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
JUNE THROUGH AUGUST 1989
SOIL TREATMENT SYSTEM
PACIFIC RENAISSANCE PLAZA
OAKLAND, CALIFORNIA

HLA Job No. 9382,040.02 PRP

Submitted on behalf of:

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October 2, 1989

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1.0 INTRODUCTION AND BACKGROUND

1.1 Introduction

This report describes the operation and monitoring of the in situ soil treatment system at the Pacific Renaissance Plaza (PRP) site in Oakland, California, for the period from August 3 to September 7, 1989, and discusses the performance of the system during the second quarter of operation, from June 6 to September 7, 1989. The PRP site, part of the Oakland Chinatown Redevelopment Project Area, is bounded by 9th, Franklin, and Webster streets and the East Bay Municipal Utility District (EBMUD) property line approximately 100 feet north of the centerline of 10th Street (Plate 1). The soil treatment system is designed to remove petroleum hydrocarbons from soil within the site boundaries before it is excavated during construction of the complex. The system began operation on March 4, 1989. Recent discussions with Pacific Renaissance Associates, the developer of the project, indicate that construction is scheduled to begin in February 1990.

This report has been prepared by Harding Lawson Associates (HLA) on behalf of the City of Oakland Redevelopment Agency (Agency). It is submitted in accordance with monitoring and reporting 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 clarified in a letter dated March 17, 1989, from HLA to the RWQCB.

1.2 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 described in the 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 analyses of soil samples collected during treatment system well installation activities. System operation and monitoring from March through July are described in *HLA 1989b through f*. The objective of the system and a description of the process are presented in *HLA 1989e*.

2.0 TREATMENT SYSTEM OPERATIONS - AUGUST 1989

System operational activities and adjustments made in August are summarized below:

- Pumps in each Extraction Well (with exception of EW-21) were reconditioned; the pumps were removed from the wells and run in a chlorine/soap bath. Flowmeters and water-level probes for each of these wells were also cleaned.

- Injection Wells IW-5, IW-6, and IW-8 were redeveloped by swabbing, bailing and pumping to increase flow. Extraction Well EW-1 was also redeveloped.

- At the west end of the system, as shown on Plate 1, two infiltration basins, designated BA-8 and BA-9, were constructed between August 10 and 12. Infiltration of recycled water with nutrients began August 12.

- A sand filter was installed on August 29 at the influent to the carbon treatment system to reduce clogging in bag filters resulting from the accumulation of microorganisms.

3.0 TREATMENT SYSTEM MONITORING - AUGUST 1989

3.1 Flow Rate, Water-Level, and Water Chemistry Monitoring

Flow rates, water levels, and water chemistry were monitored using procedures described in *HLA, 1989e*. Water samples were collected from selected extraction wells, injection wells, and monitoring wells and analyzed for inorganic and organic constituents and microbial populations. For each well, Table 1 presents the sampling frequency, analytical parameters, and EPA test methods used (for organic constituents). The sampling schedule may be modified in subsequent months in response to the operation and performance of the system.

3.2 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*). Individual injection well, infiltration basin, and extraction well flow rates from August 1 to September 6 were averaged for use as model input (Tables 2 and 3).

3.3 Confirmation Borings - Soil Sampling and Analysis

Soil samples were collected and analyzed for petroleum hydrocarbons and volatile organic constituents to assess the progress of soil treatment and to further characterize chemicals in site soils. On September 1, 1989, four confirmation borings, designated BC-9 through BC-12, were drilled and sampled (Plate 2). Drilling was performed by Bay Area Exploration, Inc., of Suisun, California, using a CME 55 hollow-stem auger rig. An HLA geologist supervised the drilling, performed health and safety monitoring, and collected samples for lithologic characterization, for field screening of volatile organic compounds (VOCs), and for chemical analyses. Soils were logged using the

Unified Classification System (USCS) and Munsell Color Index Chart. Field screening for VOCs was performed using a portable Century flame ionization organic vapor analyzer (OVA).

Soil samples were collected at 1.5-foot intervals from approximately 22 feet below ground surface (bgs) to the total depth of the borings (28 feet bgs) using a 1.5-foot long modified California split-barrel sampler lined with three 6-inch long 2.5-inch-diameter stainless steel tubes. This sampling scheme provided a 6-foot-long continuous sample core through the target zone of suspected soil contamination. The bottom tube of each sample drive was sealed on both ends with aluminum foil, plastic end caps, and electrician's tape, labeled, and placed in an ice chest for cool storage. Soil in the second tube was screened in the field for VOCs using an OVA and checked for the presence of hydrocarbon odors and evidence of staining. The remaining tube of soil was used for lithologic logging.

On the basis of results of field screening, three soil samples from Boring BC-9 and one sample from Borings BC-10, BC-11, and BC-12 were analyzed individually and one composite sample from four sample tubes from each boring was analyzed. At each boring, the individual samples submitted for analyses were those suspected to have the highest concentrations of petroleum hydrocarbons on the basis of field screening. Composite samples were prepared to assess the progress of soil treatment characteristics at a scale consistent with the planned characterization of the treatment zone during excavation. In all, six individual soil samples and four composite samples were analyzed.

All soil samples were stored on ice until delivery with completed chain of custody forms to Pace Laboratories, Inc. (Pace), of Novato, California. Soil samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline by EPA Test Method 3550/8015 and for purgeable aromatics by EPA Test Method 8020. The results of the confirmation boring soil sample analyses are discussed in Section 4.4.

4.0 RESULTS

4.1 Hydraulic Analysis - August 1 to September 6, 1989

Flow rates for wells and basins installed by HLA were calculated based on readings from the flowmeters on the wellheads. Average injection and extraction rates for August are presented in Tables 2 and 3. From August 1 to September 6, the total flow rate for all injection wells was about 26.3 gallons per minute (gpm). The flow rate for injection wells located south of 10th Street, Wells IW-1 to IW-9, was about 24.9 gpm. The average flow rate into Basins BA-1 to BA-7 was about 5.4 gpm from August 1 to September 6, and the average flow rate into Basins BA-8 and BA-9 between August 12 and September 6 was about 2.0 gpm (Table 2). All the influent to these covered basins is assumed to infiltrate. Total flow into all injection wells and infiltration basins, calculated as a monthly average, was about 33 gpm.

During this monitoring period, the total flow rate for all extraction wells was 28.0 gpm. The flow rate for Wells EW-1 through EW-20 was about 27.7 gpm, and for Well EW-21 was about 0.4 gpm (Table 3). Extraction Well EW-22 was operational, but is not equipped with a separate totalizing flowmeter. The total flow rate for all dewatering wells still in operation at the EBMUD site is estimated to be 5 gpm. The total extraction rate from PRP and EBMUD wells is estimated to be approximately 33 gpm. Thus, injection/infiltration rates and extraction rates were approximately equal in August.

Table 4 presents measurements of depth to water in monitoring wells and calculated water-level elevations from January 3 to September 6, 1989. Ground-water elevations on September 6, 1989, are shown on Plate 3 and represent conditions approximately 186 days after system startup. Contours of ground-water elevations simulated using the numerical model are also presented on Plate 3. Flow rates for the infiltration basins were included in the model input for the September 6 simulation. 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, the simulated water levels show good agreement with water-level elevations measured at monitoring wells. Plate 4 presents the results of a linear regression analysis of observed versus simulated ground-water elevations. The regression coefficient, R, is the measure of least squares best fit and was calculated to have a value of 0.97 for the September 6 results, where R = 1.00 represents a perfect match. For September 6, differences between observed and simulated elevations are generally less than 1 foot for wells outside the treatment area, with the exception of MW-10 and MW-18, which show differences of approximately 2 feet. Differences between simulated and observed ground-water elevations from the transect of wells within the treatment area (MW-15, MW-16, MW-17) were approximately 1-1/2 feet. For the other wells within the treatment area, differences are generally less than 1 foot, with the exception of Well MW-9 which differs by less than 2-1/2 feet.

Water-level contours calculated using the site model can be used to assess the hydraulic control of injected water. Simulated contours for September 6 indicate overall hydraulic control of injected water. Most injected water is recovered by the extraction wells without traveling off site. At the eastern and western ends 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 9th Street where simulations show that the capture zone of Well EW-16 extends off site. A similar situation occurs along the Franklin Street site boundary, where extraction well capture zones also extend 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 mean sea level (MSL), substantially lower than pumping levels in PRP extraction wells. These lower pumping levels induce movement of some injected water to the EBMUD wells. The discharge from these wells is collected and treated by the carbon adsorption system at the site. Because the EBMUD wells are functioning as part of the soil treatment system, the area of treatment effectively extends to the northern boundary of the site.

4.2 Distribution of Inorganic Constituents and Microbial Populations in Ground Water

Tables 5 and 6 present the inorganic chemical and microbiological analysis results for the bioremediation treatment system from startup through September 7, 1989. Nitrate concentrations in ground water at the site for the September 7 sampling round are presented on Plate 5. The September 7 average nitrate concentration within the treatment zone (Wells MW-9, MW-11, MW-15, MW-16, and MW-17) is approximately 7 times higher than the average concentrations outside the treatment zone (Wells MW-7, MW-10, MW-12 and MW-18), indicating hydraulic control of injected water. Plate 6 illustrates that hydraulic control is maintained at the western corner of the treatment system with the nitrate concentration at MW-11 (inside) significantly higher than the concentrations at MW-12 and MW-18 (outside) after start up of the system in March. Plate 6 also shows that nitrate concentrations are generally stable through the second quarter (June 6 to September 7) with average inside concentrations approximately 5 to 6 times higher than average outside concentrations. Nitrate concentrations at MW-13 and MW-14 are similar to concentrations observed at MW-15, MW-16, and MW-17 (Table 6 and Plate 7), supporting the hydraulic results that indicate movement of some injection water to the EBMUD wells. Plate 7 also

illustrates a decrease in concentrations for the early portion and an increase for the later portion of the second quarter.

Phosphate concentrations in ground water at the site for the September 7, 1989, sampling round are presented on Plate 8. The September 7 average phosphate concentration within the treatment zone is approximately 9 times higher than the average concentration outside the treatment zone. Plate 9 shows phosphate concentrations for MW-11, MW-12, and MW-18 that indicate hydraulic control at the west end of the treatment zone. Phosphate concentrations at MW-11 are generally stable at the beginning of the second quarter and increasing at the end of the quarter. Concentrations observed at MW-12 and MW-18 also follow this trend but are considerably lower. As shown on Plate 10, MW-15 and MW-16 show an increasing trend similar to that of MW-11, while MW-14 shows a slight increase in concentration similar to MW-12 and MW-18.

Plate 11 shows a time concentration plot of microbial counts of hydrocarbon utilizing bacteria for selected monitoring wells within the treatment zone that illustrates an increase in populations from system startup. The counts show a slight decreasing trend for the latter portion of the second quarter. Total microbial counts for these wells also show a slight decreasing trend during this time period (Table 6). This decrease in microbe populations may be due to conditions in the subsurface that are not conducive to optimum microbial growth. Subsurface conditions that could contribute to decreasing populations are microbial oxygen demand that exceeds available oxygen, and localized fluctuations in nutrient availability, hydrocarbon concentrations, and hydrogen peroxide.

Dissolved oxygen has been measured in samples from extraction wells during the reporting period (Table 5). From June 6 to September 7 the levels have decreased with time, with the exception of Wells EW-13, EW-18, and EW-19. These three wells

recorded the highest concentrations at >20.0 parts per million (ppm). These results indicate that hydrogen peroxide introduced at the injection wells/basins is degraded (either naturally or microbially) before reaching the extraction wells.

Ammonia concentrations have been measured in samples from selected extraction wells as presented in Table 5. Detectable concentrations were found in only six extraction wells, and at low levels (except in EW-15 and EW-19) compared to the concentrations of the injection water. Ammonia was detected in only five monitoring wells, also at generally low concentrations (except MW-9 and MW-11) compared to injection water concentrations. These results suggest that ammonia is being retarded or utilized, or both, close to the injection wells.

4.3 Distribution of Petroleum Hydrocarbons in Ground Water

Results of organic analyses of ground-water samples are presented in Table 7. Laboratory data sheets are presented in Appendix A. Petroleum hydrocarbon concentrations as TPH (gasoline) for the September 6-7 sampling round are presented on Plate 12.

Reported TPH values from Monitoring Wells MW-10, MW-11, and MW-14 within the treatment area are higher for the September round than for the August sampling round results. Reported TPH values for the September round for remaining wells are similar to or less than values for August. TPH values in samples from the transect wells, MW-15, MW-16, and MW-17, showed substantial declines from August to September. Petroleum hydrocarbons as TPH were not detected at MW-12 and MW-18, located west of the treatment area, or at MW-13, located north of the ring of extraction wells. For the second quarter, selected monitoring wells show increased (MW-10, MW-11) or decreased (MW-12) TPH concentrations while most wells show variable concentrations.

TPH values in ground-water samples from Extraction Wells EW-15, EW-16, and EW-19 increased from the August to the September rounds, while concentrations in samples from EW-1, EW-4, EW-8, EW-12, and EW-21 remained stable or decreased. Well EW-15 and others in the vicinity of EW-15 were checked for the presence of a separate liquid phase. No occurrences of separate liquid phases were observed. For the quarter, EW-21 shows a decrease, EW-8 and EW-14 show increases, and remaining extraction wells show stable or variable concentrations.

4.4 Confirmation Borings

Lithologic characterization of soils from confirmation borings indicate geologic materials similar to those observed and characterized during previous soil boring and well installation activities at the site, as described in *HLA 1988 and 1989b.* Predominantly yellowish brown and olive-brown silty sands (SM), poorly graded sands (SP), and clayey sands (SC) were encountered to the total depths of the borings.

Results of OVA headspace and laboratory analysis of soil samples from the confirmation borings are presented in Table 8. Locations of confirmation borings and previous HLA borings are shown on Plate 2. Laboratory data sheets are presented in Appendix B.

Petroleum hydrocarbons were detected in each of the 10 soil samples analyzed from confirmation borings. Five of the confirmation boring samples had TPH concentrations greater than 1,000 milligrams per kilogram (mg/kg), and four samples had TPH concentrations less than 100 mg/kg. Highest measured TPH (as gasoline) concentrations were in the 24.5-25 foot sample from Confirmation Boring BC-10, measured at 5,200 mg/kg, and in the 24.5-25 foot sample from BC-9, measured at 3,700 mg/kg. No samples from BC-11 and BC-12 showed TPH values greater than 100 mg/kg.

Results of soil analysis also indicate that within the area of highest levels of petroleum hydrocarbons at BC-9 and BC-10, there is significant variability in hydrocarbon concentrations. TPH values measured in three individual samples from Boring BC-9 ranged from 710 to 3700 mg/kg, reflecting variations over a vertical distance of approximately 4 feet.

The following EPA Test Method 8020 compounds were detected in confirmation boring soil samples: benzene, toluene, ethylbenzene, and xylenes (BTEX). The maximum concentrations of these compounds were measured in the 24.5-25 foot sample from Boring BC-10 at 58 mg/kg benzene, 380 mg/kg toluene, 120 mg/kg ethylbenzene, and 590 mg/kg xylenes. In general, high concentrations of BTEX compounds correlate with high TPH values.

5.0 ACTIVITIES PLANNED FOR SEPTEMBER THROUGH NOVEMBER 1989

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

Monitoring of water levels, flow rates, and inorganic and organic constituent concentrations will continue.

To increase the flow of nutrient-enriched water in selected areas, one infiltration basin will be installed adjacent to 10th Street and near the corner of Franklin Street, and three injection wells will be installed along 9th Street. Basins and wells will be equipped with individual flow meters to monitor infiltration and injection rates.

Additional confirmation soil samples will be collected to assess the progress of soil treatment. Borings will be drilled and samples collected, screened in the field for volatile organic components, and submitted to a state-certified laboratory for TPH and BTEX analyses.

6.0 REFERENCES

Harding Lawson Associates, 1988. *Site Characterization, Pacific Renaissance Plaza, Chinatown Redevelopment Project Area, Oakland, California.* December 22.

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Harding Lawson Associates, 1989c. *Report of System Monitoring: April 1989, Soil Treatment System, Pacific Renaissance Plaza, Oakland, California.* May 31.

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Harding Lawson Associates, 1989e. *Report of System Monitoring: June 1989, Soil Treatment System, Pacific Renaissance Plaza, Oakland, California.* August 2.

Harding Lawson Associates, 1989f. *Report of System Monitoring: July 1989, Soil Treatment System, Pacific Renaissance Plaza, Oakland, California.* September 5.

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

Harding Lawson Associates

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	B	B	B	--	--	--	--	--	--
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	B	B	B	--	--	--	M	M	M
EW-1	D	M	M	M	M	--	M	M	--	M
EW-2	D	--	--	--	--	--	M	--	--	--
EW-3	D	--	--	--	--	--	M	--	--	--
EW-4	D	B	B	B	B	--	M	M	--	M
EW-5	D	--	--	--	--	--	--	--	--	--

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

Harding Lawson Associates

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	--	--	--	--	--	--	--	--	--
EW-7	D	--	--	--	--	--	--	--	--	--
EW-8	D	B	B	B	B	--	M	M	--	M
EW-9	D	--	--	--	--	--	--	--	--	--
EW-10	D	M	M	M	M	--	M	M	--	M
EW-11	D	M	M	M	M	--	M	M	--	M
EW-12	D	B	B	B	B	--	M	M	--	M
EW-13	D	M	M	M	M	--	M	M	--	M
EW-14	D	M	M	M	M	--	M	M	--	M
EW-15	D	M	M	M	M	--	M	M	--	M
EW-16	D	B	B	B	B	--	M	M	--	M
EW-17	D	--	--	--	--	--	--	--	--	--
EW-18	D	--	--	--	--	--	--	--	--	--
EW-19	D	B	B	B	B	--	M	M	--	M
EW-20	D	--	--	--	--	--	--	--	--	--
EW-21	D	B	B	B	B	--	M	M	--	M
EW-22	D	--	--	--	--	--	--	--	--	--

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

Harding Lawson Associates

Sampling Station	Flow/Water Levels	Measurement/Analysis								
		Nitrate	Ammonia	Phosphate	Microbial Enumeration	Dissolved Iron	Dissolved Oxygen	EPA 8015 (TPH)	EPA 8010	EPA 8020 (BTEX)
Monitoring Wells										
MW-2	W	--	--	--	--	--	--	--	--	--
MW-3	W	--	--	--	--	--	--	--	--	--
MW-5	W	M	M	M	--	--	--	M	--	M
MW-6	W	--	--	--	--	--	--	--	--	--
MW-7	W	M	M	M	--	--	--	M	--	M
MW-8	W	--	--	--	--	--	--	--	--	--
MW-9	W	B	B	B	--	--	--	M	--	M
MW-10	W	B	B	B	--	--	--	M	--	M
MW-11	W	B	B	B	B	--	--	M	--	M
MW-12	W	B	B	B	--	--	--	M	--	M
MW-13	W	B	B	B	--	--	--	M	--	M
MW-14	W	B	B	B	M	--	--	M	--	M
MW-15	D	B	B	B	M	--	--	M	--	M
MW-16	D	B	B	B	B	--	--	M	--	M
MW-17	D	B	B	B	B	--	--	M	--	M
MW-18	W	B	B	B	--	--	--	M	--	M

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

Table 2. Injection Well and Infiltration Basin Flow Rates - August, 1989

Injection Well Flow Rates

Meter No.	06-Sep-89 Totalizer Reading	01-Aug-89 Totalizer Reading	Elapsed Time (min)	Average Flow Rate (gpm)
IW-1	1076181	820225	52025	4.92
IW-2	989073	789676	52025	3.83
IW-3	769521	628936	52025	2.70
IW-4	914649	686765	52025	4.38
IW-5	282868	224970	52025	1.11
IW-6	517570	461247	52025	1.08
IW-7	1106911	928019	52025	3.44
IW-8	425123	352349	52025	1.40
IW-9	613648	509705	52025	2.00
IW-10	97757	94359	52025	0.07
IW-11	347258	276527	52025	1.36
Total (1-9)	6695544	5401892	52025	24.87
Total (10,11)	445015	370886	52025	1.42
Total (1-11)	7140559	5772778	52025	26.29

Note: Totalizer readings in gallons.

Infiltration Basin Flow Rates

Meter No.	06-Sep-89 Totalizer Reading	01-Aug-89 Totalizer Reading	Elapsed Time (min)	Average Flow Rate (gpm)
BA-1	109875	54060	52150	1.07
BA-2	43262	19527	52150	0.46
BA-3	88873	50084	52150	0.74
BA-4	56265	22603	52150	0.65
BA-5	133223	39687	52150	1.79
BA-6	2909	2909	52150	0.00
BA-7	58806	25307	52150	0.64
BA-8*	45854	10	35845	1.28
BA-9*	24342	10	35845	0.68
Total (1-7)	493213	214177	52150	5.35
Total (8,9)	70196	20	35845	1.96
Total (1-9)	563409	214197	52150	6.70

Note: Totalizer readings in gallons.

*:Basins operational as of 08-Sep-89

Table 3. Extraction Well Flow Rates - August 1989

Meter No.	06-Sep-89 Totalizer Reading	01-Aug-89 Totalizer Reading	Elapsed Time (min)	Average Flow Rate (gpm)
EW-1	229530	171502	52030	1.12
EW-2	235937	194644	52030	0.79
EW-3	383128	271055	52030	2.15
EW-4	292454	225571	52030	1.29
EW-5	356371	280615	52030	1.46
EW-6	140843	113935	52030	0.52
EW-7	121313	106593	52030	0.28
EW-8	254670	190083	52030	1.24
EW-9	265436	198026	52030	1.30
EW-10	247334	189951	52030	1.10
EW-11	231801	174149	52030	1.11
EW-12	191442	148233	52030	0.83
EW-13	222575	174296	52030	0.93
EW-14	236355	168168	52030	1.31
EW-15	381985	255930	52030	2.42
EW-16	643590	528095	52030	2.22
EW-17	543645	413837	52030	2.49
EW-18	600011	486105	52030	2.19
EW-19	407275	301059	52030	2.04
EW-20	199360	153293	52030	0.89
EW-21	52585	34151	52030	0.35
EW-22 *			52030	0.00
Total (1-20)	6185055	4745140	52030	27.67
Total (21-22)*	52585	34151	52030	0.35
Total (1-22)	6237640	4779291	52030	28.03

Note: Totalizer readings in gallons.
* Well EW-22 is not equipped with a totalizing flow meter.

Table 4. Water-Level Elevations - January through August 1989

Well No.	MW-2		MW-3		MW-5		MW-6		MW-7		MW-8		MW-9	
	GROUND SURFACE 40.05	TOP OF CASING 39.55	GROUND SURFACE 39.02	TOP OF CASING 38.35	GROUND SURFACE 38.45	TOP OF CASING 37.86	GROUND SURFACE 39.95	TOP OF CASING 39.59	GROUND SURFACE 39.35	TOP OF CASING 39.10	GROUND SURFACE 40.63	TOP OF CASING 40.47	GROUND SURFACE 38.65	TOP OF CASING 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
14-Jun-89	27.58	11.97	26.00	12.35	25.52	12.34	26.88	12.71	28.09	11.01	29.20	11.27	20.53	17.97
19-Jun-89	-	-	-	-	-	-	-	-	-	-	-	-	20.31	18.19
28-Jun-89	-	-	27.88	10.47	25.39	12.47	-	-	-	-	-	-	21.26	17.24
05-Jul-89	27.34	12.21	25.92	12.43	25.50	12.36	26.66	12.93	27.68	11.42	28.99	11.48	21.88	16.62
21-Jul-89	-	-	24.73	13.62	25.44	12.42	-	-	27.60	11.50	-	-	21.39	17.11
28-Jul-89	-	-	-	-	-	-	-	-	-	-	-	-	21.36	17.14
01-Aug-89	27.22	12.33	26.67	11.68	25.36	12.50	26.61	12.98	27.44	11.66	28.79	11.68	21.60	16.90
09-Aug-89	27.18	12.37	25.91	12.44	25.36	12.50	26.57	13.02	27.40	11.70	28.74	11.73	21.66	16.84
15-Aug-89	27.24	12.31	25.95	12.40	25.48	12.38	27.63	11.96	27.62	11.48	28.79	11.68	21.80	16.70
30-Aug-89	27.21	12.34	-	-	25.69	12.17	26.60	12.99	27.52	11.58	28.66	11.81	22.98	15.52
06-Sep-89	27.22	12.33	25.93	12.42	25.55	12.31	26.61	12.98	27.38	11.72	28.77	11.70	21.97	16.53

Notes:

Elevations are in feet above mean sea level (MSL).
Depth to water in feet measured from top of casing.

Table 4. Water-Level Elevations - January through August 19

Well No.	MW-17		MW-18	
	GROUND SURFACE 39.16	TOP OF CASING 40.16	GROUND SURFACE 36.56	TOP OF CASING 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
14-Jun-89	20.44	19.72	25.89	9.99
19-Jun-89	19.72	20.44	25.91	9.97
28-Jun-89	20.89	19.27	25.76	10.12
05-Jul-89	21.56	18.60	25.68	10.20
21-Jul-89	21.52	18.64	25.58	10.30
28-Jul-89	20.25	19.91	-	-
01-Aug-89	21.15	19.01	25.32	10.56
09-Aug-89	21.59	18.57	25.31	10.57
15-Aug-89	21.21	18.95	25.49	10.39
30-Aug-89	23.24	16.92	25.37	10.51
06-Sep-89	22.75	17.41	25.24	10.64

Notes:

Elevations are in feet above mean sea level (MSL).
Depth to water in feet measured from top of casing.

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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	4.6E+2
	05-Jun-89	25.9	ND	14.5	NT	ND	NT	NT
	14-Jun-89	17.6	2.3	12.6	NT	ND	NT	NT
	20-Jun-89	NT	NT	19.3	NT	NT	NT	NT
	27-Jun-89	52.8	NT	16.5	NT	NT	NT	NT
	06-Jul-89	47.3	4.0	13.3	NT	ND	9.3E+5	7.0E+3
	22-Jul-89	33.0	6.7	NT	NT	ND	NT	NT
	03-Aug-89	46.2	7.8	NT	NT	ND	NT	NT
	07-Sep-89	63.8	14.5	17.7	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
	14-Jun-89	NT	NT	15.6	NT	NT	NT	NT
	20-Jun-89	NT	NT	19.6	NT	NT	NT	NT
	27-Jun-89	NT	NT	18.9	NT	NT	NT	NT
	06-Jul-89	NT	NT	16.5	NT	NT	NT	NT
	21-Jul-89	NT	NT	16.5	NT	NT	NT	NT
	07-Sep-89	NT	NT	>20.0	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
	14-Jun-89	NT	NT	>20.0	NT	NT	NT	NT
	20-Jun-89	NT	NT	19.7	NT	NT	NT	NT
	27-Jun-89	NT	NT	NT	NT	NT	NT	NT
	06-Jul-89	NT	NT	14.0	NT	NT	NT	NT
	21-Jul-89	NT	NT	>20.0	NT	NT	NT	NT
	07-Sep-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

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-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	NT	NT
	14-Jun-89	39.6	15.0	16.9	NT	ND	NT	NT
	20-Jun-89	NT	NT	>20.0	NT	NT	NT	NT
	27-Jun-89	55.0	15.5	15.6	NT	0.5	NT	NT
	06-Jul-89	36.4	16.4	10.7	NT	0.6	2.3E+6	4.9E+4
	22-Jul-89	33.7	18.3	NT	NT	0.8	6.4E+5	4.9E+4
	03-Aug-89	46.2	25.5	NT	NT	3.1	1.5E+7	1.2E+3
	17-Aug-89	49.5	20.0	NT	NT	1.3	2.9E+6	5.4E+3
	07-Sep-89	29.7	20.0	4.3	NT	2.9	--	--
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
	14-Jun-89	NT	NT	19.1	NT	NT	NT	NT
	20-Jun-89	NT	NT	NT	NT	NT	NT	NT
	27-Jun-89	NT	NT	15.3	NT	NT	NT	NT
	06-Jul-89	NT	NT	12.8	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
	14-Jun-89	NT	NT	16.0	NT	NT	NT	NT
	20-Jun-89	NT	NT	NT	NT	NT	NT	NT
	27-Jun-89	NT	NT	16.4	NT	NT	NT	NT
	06-Jul-89	NT	NT	13.5	NT	NT	NT	NT
	07-Sep-89	42.9	15.5	4.6	NT	ND	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
	14-Jun-89	NT	NT	17.4	NT	NT	NT	NT
	20-Jun-89	NT	NT	15.9	NT	NT	NT	NT
	27-Jun-89	NT	NT	12.9	NT	NT	NT	NT
	06-Jul-89	NT	NT	14.8	NT	NT	NT	NT

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

Harding Lawson Associates

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)
	07-Sep-89	53.9	22.0	14.8	NT	1.1	--	--
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	6.4E+6	1.6E+5
	14-Jun-89	48.4	15.8	18.2	NT	2.0	9.2E+6	2.4E+5
	20-Jun-89	NT	NT	>20.0	NT	NT	NT	NT
	27-Jun-89	NT	NT	18.5	NT	NT	NT	NT
	06-Jul-89	52.8	25.7	19.3	NT	2.5	4.9E+6	1.7E+5
	22-Jul-89	30.4	33.8	NT	NT	3.4	2.4E+6	2.4E+4
	03-Aug-89	50.6	33.8	NT	NT	4.0	3.3E+5	1.8E+3
	07-Sep-89	56.8	85.8	>20.0	NT	7.2	--	--
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
	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	1.8E+6	2.2E+3
	14-Jun-89	29.7	13.3	11.8	NT	ND	3.7E+7	2.4E+5
	20-Jun-89	8.8	13.5	15.8	NT	ND	2.0E+7	3.5E+4
	27-Jun-89	42.9	13.3	19.7	NT	ND	9.5E+5	2.4E+5
	06-Jul-89	55.0	16.0	15.8	NT	ND	9.1E+6	1.1E+5
	22-Jul-89	23.8	18.3	NT	NT	1.4	NT	NT
	03-Aug-89	42.9	20.0	NT	NT	2.1	NT	NT
	17-Aug-89	52.8	25.6	NT	NT	2.3	8.0E+5	3.1E+3
	07-Sep-89	55.0	25.0	18.8	NT	1.3	--	--
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

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

Harding Lawson Associates

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)
	05-Jun-89	52.8	13.2	18.2	NT	ND	NT	NT
	14-Jun-89	45.1	14.2	17.0	NT	ND	NT	NT
	20-Jun-89	NT	NT	18.5	NT	NT	NT	NT
	27-Jun-89	NT	NT	16.1	NT	NT	NT	NT
	06-Jul-89	NT	NT	16.4	NT	NT	NT	NT
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	NT	8.0	NT	ND	NT	NT
	23-May-89	37.0	NT	17.8	NT	ND	7.0E+5	NT
	31-May-89	46.2	NT	17.8	NT	ND	5.4E+6	1.7E+3
	05-Jun-89	NT	NT	19.1	NT	NT	NT	NT
	14-Jun-89	42.9	NT	14.5	NT	ND	NT	NT
	20-Jun-89	NT	NT	>20.0	NT	NT	NT	NT
	27-Jun-89	NT	NT	>20.0	NT	NT	NT	NT
	06-Jul-89	NT	NT	>20.0	NT	NT	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	7.9E+5	1.1E+4
	14-Jun-89	NT	NT	>20.0	NT	NT	NT	NT
	20-Jun-89	NT	NT	>20.0	NT	NT	NT	NT
	27-Jun-89	NT	NT	19.5	NT	NT	NT	NT
	06-Jul-89	56.8	8.5	>20.0	NT	ND	2.5E+6	1.6E+6
	22-Jul-89	44.0	11.0	NT	NT	ND	NT	NT
	03-Aug-89	46.9	16.0	NT	NT	ND	NT	NT
	17-Aug-89	61.6	17.2	NT	NT	NT	2.9E+4	1.7E+3
	07-Sep-89	61.6	24.6	>20.0	NT	>20.0	--	--
EW-20								
	14-Jun-89	NT	NT	19.1	NT	NT	NT	NT
	20-Jun-89	NT	NT	17.9	NT	NT	NT	NT
	27-Jun-89	NT	NT	17.5	NT	NT	NT	NT
	06-Jul-89	NT	NT	16.7	NT	NT	NT	NT
EW-21								
	23-May-89	NT	NT	NT	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)
	31-May-89	17.6	5.0	NT	NT	ND	3.7E+4	2.4E+4
	05-Jun-89	17.6	1.3	NT	NT	ND	9.3E+4	7.9E+3
	14-Jun-89	26.0	1.0	NT	NT	ND	5.8E+4	2.4E+4
	20-Jun-89	29.0	0.8	NT	NT	ND	1.5E+5	7.0E+3
	27-Jun-89	27.1	0.8	NT	NT	ND	NT	NT
	06-Jul-89	43.6	0.5	NT	NT	ND	NT	NT
	22-Jul-89	26.8	0.5	NT	NT	ND	NT	NT
	03-Aug-89	26.8	0.5	NT	NT	ND	NT	NT
	17-Aug-89	48.0	3.0	NT	NT	ND	2.9E+4	1.7E+3
	07-Sep-89	23.8	7.8	9.0	NT	ND	--	--
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
	20-Jun-89	35.9	35.0	NT	NT	8.8	NT	NT
	27-Jun-89	26.4	29.0	NT	NT	9.8	NT	NT
	06-Jul-89	34.8	42.5	NT	NT	9.4	NT	NT
	22-Jul-89	23.8	42.5	NT	NT	10.2	NT	NT
	03-Aug-89	23.8	38.5	NT	NT	10.2	NT	NT
	17-Aug-89	17.6	80.0	NT	NT	16.0	NT	NT
	07-Sep-89	35.0	50.0	NT	NT	10.9	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
	20-Jun-89	27.1	14.0	NT	NT	ND	NT	NT
	27-Jun-89	50.6	13.6	NT	NT	ND	NT	NT
	06-Jul-89	66.0	16.6	NT	NT	0.5	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)
	22-Jul-89	37.4	18.0	NT	NT	0.8	NT	NT
	03-Aug-89	48.4	21.4	NT	NT	1.4	NT	NT
	17-Aug-89	39.6	NT	NT	NT	1.7	NT	NT
	07-Sep-89	NT	NT	NT	NT	NT	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

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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
	06-Jul-89	NT	2.5	1.7	NT	ND	NT	NT
MW-7								
	06-Jun-89	ND	4.8	1.8	NT	ND	NT	NT
	06-Jul-89	ND	ND	1.8	NT	ND	NT	NT
	22-Jul-89	ND	0.5	NT	NT	ND	NT	NT
	03-Aug-89	ND	3.3	NT	NT	ND	NT	NT
	07-Sep-89	ND	9.0	NT	NT	ND	NT	NT
MW-8								
	06-Jun-89	NT	NT	4.2	NT	NT	NT	NT
	06-Jul-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	NT	10.8	NT	NT
	14-Jun-89	63.8	14.0	13.9	NT	3.3	NT	NT
	06-Jul-89	56.8	30.0	NT	NT	NT	NT	NT
	22-Jul-89	37.4	29.0	NT	NT	4.4	NT	NT
	03-Aug-89	38.5	25.0	NT	NT	5.5	NT	NT
	17-Aug-89	74.4	20.0	NT	NT	3.9	NT	NT
	07-Sep-89	83.6	39.0	NT	NT	6.6	NT	NT
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

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)
	06-Jun-89	17.6	2.3	2.0	NT	ND	NT	NT
	14-Jun-89	23.1	ND	2.1	NT	NT	NT	NT
	06-Jul-89	20.9	ND	NT	NT	NT	NT	NT
	22-Jul-89	17.6	0.5	NT	NT	ND	NT	NT
	03-Aug-89	23.8	ND	NT	NT	ND	NT	NT
	17-Aug-89	16.5	1.3	NT	NT	ND	NT	NT
	07-Sep-89	18.0	1.5	NT	NT	ND	NT	NT
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
	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
	06-Jun-89	66.0	33.0	NT	NT	ND	5.0E+6	2.8E+4
	14-Jun-89	52.8	25.7	14.9	NT	0.5	1.2E+7	2.4E+5
	20-Jun-89	61.6	24.8	12.8	NT	0.9	7.1E+6	1.1E+4
	06-Jul-89	56.8	32.8	NT	NT	NT	8.5E+6	5.4E+5
	22-Jul-89	33.0	27.2	NT	NT	9.6	NT	NT
	03-Aug-89	52.8	19.1	NT	NT	4.3	1.9E+5	1.1E+4
	17-Aug-89	58.3	38.9	NT	NT	5.8	1.1E+6	1.8E+4
	07-Sep-89	61.6	47.2	NT	NT	7.4	--	--
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
	06-Jun-89	9.2	2.8	NT	NT	ND	NT	NT
	20-Jun-89	8.4	1.0	4.0	NT	ND	NT	NT
	06-Jul-89	4.8	ND	NT	NT	NT	NT	NT
	22-Jul-89	5.3	0.5	NT	NT	ND	NT	NT
	03-Aug-89	7.7	0.5	NT	NT	ND	NT	NT

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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)
	17-Aug-89	2.0	1.3	NT	NT	ND	NT	NT
	07-Sep-89	4.5	4.8	NT	NT	ND	NT	NT
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
	06-Jun-89	40.5	3.0	NT	NT	ND	NT	NT
	27-Jun-89	57.2	0.8	18.5	NT	ND	5.9E+5	1.1E+3
	06-Jul-89	36.5	ND	NT	NT	NT	5.6E+5	7.8E+2
	22-Jul-89	33.1	0.5	NT	NT	ND	NT	NT
	03-Aug-89	56.3	3.0	NT	NT	ND	NT	NT
	17-Aug-89	47.4	4.3	NT	NT	ND	NT	NT
	07-Sep-89	59.8	10.0	NT	NT	ND	NT	NT
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
	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
	06-Jun-89	44.7	2.0	NT	NT	ND	NT	NT
	27-Jun-89	48.4	0.8	12.0	NT	ND	1.1E+6	2.4E+5
	06-Jul-89	22.5	ND	NT	NT	NT	2.5E+6	2.4E+5
	22-Jul-89	33.4	0.5	NT	NT	ND	3.8E+6	9.5E+3
	03-Aug-89	38.7	3.0	NT	NT	ND	NT	NT
	17-Aug-89	35.2	4.3	NT	NT	ND	NT	NT
	07-Sep-89	59.8	7.5	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

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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)
	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
	06-Jun-89	53.9	2.5	NT	NT	ND	NT	NT
	06-Jul-89	46.9	7.5	NT	NT	ND	3.8E+6	3.3E+4
	22-Jul-89	28.2	10.3	NT	NT	ND	1.7E+6	2.2E+3
	03-Aug-89	38.5	10.8	NT	NT	ND	NT	NT
	17-Aug-89	70.4	18.6	NT	NT	ND	NT	NT
	07-Sep-89	56.8	29.0	NT	NT	1.6	--	--
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
	06-Jun-89	43.6	18.2	NT	NT	ND	4.0E+6	2.8E+4
	20-Jun-89	61.6	7.6	5.3	NT	ND	1.1E+7	5.4E+4
	06-Jul-89	55.4	23.1	NT	NT	1.5	5.7E+6	4.9E+4
	22-Jul-89	55.0	10.7	NT	NT	ND	NT	NT
	03-Aug-89	45.8	10.0	NT	NT	1.3	1.1E+5	1.8E+3
	17-Aug-89	74.8	19.0	NT	NT	1.5	8.1E+5	1.4E+4
	07-Sep-89	61.6	52.1	NT	NT	3.7	--	--
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
	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

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)
	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
	06-Jun-89	46.2	16.0	NT	NT	ND	3.0E+6	3.5E+4
	14-Jun-89	42.9	18.0	15.4	NT	ND	3.0E+6	4.3E+4
	27-Jun-89	56.8	11.0	NT	NT	ND	1.1E+7	9.2E+4
	06-Jul-89	50.6	13.0	NT	NT	ND	7.2E+6	1.1E+5
	22-Jul-89	45.8	20.0	NT	NT	ND	7.3E+5	7.9E+4
	03-Aug-89	70.4	14.0	NT	NT	1.0	8.3E+4	1.3E+3
	17-Aug-89	63.8	20.0	NT	NT	1.7	2.3E+5	9.2E+3
	07-Sep-89	79.2	32.0	NT	NT	1.4	--	--
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
	06-Jun-89	17.1	1.3	NT	NT	ND	NT	NT
	27-Jun-89	8.8	0.8	NT	NT	ND	NT	NT
	06-Jul-89	15.7	ND	NT	NT	NT	NT	NT
	22-Jul-89	17.2	0.5	NT	NT	ND	NT	NT
	03-Aug-89	11.0	0.5	NT	NT	ND	NT	NT
	17-Aug-89	16.5	1.3	NT	NT	ND	NT	NT
	07-Sep-89	15.0	3.0	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.
* : 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.

Harding Lawson Associates

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)	0.0005/0.0002 *		0.0005/0.0002 *		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
	07-Jul-89	0.0002	0.001	0.00034	0.0059	0.56
	02-Aug-89	ND	0.0015	0.0054	0.0059	0.7
	07-Sep-89	ND	ND	ND	0.0015	0.59
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
	06-Jul-89	0.16	0.084	0.052	1.8	5.2
	02-Aug-89	0.032	0.034	0.012	1.6	4.9
	06-Sep-89	0.007	0.022	ND	0.36	1.5
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
	06-Jul-89	2.0	2.2	0.54	1.8	12
	02-Aug-89 @	8.8/8.6	1.7/1.7	0.36/0.34	1.5/1.5	19/20
	06-Sep-89 @	8.1/11	5.2/6.3	0.82/0.93	5.5/6.1	36/34
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
	06-Jul-89 @	2.1/2.3	2.5/2.8	0.14/0.16	2.6/3.0	15/15
	02-Aug-89	7.2	7.5	0.26	7.1	37
	06-Sep-89	5.0	6.5	0.41	5.2	47
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	0.003	ND	0.0063	0.10
	07-Jun-89	0.034	0.0037	ND	0.012	0.18

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)	0.0005/0.0002 *		0.0005/0.0002 *		0.25/0.05**
	06-Jul-89	0.029	0.0025	ND	0.0059	0.12
	02-Aug-89	0.023	0.002	ND	0.005	ND
	07-Sep-89 a	0.051/0.059	0.0016/0.002	ND/ND	0.0049/0.0058	ND/ND
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
	06-Jul-89	0.210	0.054	0.013	0.109	0.76
	02-Aug-89	0.098	0.011	0.0005	0.031	0.27
	07-Sep-89	0.039	0.0020	ND	0.0050	ND
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 a	0.057/ND	0.0022/ND	0.0005/ND	0.043/ND	1.1/0.64
	06-Jul-89	3.0	1.7	0.050	3.6	14
	01-Aug-89	0.49	0.084	ND	0.84	4.5
	06-Sep-89	1.0	0.090	ND	1.4	4.9
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
	05-Jul-89	2.0	3.0	0.26	2.0	12
	03-Aug-89	2.6	2.8	0.75	3.8	24
	06-Sep-89	1.1	1.4	0.23	1.3	7.3
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
	05-Jul-89	1.9	2.7	1.8	4.5	16
	03-Aug-89 a	1.8/1.9	2.6/2.6	0.18/0.19	5.7/6.0	17/17
	06-Sep-89	0.96	3.3	0.26	1.3	8.9
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
	05-Jul-89	3.0	3.3	2.7	3.9	18
	02-Aug-89	4.8	9.5	0.63	14	47

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)	0.0005/0.0002 *		0.0005/0.0002 *		0.25/0.05**
	03-Aug-89	5.1	6.1	0.73	12	NT
	06-Sep-89	2.8	4.5	0.32	8.4	21
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
	06-Jul-89	ND	ND	ND	ND	ND
	02-Aug-89	ND	ND	ND	ND	ND
	06-Sep-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
	05-Jul-89	4.4	5.1	0.32	3.8	24
	02-Aug-89	3.1	4.0	0.4	2.9	23
	06-Sep-89	3.0	3.7	0.26	3.0	11
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
	05-Jul-89	0.29	0.15	0.021	1.2	4.3
	02-Aug-89	0.23	0.1	0.023	1.1	6.3
	06-Sep-89	0.17	0.03	LT 0.0005	0.80	3.0
EW-7						
	05-Jul-89	18	16	0.67	10	74
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
	05-Jul-89	3.3	2.9	0.22	3.1	19
	02-Aug-89	5.7	5.6	0.33	5.8	37
	06-Sep-89	5.7	5.5	0.19	10	38
EW-10						
	07-Sep-89	8.1	7.4	0.80	9.2	42
EW-11						
	07-Sep-89	7.7	8.0	0.52	5.3	25
EW-12						
	01-May-89	1.8	0.66	0.048	0.62	3.6
	05-Jun-89	25	20	0.8	11	71
	05-Jul-89	5.2	5.6	0.38	3.4	25

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)	0.0005/0.0002 *		0.0005/0.0002 *		0.25/0.05**
	02-Aug-89	4.5	5.4	0.39	3.3	25
	07-Sep-89	2.2	1.8	0.059	2.2	9.9
EW-13						
	19-Apr-89	0.068	0.0064	ND	0.20	0.79
	07-Sep-89	3.3	3.2	1.8	0.026	15
EW-14						
	05-Jul-89	1.8	1.7	0.08	1.1	8.7
	07-Sep-89	4.1	3.5	0.20	3.7	16
EW-15						
	19-Apr-89 #	13080	61000	16000	140000	660000
	05-Jul-89	2.0	2.8	0.26	2.9	19
	02-Aug-89	1.7	3.4	0.68	2.5	15
	07-Sep-89	8.4	7.6	0.20	6.3	37
EW-16						
	04-Apr-89 a	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
	05-Jul-89	2.8	3.6	0.28	1.8	16
	02-Aug-89	1.1	1.2	0.86	1.2	6.6
	07-Sep-89	2.6	2.7	0.21	1.9	11
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
	05-Jul-89 a	2.2/1.4	0.62/0.71	0.041/0.043	0.72/0.8	4.8/5.3
	02-Aug-89	1.7	1.1	0.039	0.95	7.4
	07-Sep-89	2.5	2.1	0.15	1.5	9.1
EW-21						
	05-Jun-89	ND	ND	ND	0.3	3.2
	05-Jul-89	0.0026	0.015	0.017	0.095	1.1
	02-Aug-89	0.0027	0.012	0.0054	0.031	0.48
	07-Sep-89	0.0060	0.0095	0.0020	0.0026	0.34
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
	06-Jul-89	ND	ND	ND	ND	ND
	01-Aug-89	ND	ND	ND	ND	ND
	02-Aug-89	ND	ND	ND	ND	ND
	03-Aug-89	ND	ND	ND	ND	ND
	06-Sep-89	ND	ND	ND	ND	ND

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)	0.0005/0.0002 *		0.0005/0.0002 *		0.25/0.05**
	07-Sep-89	ND	ND	ND	ND	ND

NOTES:

LOD: Limit of Detection.
ND: Not detected at or above LOD.
NT: Not tested.
*: LOD Changed to 0.0002 on 01-May-89
**: LOD Changed to 0.05 on 01-May-89
@: Two values indicate results of duplicate analyses.
LT: Less Than
#: Free product observed in well.
Organic constituents reported in milligrams per liter.
Analyses performed by PACE Laboratories, Inc.

Table 8. Results of Organic Chemical Analyses of Soil Samples from Confirmation Borings

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

LOCATION		DEPTH (ft)	OVA HEADSPACE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES, TOTAL	TPH as GASOLINE
LOD		(mg/kg)		0.005	0.005	0.005	0.005	1.0
CONFIRMATION BORINGS								
BC-9	*	23-23.5	>1000	4.4	56	19	130	710
9/1/89	*	24-24.5	800	NT	NT	NT	NT	NT
	*	24.5-25	>1000	20	220	69	660	3700
	*	25.5-26	>1000	NT	NT	NT	NT	NT
		26.5-27	>1000	13	110	36	200	1200
		Composite		33	180	82	310	2800
BC-10	*	23-23.5	>1000	NT	NT	NT	NT	NT
9/1/89	*	24-24.5	800	NT	NT	NT	NT	NT
	*	24.5-25	720	58	380	120	590	5200
	*	25.5-26	>1000	NT	NT	NT	NT	NT
		Composite		14	75	37	130	1300
BC-11	*	23-23.5	220	NT	NT	NT	NT	NT
9/1/89	*	24-24.5	260	NT	NT	NT	NT	NT
	*	24.5-25	>1000	1.4	3.7	1.6	11	81
	*	25.5-26	>1000	NT	NT	NT	NT	NT
		Composite		0.65	2.3	1.1	7.2	45
BC-12	*	23-23.5	200	NT	NT	NT	NT	NT
9/1/89	*	24-24.5	5	NT	NT	NT	NT	NT
	*	24.5-25	140	0.027	0.020	0.012	0.32	1.9
	*	25.5-26	>1000	NT	NT	NT	NT	NT
		Composite		0.26	0.89	0.35	2.3	18

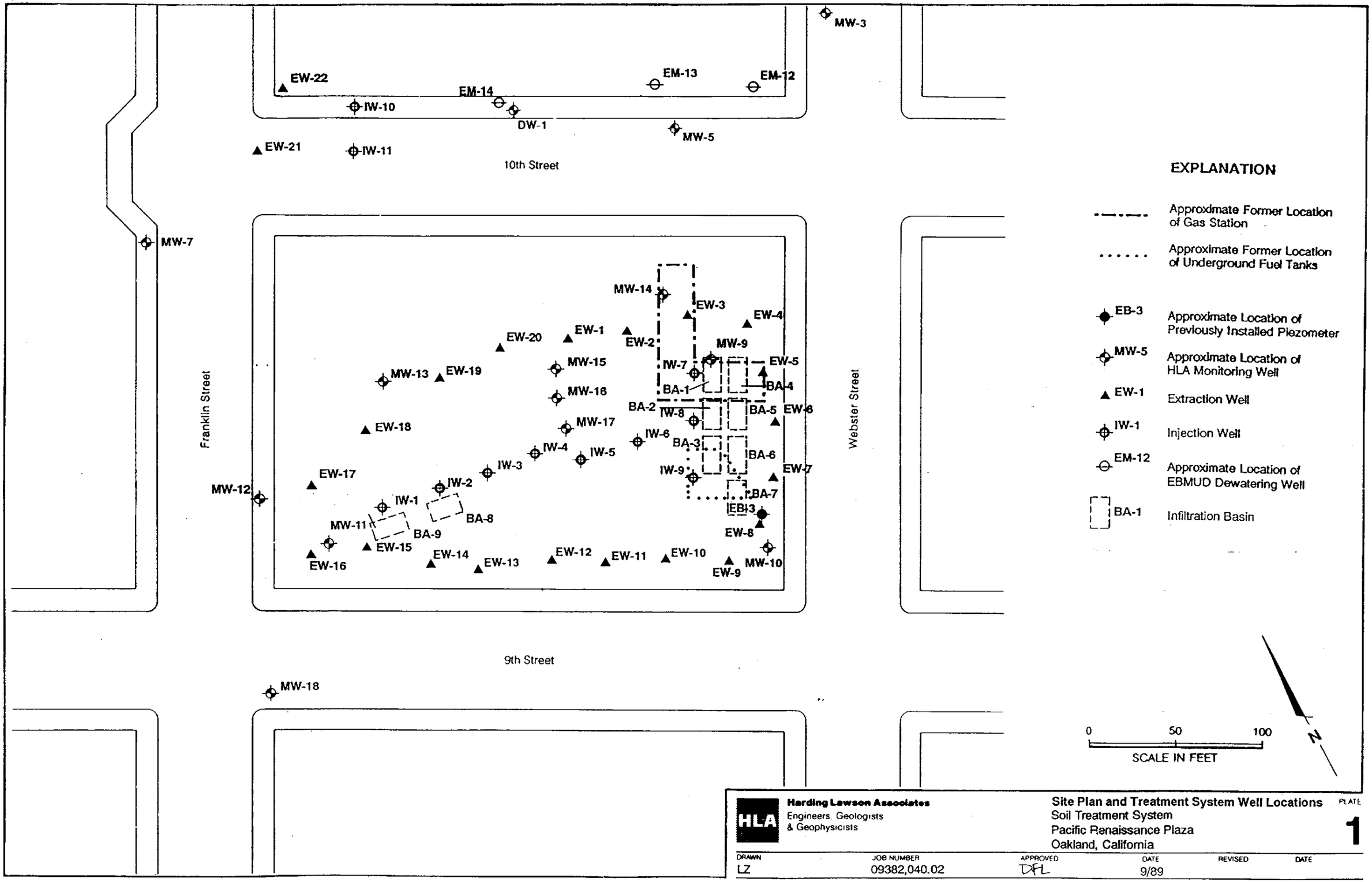
NOTES:

Organic constituents reported in milligrams per kilogram (mg/kg)

Analyses performed by PACE Laboratories unless otherwise noted

LOD: Limit of Detection unless otherwise noted
ND: Not detected at or above limit of detection (LOD)
NT: Not tested
*: Sample used in the composite sample

13420



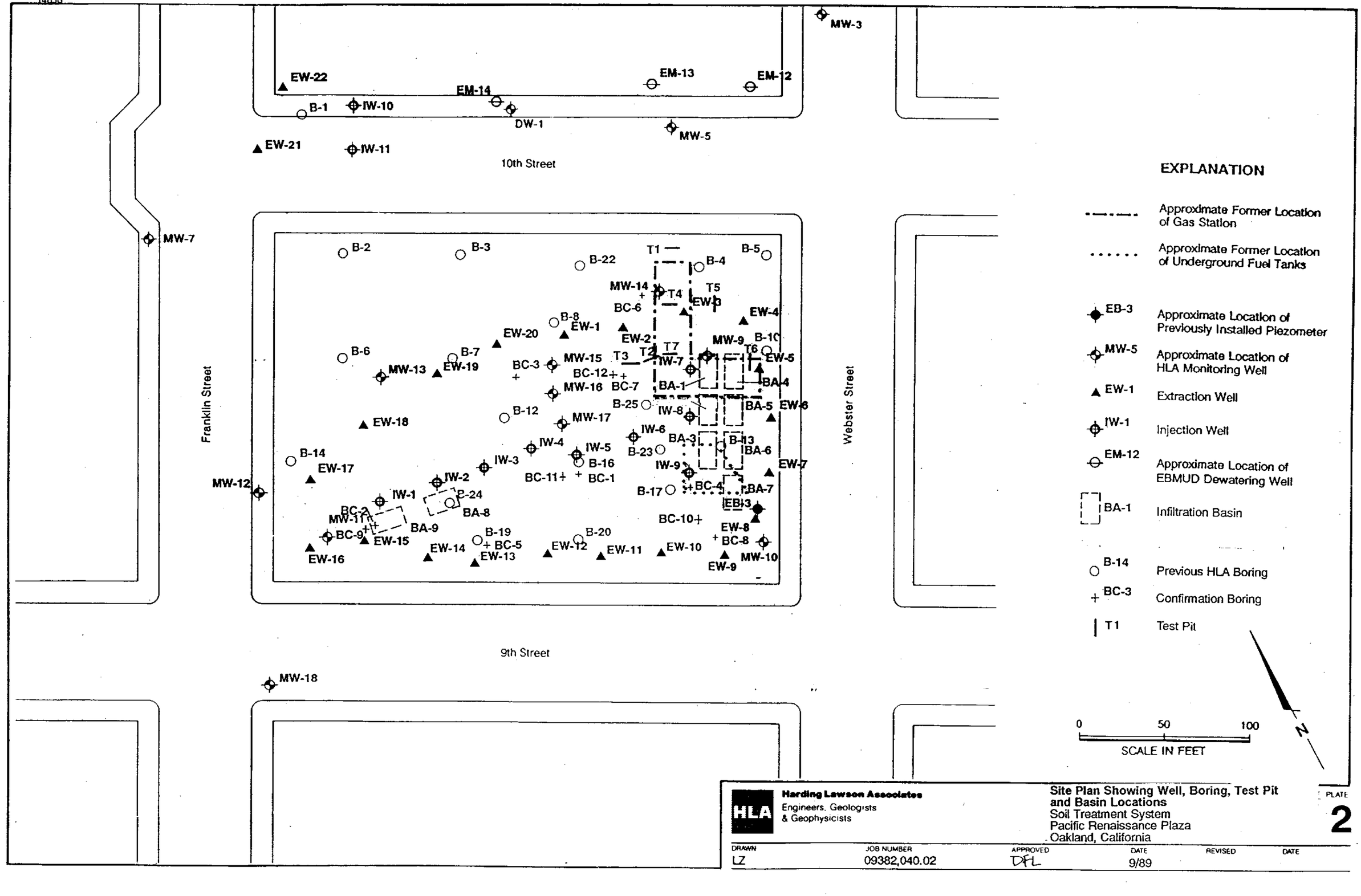
Harding Lawson Associates
Engineers, Geologists & Geophysicists

Site Plan and Treatment System Well Locations
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **1**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LZ	09382,040.02	DPL	9/89		

13420 14836



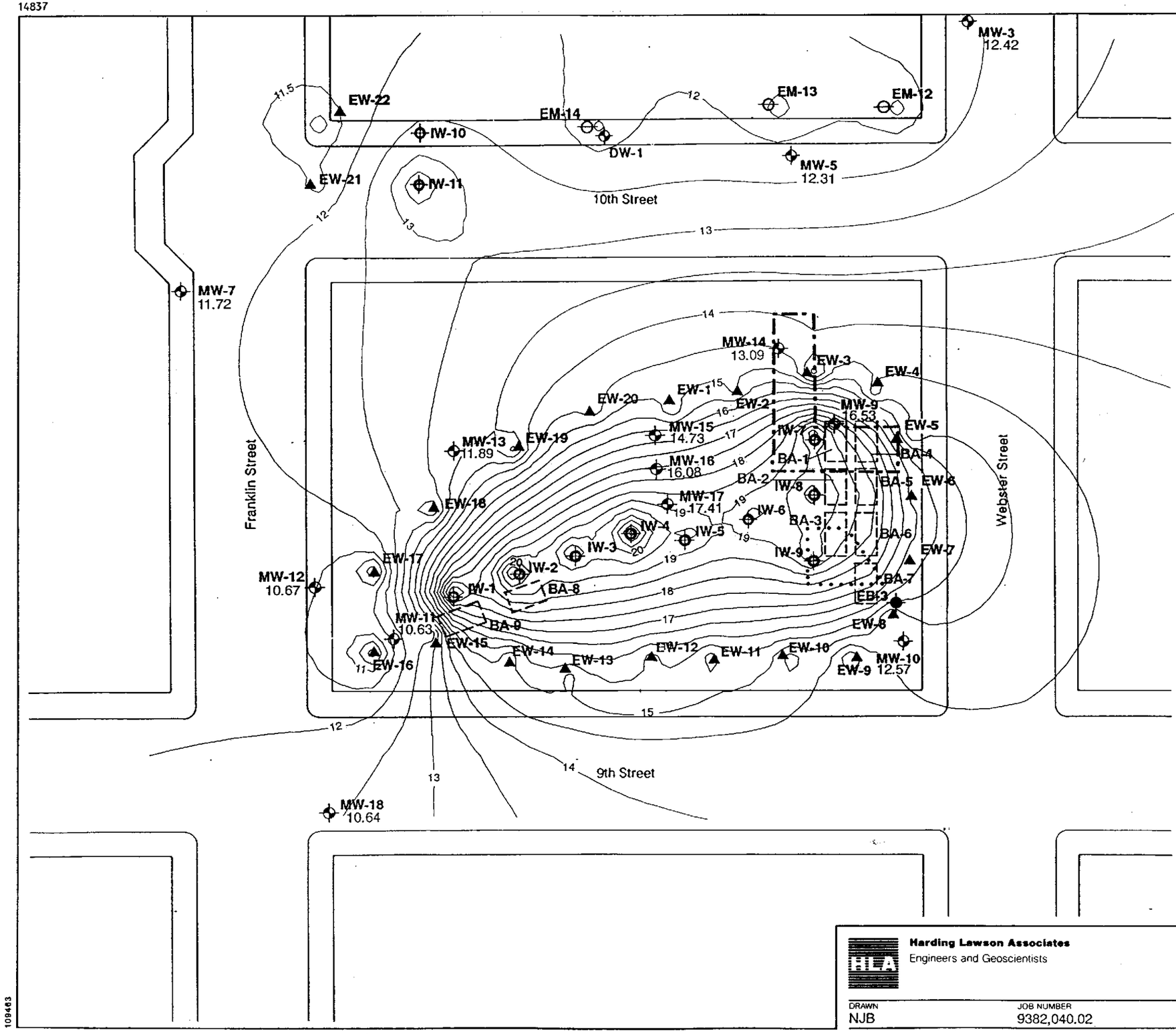
Harding Lawson Associates
Engineers, Geologists & Geophysicists

Site Plan Showing Well, Boring, Test Pit and Basin Locations
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
LZ	09382,040.02	DFL	9/89		

14837



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
- BA-1 — Infiltration Basin
- 18.78 — Observed Ground-Water Elevation (feet above MSL)
- Simulated Ground-Water Elevation Contour (contour interval 0.5 feet)

0 50 100
SCALE IN FEET

N

Harding Lawson Associates
Engineers and Geoscientists

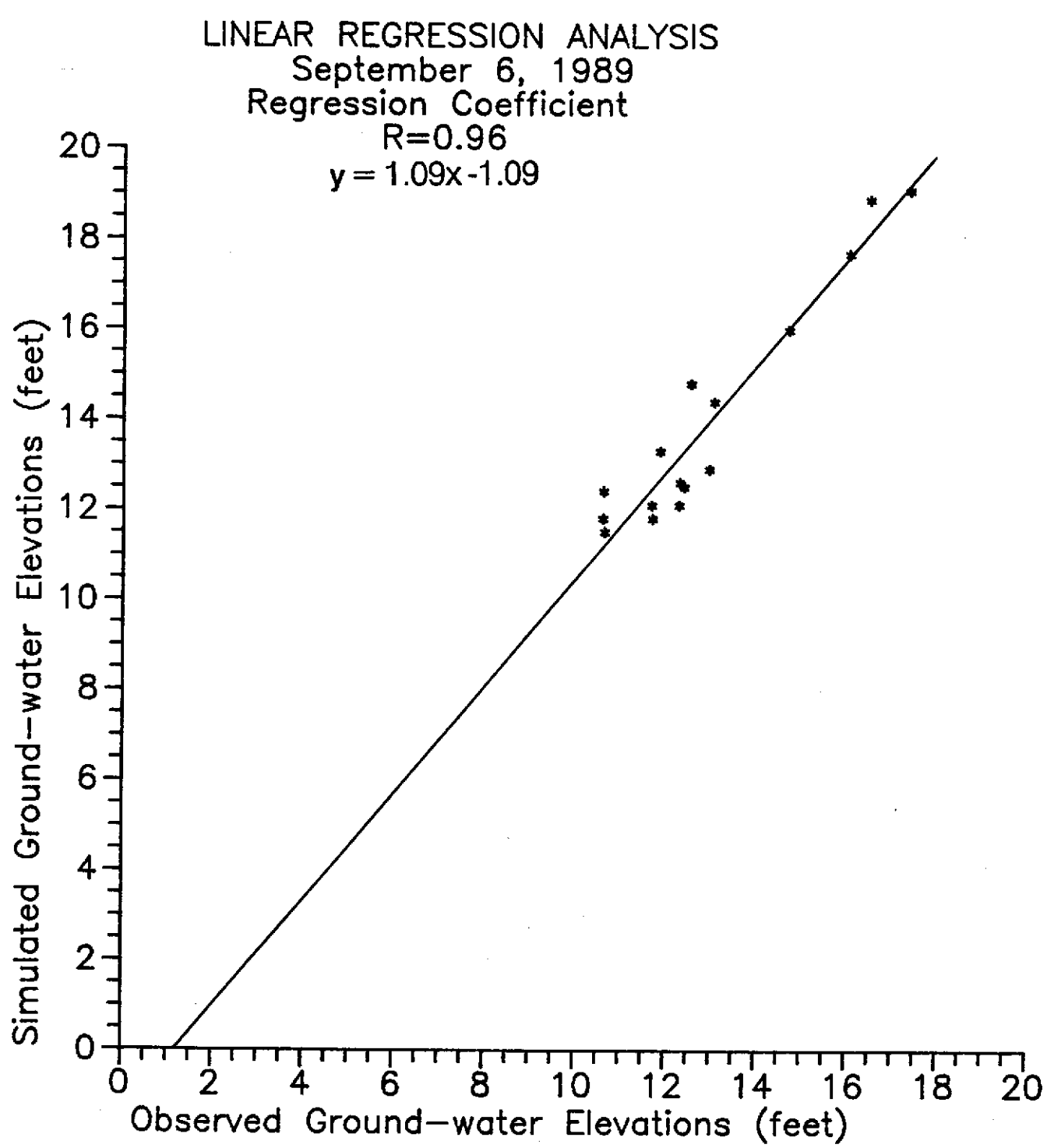
Observed and Simulated Ground-Water Elevations - September 6, 1989
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
NJB	9382,040.02	DPL	9/89		

109463

14838



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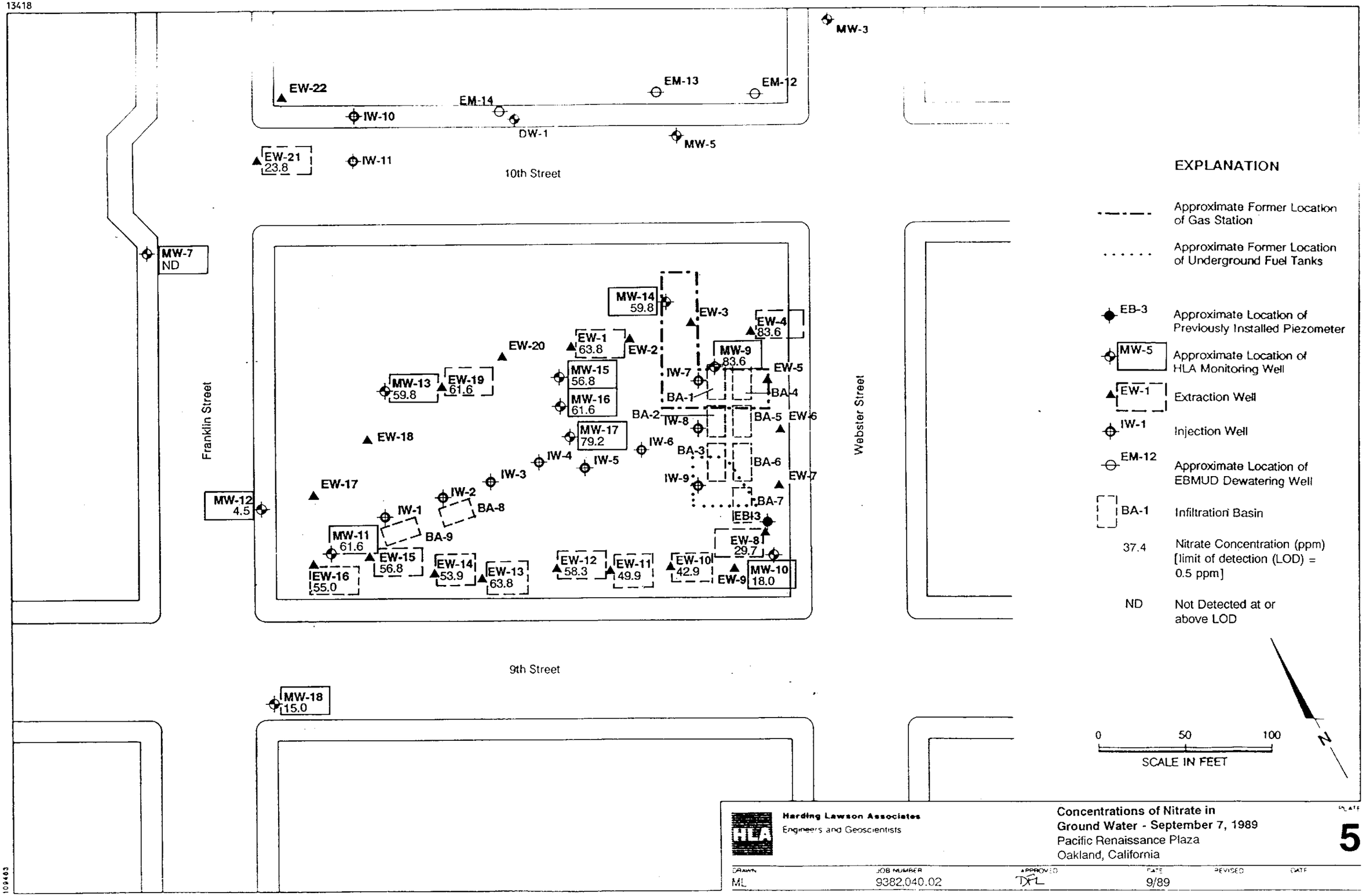
Engineering and
Environmental Services

Linear Regression of Observed versus Simulated Ground-Water Elevations - September 6, 1989
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
NJB	9382,040.02	DPL	9/89	

13418



109463

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Engineers and Geoscientists

Concentrations of Nitrate in Ground Water - September 7, 1989
Pacific Renaissance Plaza
Oakland, California

PLATE **5**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
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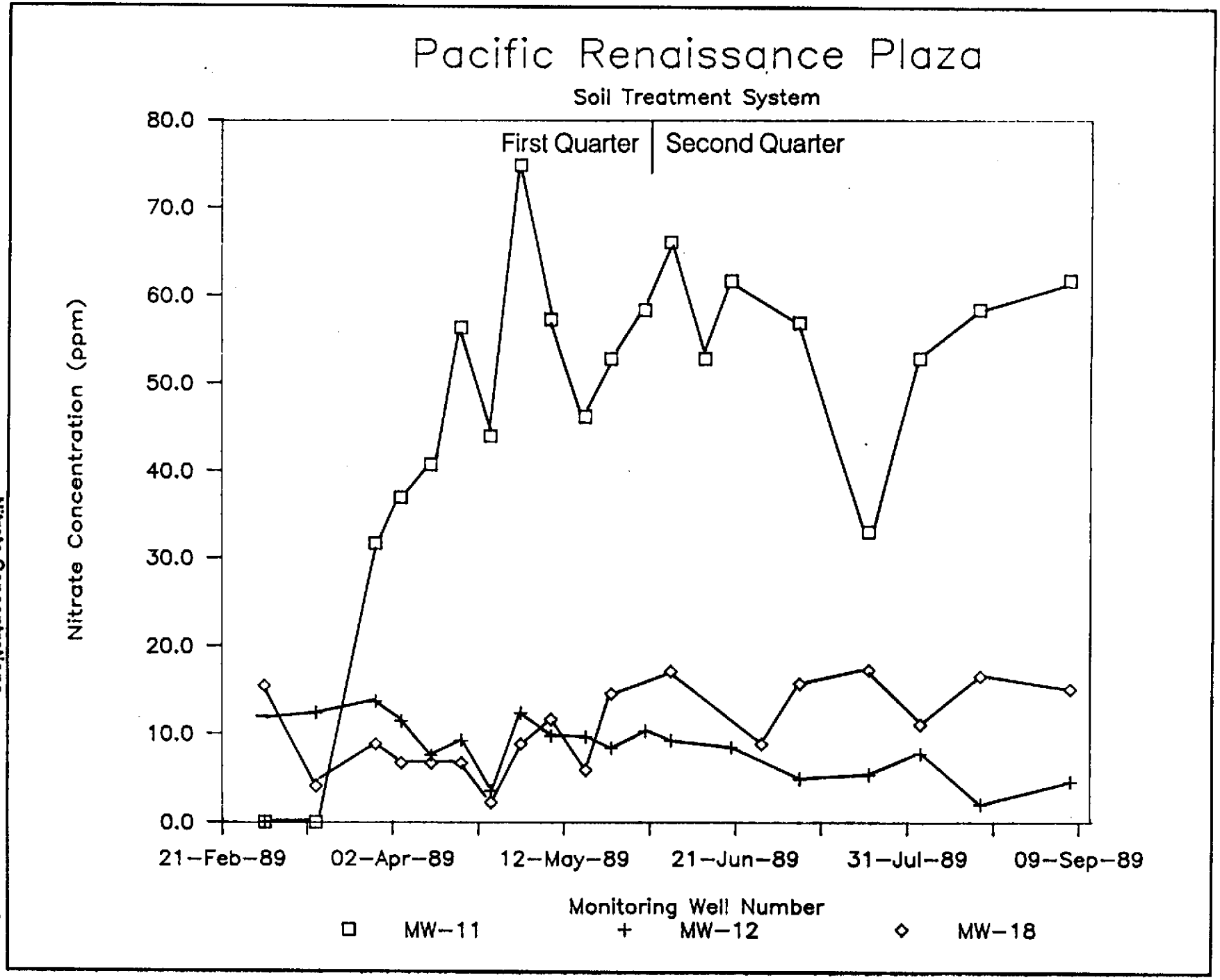

14839

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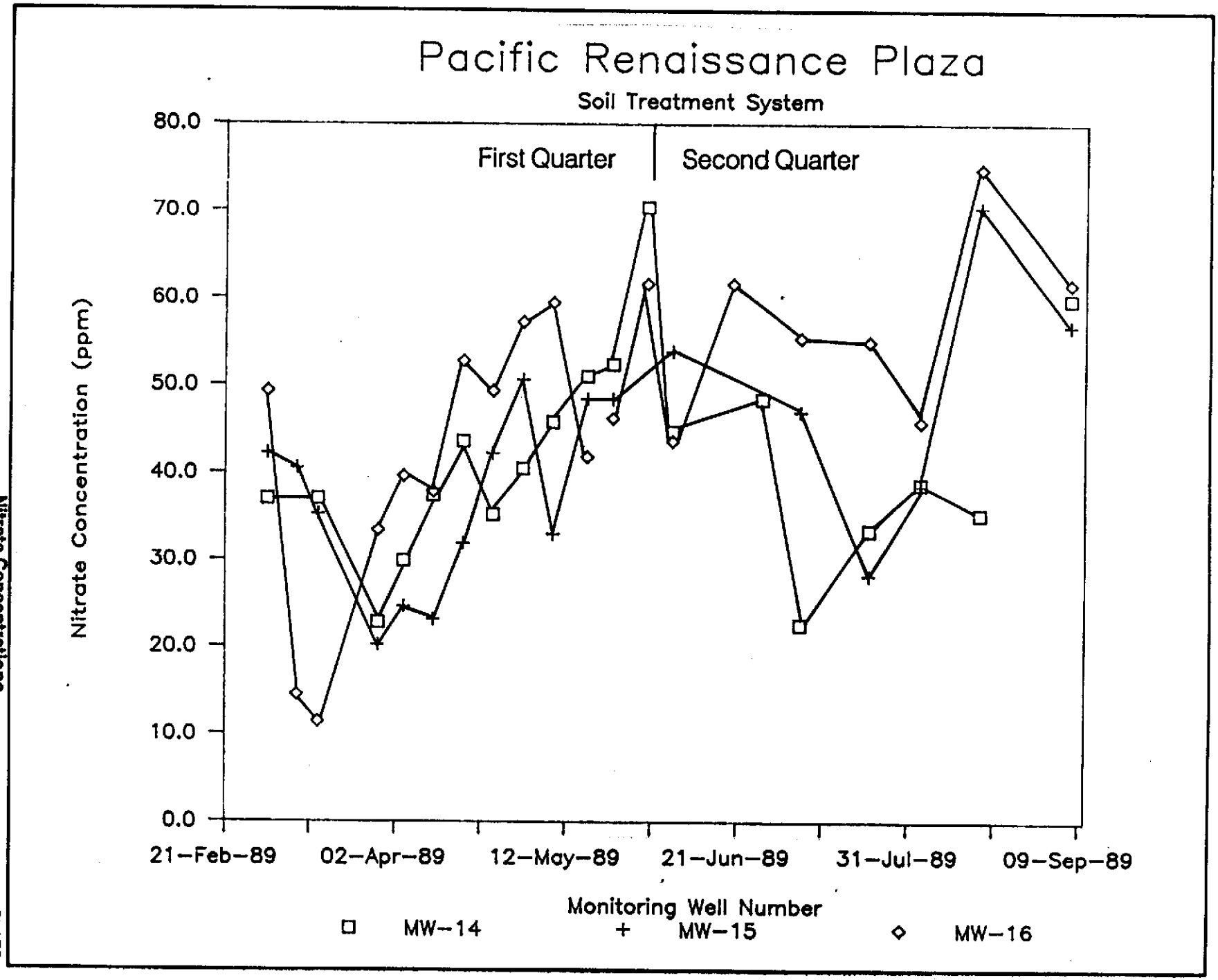
Engineering and Environmental Services

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

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
NJB	9382,040.02		9/89	

PLATE **6**



14840

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Engineering and Environmental Services

DRAWN NJB

JOB NUMBER 9382,040.02

APPROVED

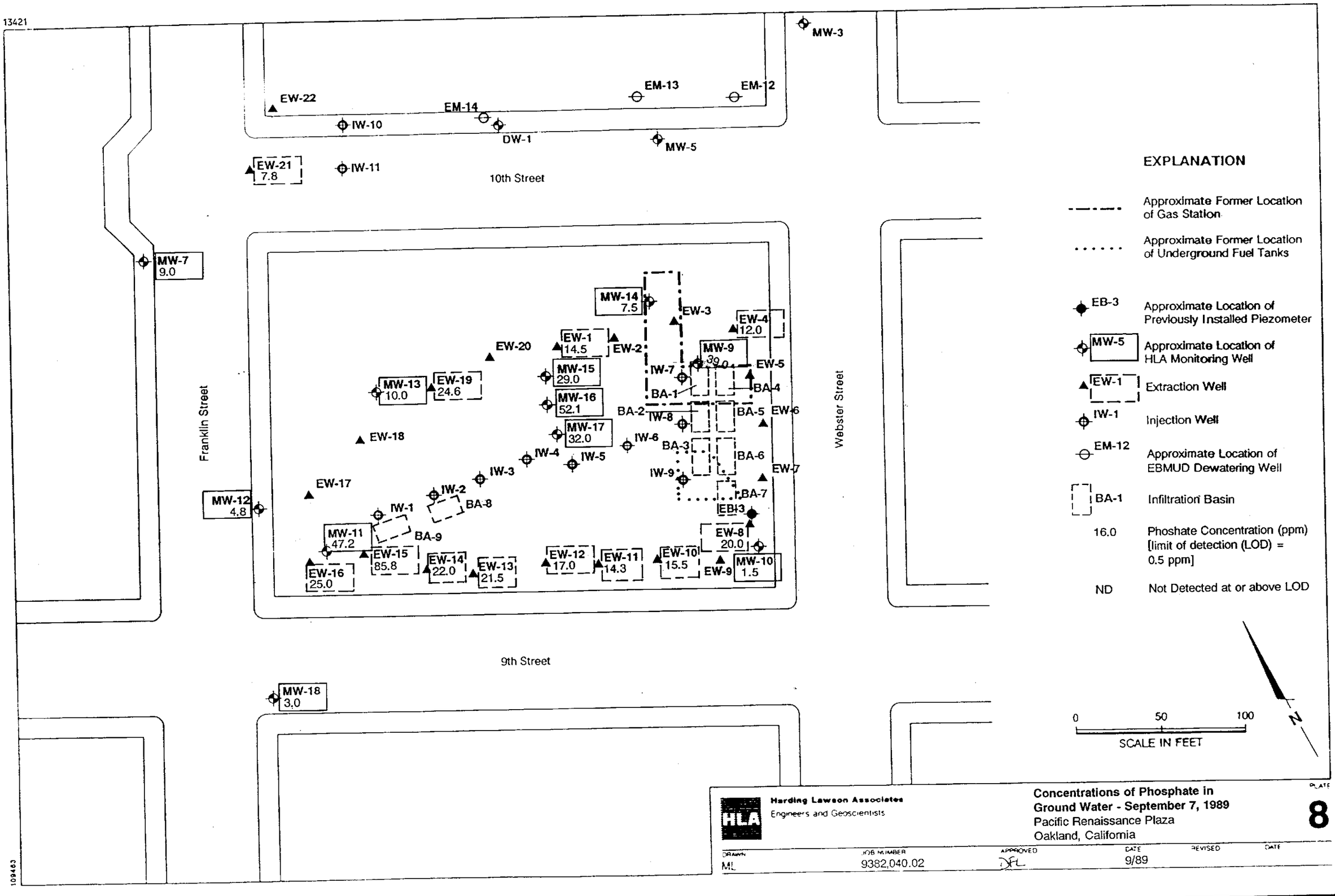
DATE 9/89

REVISED DATE

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

PLATE 7

13421



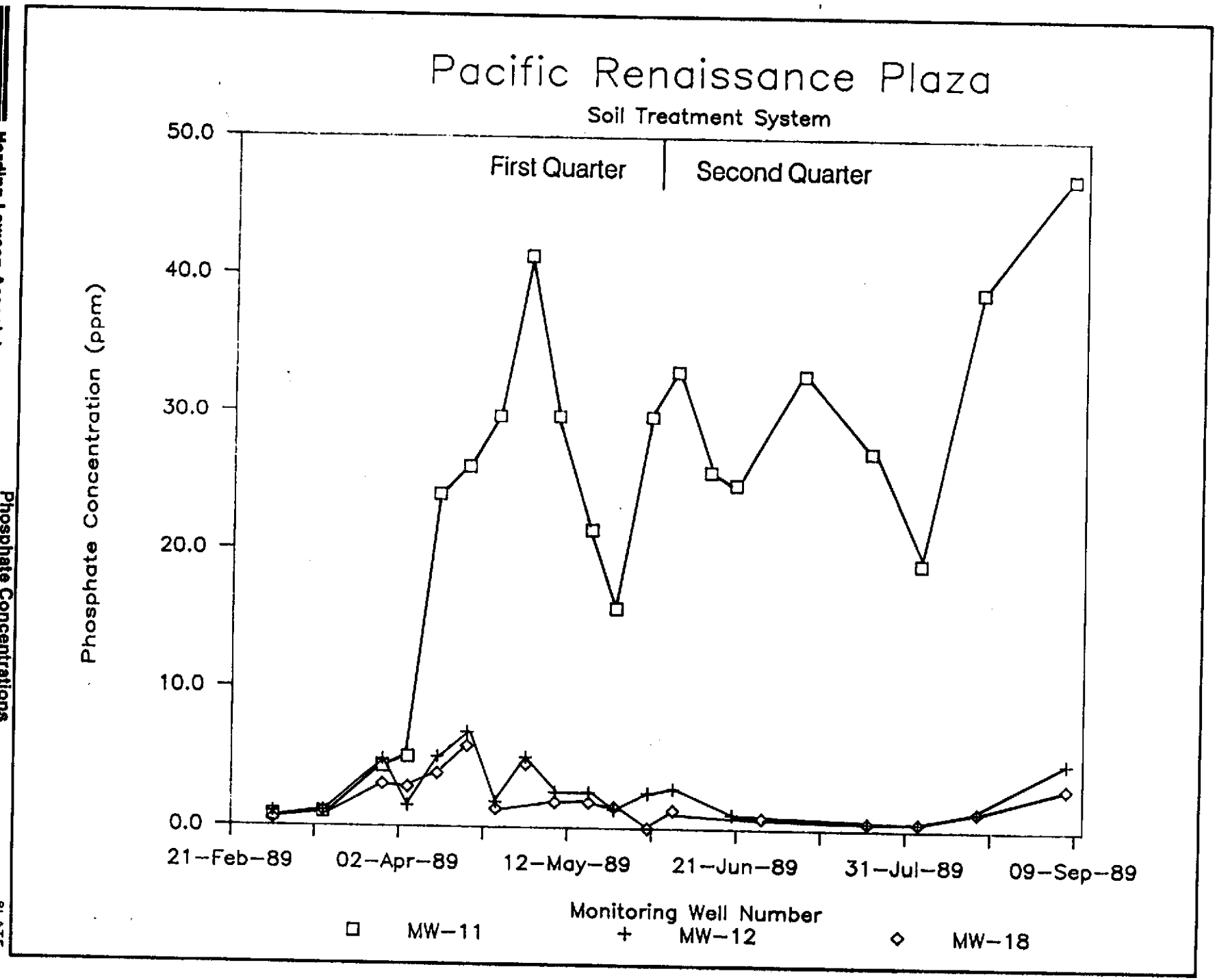
109463

Harding Lawson Associates
Engineers and Geoscientists

Concentrations of Phosphate in Ground Water - September 7, 1989
Pacific Renaissance Plaza
Oakland, California

PLATE **8**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ML	9382,040.02	DFL	9/89		



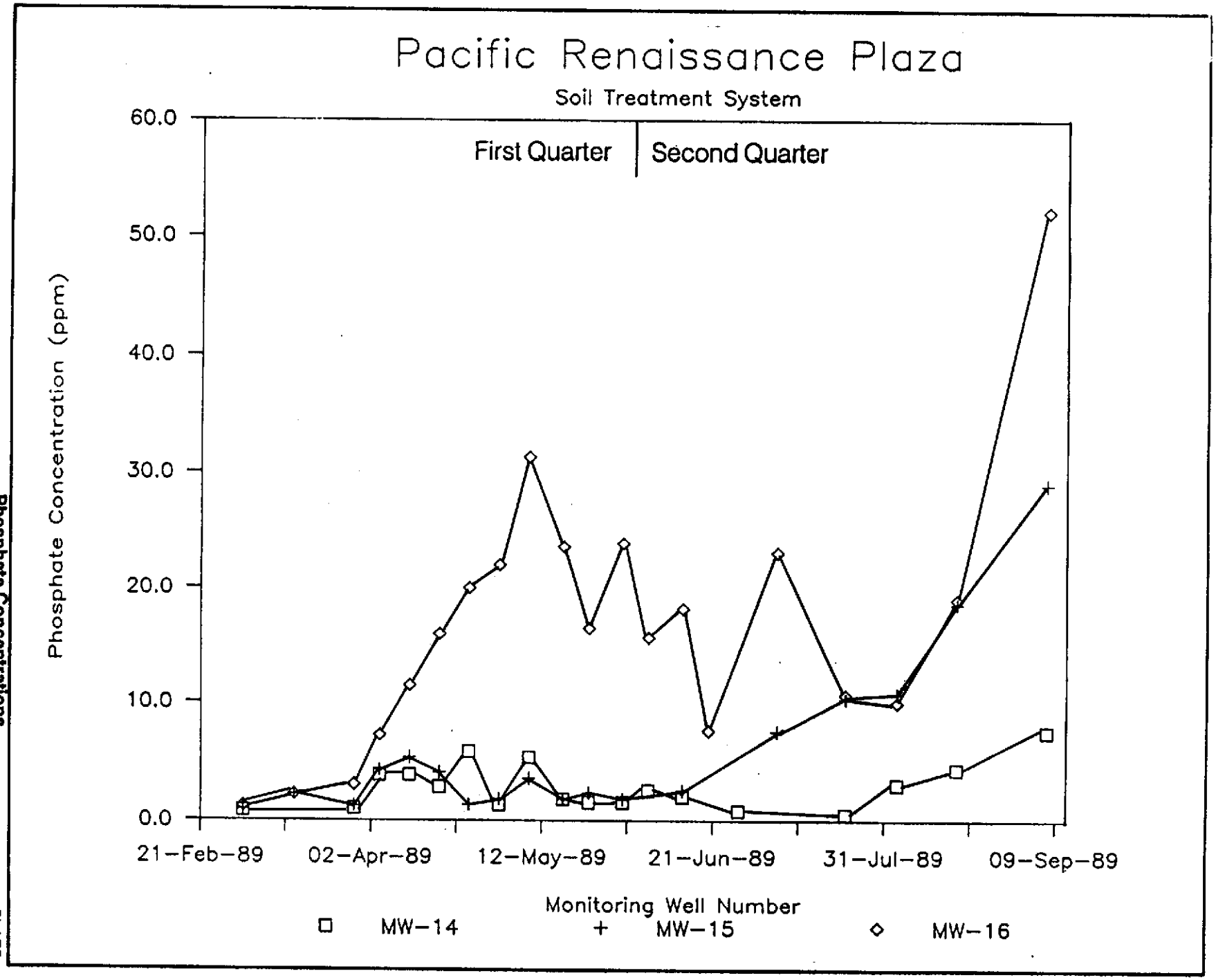
14841

Harding Lawson Associates
Engineering and Environmental Services

DRAWN: NJB
JOB NUMBER: 9382,040.02
APPROVED:
DATE: 9/89
REVISED DATE:

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

PLATE **9**



Harding Lawson Associates
Engineering and Environmental Services

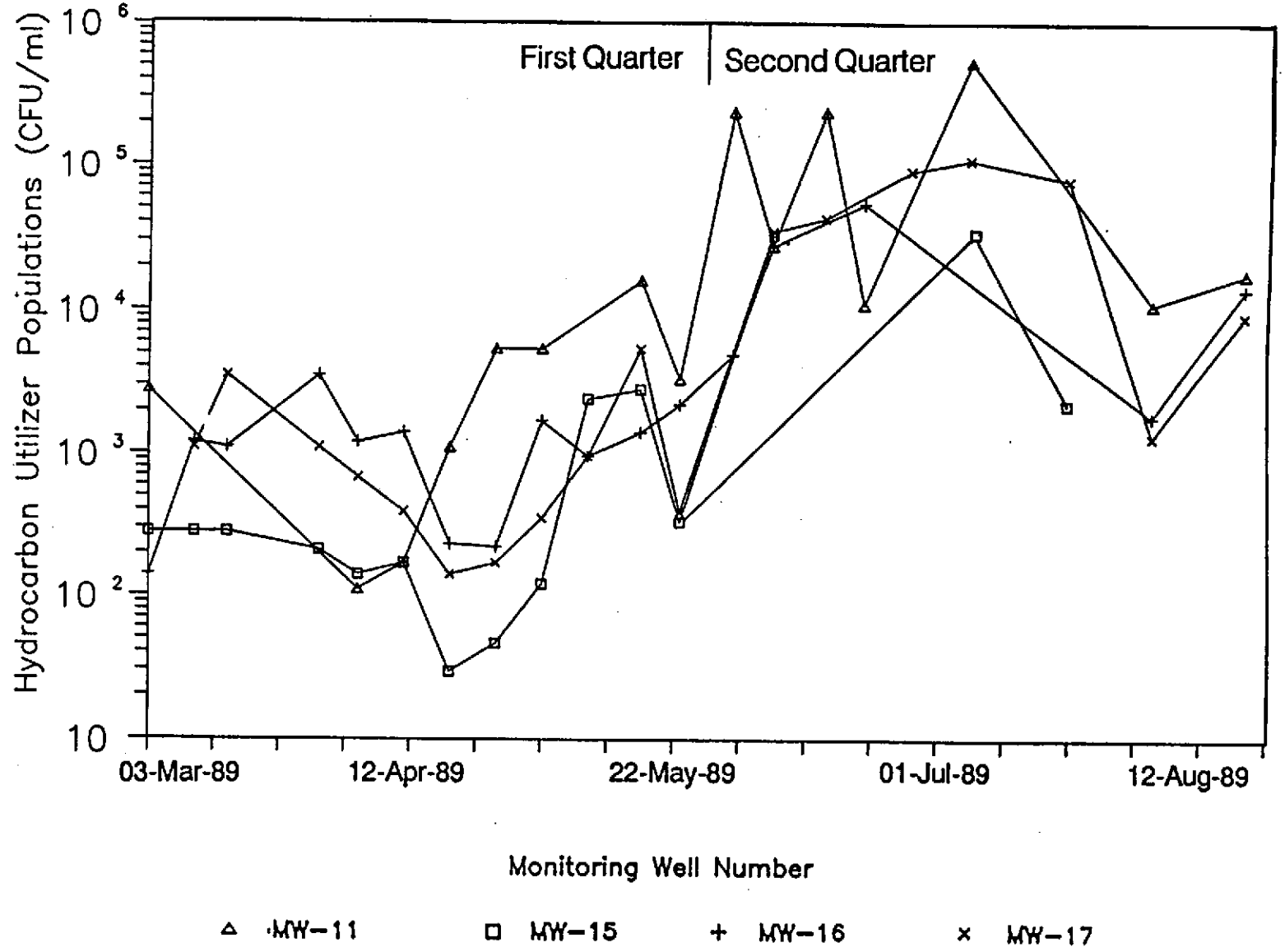
Phosphate Concentrations
Wells MW-14, MW-15, MW-16
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
NJB	9382.040.02		9/89	

PLATE **10**

Pacific Renaissance Plaza

Soil Treatment System



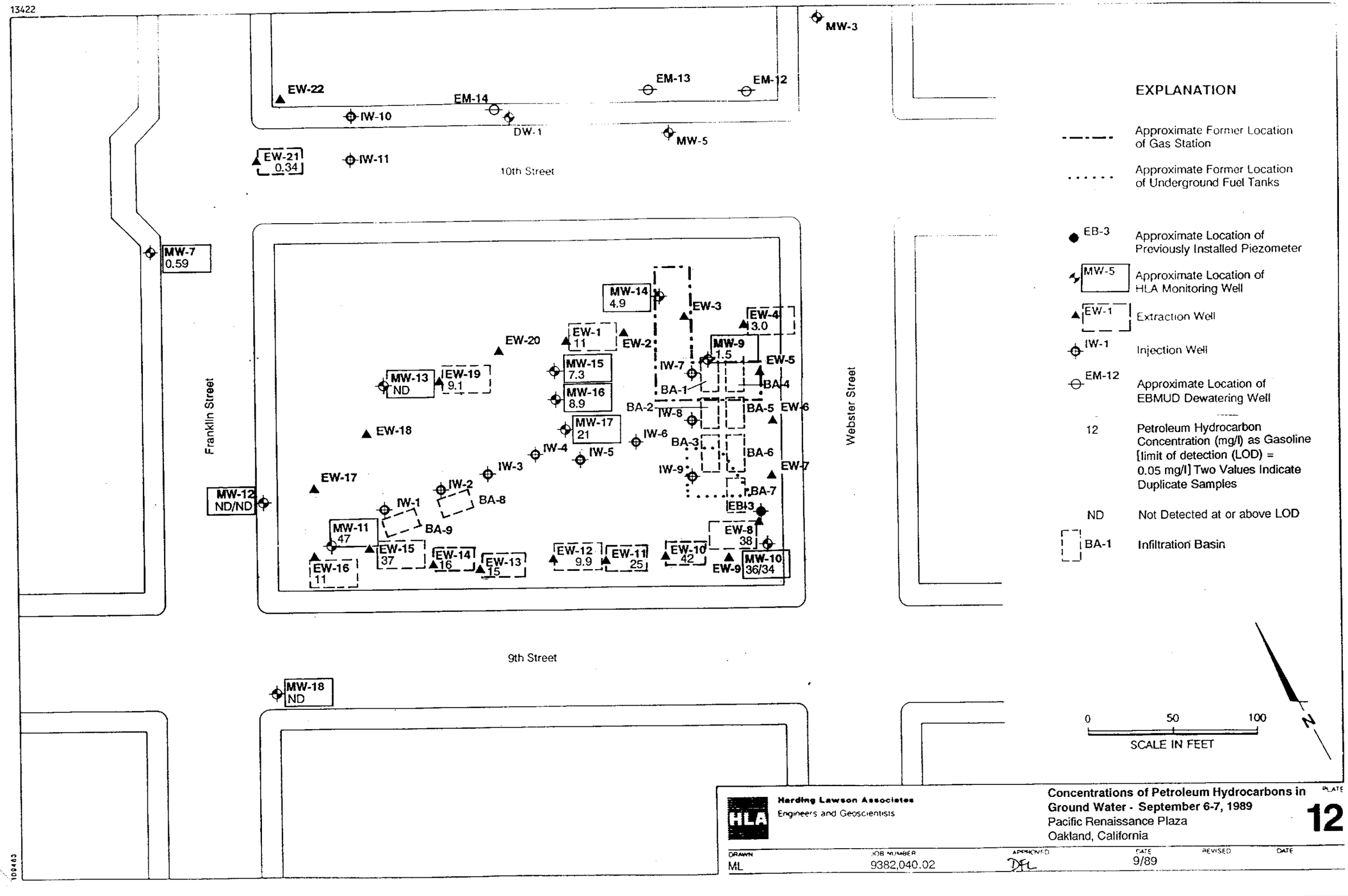
Hydrocarbon Utilizer Populations
Wells MW-11, MW-15, MW-16, and MW-17
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
NJB	9382.040.02	DFL	9/89	

PLATE **11**

Harding Lawson Associates
Engineering and Environmental Services

13422



100463

Harding Lawson Associates
Engineers and Geoscientists

Concentrations of Petroleum Hydrocarbons in Ground Water - September 6-7, 1989
Pacific Renaissance Plaza
Oakland, California

PLATE **12**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ML	9382,040.02	DFL	9/89		

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

September 20, 1989

Mr. David Leland
Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94945

Dear Mr. Leland:

Enclosed is the report of laboratory analyses for samples received 09/06/89.

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 94945

September 20, 1989
PACE Project Number: 490906504
PACE WP Number: WPPLAB 1058

Attn: Mr. David Leland

PRP Oakland

Date Sample(s) Collected: 09/06/89
Date Sample(s) Received: 09/06/89

PACE Sample Number: / Parameter	Units	MDL	767910 89090601 MW-14	767920 89090602 MW-9	767930 89090603 MW-10
ORGANIC ANALYSIS					
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.05	4.9	1.5	36
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/L	0.0002	1.0	0.007	8.1
Ethylbenzene	mg/L	0.0002	ND	ND	0.82
Toluene	mg/L	0.0002	0.090	0.022	5.2
Xylenes, total	mg/L	0.0002	1.4	0.36	5.5

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

September 20, 1989
PACE Project Number: 490906504

PACE Sample Number: / Parameter	Units	MDL	767940 89090604	767950 89090605	767960 89090606
ORGANIC ANALYSIS			MW-10 Duplicate	MW-15	MW-16
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.05	34	7.3	8.9
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/L	0.0002	11	1.1	0.96
Ethylbenzene	mg/L	0.0002	0.93	0.23	0.26
Toluene	mg/L	0.0002	6.3	1.4	3.3
Xylenes, total	mg/L	0.0002	6.1	1.3	1.8

MDL Method Detection Limit

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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

September 20, 1989
PACE Project Number: 490906504

PACE Sample Number: / Parameter	Units	MDL	767970 89090607	767980 89090608	767990 89090609
ORGANIC ANALYSIS			Trip Blank	MW-17	MW-11
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.05	ND	21	47
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/L	0.0002	ND	2.8	5.0
Ethylbenzene	mg/L	0.0002	ND	0.32	0.41
Toluene	mg/L	0.0002	ND	4.5	6.5
Xylenes, total	mg/L	0.0002	ND	8.4	5.2

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

September 20, 1989
PACE Project Number: 490906504

PACE Sample Number: / Parameter	Units	MDL	768000 89090620 EW-1	768010 89090621 EW-4	768020 89090622 EW-8
ORGANIC ANALYSIS					
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.05	11	3.0	38
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/L	0.0002	3.0	0.17	5.7
Ethylbenzene	mg/L	0.0002	0.26	LT 0.005	0.19
Toluene	mg/L	0.0002	3.7	0.038	5.5
Xylenes, total	mg/L	0.0002	3.0	0.80	10

MDL Method Detection Limit
LT Less than.

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

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

October 02, 1989
PACE Project Number: 490907505

Attn: Mr. David Leland

PRP Oakland

Date Sample(s) Collected: 09/07/89
Date Sample(s) Received: 09/07/89

PACE Sample Number: / Parameter	Units	MDL	MW-18 769110 89090610	MW-12 769120 89090611	MW-12 769130 89090612
ORGANIC ANALYSIS					
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):					
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.25	ND	ND	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020):					
Benzene	mg/L	0.0005	ND	0.051	0.059
Ethylbenzene	mg/L	0.0005	ND	ND	ND
Toluene	mg/L	0.0005	ND	0.0016	0.0022
Xylenes, total	mg/L	0.0005	ND	0.0049	0.0058

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

Mr. David Leland
Page 2

October 02, 1989
PACE Project Number: 490907505

PACE Sample Number:				MW-7 769140	MW-13 769150	Blank 769160
Parameter	Units	MDL		89090613	89090614	89090615
ORGANIC ANALYSIS						
PURGEABLE FUELS AND AROMATICS						
TOTAL FUEL HYDROCARBONS, (LIGHT):						
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.25		0.59	ND	ND
PURGEABLE AROMATICS (BTXE BY EPA 8020):						
Benzene	mg/L	0.0005		ND	0.039	ND
Ethylbenzene	mg/L	0.0005		ND	ND	ND
Toluene	mg/L	0.0005		ND	0.0020	ND
Xylenes, total	mg/L	0.0005		0.0015	0.0050	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

Mr. David Leland
Page 3

October 02, 1989
PACE Project Number: 490907505

PACE Sample Number:				EW-19 769170	EW-15 769180	EW-14 769190
Parameter	Units	MDL		89090724	89090726	89090727
ORGANIC ANALYSIS						
PURGEABLE FUELS AND AROMATICS						
TOTAL FUEL HYDROCARBONS, (LIGHT):						
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.25		9.1	37	16
PURGEABLE AROMATICS (BTXE BY EPA 8020):						
Benzene	mg/L	0.0005		2.5	8.4	4.1
Ethylbenzene	mg/L	0.0005		0.15	0.20	0.20
Toluene	mg/L	0.0005		2.1	7.6	3.5
Xylenes, total	mg/L	0.0005		1.5	6.3	3.7

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 4

October 02, 1989
PACE Project Number: 490907505

PACE Sample Number:			EW-13 769200	EW-21 769210	EW-16 769220
Parameter	Units	MDL	89090728	89090723	89090725
ORGANIC ANALYSIS					
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):					
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.25	15	0.34	11
PURGEABLE AROMATICS (BTXE BY EPA 8020):					
Benzene	mg/L	0.0005	3.3	0.0060	2.6
Ethylbenzene	mg/L	0.0005	1.8	0.0020	0.21
Toluene	mg/L	0.0005	3.2	0.0095	2.7
Xylenes, total	mg/L	0.0005	0.37	0.026	1.9

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 5

October 02, 1989
PACE Project Number: 490907505

PACE Sample Number: / Parameter	Units	MDL	EW-11 769230 89090729	EW-12 769240 89090730	EW-10 769250 89090731
ORGANIC ANALYSIS					
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):					
Purgeable Fuels, as Gasoline (EPA 8015)	mg/L	0.25	25	9.9	42
PURGEABLE AROMATICS (BTXE BY EPA 8020):					
Benzene	mg/L	0.0005	7.7	2.2	8.1
Ethylbenzene	mg/L	0.0005	0.52	0.059	0.80
Toluene	mg/L	0.0005	8.0	1.8	7.4
Xylenes, total	mg/L	0.0005	5.3	2.2	9.2

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

Appendix B

LABORATORY ANALYTICAL RESULTS FOR SOIL SAMPLES

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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

September 13, 1989

Mr. Peter Mote
Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94948

Dear Mr. Mote:

Enclosed is the report of laboratory analyses for samples received 09/01/89.

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 94948

September 13, 1989
PACE Project Number: 490901509

Attn: Mr. Peter Mote

PRP Oakland

Date Sample(s) Collected: 09/01/89
Date Sample(s) Received: 09/01/89

PACE Sample Number:			767350	767360	767370
Parameter	Units	MDL	89 BC091	89 BC092	89 BC093
ORGANIC ANALYSIS	Depth (feet)		23-23.5	24-24.5	24.5-25
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/kg wet	1.0	710	-	3700
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/kg wet	0.005	4.4	-	20
Ethylbenzene	mg/kg wet	0.005	19	-	69
Toluene	mg/kg wet	0.005	56	-	220
Xylenes, Total	mg/kg wet	0.005	130	-	660

MDL Method Detection Limit

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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

September 13, 1989
PACE Project Number: 490901509

PACE Sample Number: / Parameter	Units	MDL	767380 89 BC094	767390 89 BC095	767400 89 BC101
ORGANIC ANALYSIS	Depth (feet)		25.5-26	26.5-27	23-23.5
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/kg wet	1.0	-	1200	-
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/kg wet	0.005	-	13	-
Ethylbenzene	mg/kg wet	0.005	-	36	-
Toluene	mg/kg wet	0.005	-	110	-
Xylenes, Total	mg/kg wet	0.005	-	200	-

MDL Method Detection Limit

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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

September 13, 1989
PACE Project Number: 490901509

PACE Sample Number: / Parameter	Units	MDL	767410 89 BC102	767420 89 BC103	767430 89 BC104
ORGANIC ANALYSIS	Depth (feet)		24-24.5	24.5-25	25.5-26
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/kg wet	1.0	-	5200	-
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/kg wet	0.005	-	58	-
Ethylbenzene	mg/kg wet	0.005	-	120	-
Toluene	mg/kg wet	0.005	-	380	-
Xylenes, Total	mg/kg wet	0.005	-	590	-

MDL Method Detection Limit

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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

Mr. Peter Mote

September 13, 1989
PACE Project Number: 490901509

PACE Sample Number:			767440	767450	767460
Parameter	Units	MDL	89 BC111	89 BC112	89 BC113
ORGANIC ANALYSIS	Depth (Feet)		23-23.5	24-24.5	24.5-25
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/kg wet	1.0	-	-	81
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/kg wet	0.005	-	-	1.4
Ethylbenzene	mg/kg wet	0.005	-	-	1.6
Toluene	mg/kg wet	0.005	-	-	3.7
Xylenes, Total	mg/kg wet	0.005	-	-	11

MDL Method Detection Limit

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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

Mr. Peter Mote
Page 5

September 13, 1989
PACE Project Number: 490901509

PACE Sample Number:			767500	767510	767670 Composite 89 BC091+ 92+93+94
Parameter	Units	MDL	89 BC123	89 BC124	
ORGANIC ANALYSIS	Depth (feet)		24.5-25	25.5-26	
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/kg wet	1.0	1.9	-	2800
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/kg wet	0.005	0.027	-	33
Ethylbenzene	mg/kg wet	0.005	0.012	-	82
Toluene	mg/kg wet	0.005	0.020	-	180
Xylenes, Total	mg/kg wet	0.005	0.32	-	310

MDL Method Detection Limit

pace laboratories, inc.

REPORT OF LABORATORY ANALYSIS

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

September 13, 1989
PACE Project Number: 490901509

PACE Sample Number:			767680	767690	767700
Parameter	Units	MDL	Composite of BC101+ 02+03+04	Composite 89 BC 111+ 12+13+14	Composite 89 BC 121+ 22+23+24
ORGANIC ANALYSIS					
PURGEABLE FUELS AND AROMATICS					
TOTAL FUEL HYDROCARBONS, (LIGHT):			-	-	-
Purgeable Fuels, as Gasoline (EPA 8015)	mg/kg wet	1.0	1300	45	18
PURGEABLE AROMATICS (BTXE BY EPA 8020):			-	-	-
Benzene	mg/kg wet	0.005	14	0.65	0.26
Ethylbenzene	mg/kg wet	0.005	37	1.1	0.35
Toluene	mg/kg wet	0.005	75	2.3	0.89
Xylenes, Total	mg/kg wet	0.005	130	7.2	2.3

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

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

CHAIN OF CUSTODY FORM

Lab: PACE 490901.509

Samplers: JJF

Job Number: 09382.039.02

Name/Location: PRP OAKLAND

Project Manager: PETER MOTE

Recorder: [signature] (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
SO			X		1			89	BC	091	89	09	01	0856	HOLD (comp 76767)
SO			X		1			89	BC	092	89	09	01	0904	
SO			X		1			89	BC	093	89	09	01	0905	
SO			X		1			89	BC	094	89	09	01	0911	
SO			X		1			89	BC	095	89	09	01	0918	
SO			X		1			89	BC	101	89	09	01	1011	ANALYSIS
SO			X		1			89	BC	102	89	09	01	1021	
SO			X		1			89	BC	103	89	09	01	1022	DAVE
SO			X		1			89	BC	104	89	09	01	1030	LELAND WILL (76768) GIVE INSTRUCTIONS

ANALYSIS REQUESTED	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene+E	Total Petrol. Hydrocarb. GAS	PACE #
						X	X	76735
						X	X	76736
						X	X	76737
						X	X	76738
						X	X	76739
						X	X	76740
						X	X	76741
						X	X	76742
						X	X	76743

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) [signature]	RECEIVED BY: (Signature) [signature]	DATE/TIME 9/1/89 18:15
RELINQUISHED BY: (Signature) [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
METHOD OF SHIPMENT: HAND DELIVER		

J/1

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

6533

[redacted] Landing [redacted] Island [redacted]

200 Rush Landing Road
P.O. Box 8107
Novato, California 94948
415/892-0821
Telecopy: 415/892-1586

CHAIN OF CUSTODY FORM

Lab: PACE 490901.509

Samplers: JJF

Job Number: 09392.039.02

Name/Location: PRP OAKLAND

Project Manager: PETER MOTE

Recorder: Jeffrey Fo (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
50			X		1			89	BC	111	89	09	01	1149	HOLD 76769
50			X		1			89	BC	112	89	09	01	1156	ANALYSIS
50			X		1			89	BC	113	89	09	01	1158	DAVE LELAND
50			X		1			89	BC	114	89	09	01	1200	WILL GIVE
															76770
50			X		1			89	BC	121	89	09	01	1335	INSTRUCTIONS
50			X		1			89	BC	122	89	09	01	1342	
50			X		1			89	BC	123	89	09	01	1345	
50			X		1			89	BC	124	89	09	01	1349	

ANALYSIS REQUESTED

EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene+E	Total Petrol. Hydrocarb. GAS	PACE #
					X	X	76744
					X	X	76745
					X	X	76746
					X	X	76747
					X	X	76748
					X	X	76749
					X	X	76750
					X	X	76751

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Jeffrey Fo	RECEIVED BY: (Signature) Marcuberry	DATE/TIME 9/01/89 18:15
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
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REPORT OF SYSTEM MONITORING
JUNE THROUGH AUGUST 1989
SOIL TREATMENT SYSTEM
PACIFIC RENAISSANCE PLAZA
OAKLAND, CALIFORNIA
October 2, 1989

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QUALITY CONTROL REVIEWER

Tamara L. Williams

Tamara L. Williams
Geologist - 3954