Groundwater Investigation
Blue Print Service Company
1700 Jefferson Street
Oakland, California 94612

Prepared for

Blue Print Service Company
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Concord, California 94518

HLA Project No. 34466.3

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DISTRIBUTION

1.0 INTRODUCTION

The Blue Print Service Company (BPS) facility (Site) is located on the northeast corner of Jefferson Street and 17th Street in Oakland, California (Plate 1). The area surrounding the Site consists of a mix of commercial and residential buildings. The land surface elevation slopes gradually from 17th Street toward the intersection of Jefferson Street and San Pablo Street. The Site is bordered on the east by a two-story wooden commercial building without a basement, and on the south and west by 17th Street and Jefferson Street respectively. The Site's northern property line is bordered, from east to west, by a two-story commercial brick building, a three-story residential brick building, and an approximately 15-foot-deep depressed area, which is believed to be the former basement of a building that was demolished at an earlier time.

1.1 Background

The Site previously contained a gasoline service station with three underground storage tanks (USTs) on the southwest corner of the Site. In 1986, BPS purchased the property and continued to use the facility until 1987 to fuel its fleet of delivery trucks. During the time BPS operated the station only unleaded gasoline was stored in the USTs located on-site. In 1987 the existing buildings were demolished, the USTs removed and the Site was graded in preparation for the construction of the present production facility. The BPS production facility consists of a one-story structure, an adjacent parking area, and a freestanding concrete block wall, which encloses the parking area.

1.1.1 UST Removal

Three USTs used to store gasoline were removed from the Site on June 16, 1987. At that time holes were noted in the removed USTs and field observation indicated there had been a release of fuel into the soil and possibly groundwater. After UST removal in June 1987, the soil beneath the tanks was excavated to a depth of approximately 9 feet, aerated at the surface in accordance with Bay Area Air Quality Control Management District's Regulation 8, Rule 40, and used as backfill for the excavation.

1.1.2 Site Investigation

During February 1987, five soil borings were drilled by HLA as part of a geotechnical evaluation of the subsurface soil properties and a preliminary environmental site assessment of the BPS property (HLAa).

HLA drilled three borings 5 to 40 feet deep for geotechnical evaluation. The Site is blanketed by loose to medium dense silty sand fill, which contains occasional debris, including brick fragments. As measured in the borings, this sand fill varies from approximately 3 to 6 feet thick. The sand fill is underlain by an approximately 15- to 20-foot -thick layer of native, medium dense to dense clayey sand. An approximately 10-foot-thick layer of dense, fine-grained sand underlies this clayey sand. Beneath the sand, a stiff to very stiff silty clay extends to the 40-foot depth investigated.

Two of the five soil borings were drilled to a depth of 30 feet adjacent to the three USTs. Selected soil samples were analyzed for total petroleum hydrocarbons (TPH) using EPA Method 8015. The TPH concentrations in samples from the two borings ranged from 46 to 3,300 milligrams per kilogram (mg/kg). These soil analysis results indicated that one or more of the former USTs had released petroleum hydrocarbons into the soil.

1.1.3 Groundwater Monitoring

In June 1987, HLA installed three monitoring wells (MW-1, MW-2, and MW-3) at the Site. The wells were completed to depths between 32

and 35 feet below ground surface (bgs). During the monitoring wells' installation, soil samples were collected at depths of 23.5 to 24 feet bgs. The soil sample collected from MW-1 was reported to contain 4,500 mg/kg volatile hydrocarbons. The soil samples from the other two well borings did not contain volatile hydrocarbons above the reporting limits. After construction and development, the monitoring wells were checked for the presence of free-phase product and the water levels were measured. MW-1 was found to contain approximately 30-inches of free-phase product. Free-phase product was not observed in the MW-2 and MW-3. Groundwater level measurements indicated the groundwater flow direction was north to northeast. During the construction of the present facility, it was necessary to abandon MW-2. The loss of this well restricted HLA's ability to calculate groundwater flow direction using triangulation.

In January 1988, two addition monitoring wells (MW-1A and MW-4) were installed by HLA at the facility to be used for product recovery. One off-site monitoring well (MW-5) was installed by HLA in August 1988, approximately 170 feet north (downgradient) of the Site.

HLA has performed groundwater monitoring at the Site since August of 1991, and quarterly monitoring since the first quarter of 1994. Historical results from this monitoring are provided in Table 1. Results indicate substantial progress has been achieved in removing petroleum hydrocarbons from the groundwater. Free-phase product is no longer present in any of the monitoring wells and benzene, toluene, ethylbenzene, and total xylenes, (BTEX) have been reduced over 50 percent.

1.1.4 Free Product Recovery and Groundwater Remediation

After free-phase product was found in MW-1, the product in the well was removed on a daily basis. Between September 1987 and March 1991 BPS personnel removed an estimated 2,300 gallons of free-phase product in this manner.

HLA completed a treatment feasibility study in 1990 and a groundwater treatment system was constructed. The groundwater extraction and treatment system has been in operation since June 1992. The system extracts free product and groundwater from MW-1A and MW-4, located downgradient of the former USTs. The extraction wells are equipped with air-actuated submersible pumps that convey fluid from the wells to an oil-water separator where the free-phase product is separated from the groundwater for storage into an aboveground product convault.

Groundwater is drawn from the separator into a 3,000-gallon polyurethane tank (bioreactor) where the hydrocarbon constituents are further reduced through an aerobic bioremediation process. During the bioremediation process, nutrient and air are injected into the tank and the groundwater in the bioreactor is constantly recirculated to allow continual mixing of the air, nutrient, and petroleum hydrocarbons. The bioreactor processes groundwater in batches of approximately 500 gallons which, after bio-treatment, are pumped through sand filters that remove the suspended solids and three liquid-phase activated carbon filters, arranged in series, to remove the remaining hydrocarbons. After passing through a series of carbon filters the water is discharged into the sanitary sewer under a permit from East Bay Municipal Utility District.

The system discharges between 700 and 1,600 gallons per day, depending on groundwater elevations. This equates to a combined rate of approximately 0.5 to 1 gallon per minute (gpm) from the two wells. While the extraction rates of the two pumps is not individually metered, it has been observed in the field that extraction well MW-4 produces substantially more fluids than extraction well MW-1A.

To date, source removal by product recovery has been the main priority at the Site. Between July 1992 and July 1999 the treatment system has removed approximately 867 gallons of free-phase product (gasoline) from the groundwater.

Assuming a value of 0.7 for the specific gravity of gasoline, this would calculate to approximately 5,000 pounds of gasoline removed. Bioreactor influent concentration data indicates the bioreactor and carbon filters have removed an estimated additional 300 to 400 pounds of gasoline in the dissolved phase. Therefore, the total amount gasoline recovered from this Site by the system and bailing is approximately 19,000 pounds.

1.1.5 Corrective Action Plan

HLA issued a Corrective Action Plan (CAP), dated November 11, 1997, to Alameda County Health Care Services (ACHCS) that identified and evaluated four corrective action alternatives. The CAP was consistent with the National Contingency Plan (NCP) and was prepared in accordance with U.S. Environmental Protection Agency (EPA) guidance documentation (*EPA, 1988*).

The CAP following findings generally concurred with suggestions received from ACHCS (*ACHCS, 1997*):

- Discontinue treatment system operations when free product is no longer observed at the site.
- Further delineate the plume, as presented herein.
- If feasible, use oxygen releasing compound (ORC) to further degrade dissolved hydrocarbons.
- Proceed with Risk Based Corrective Action (RBCA) and implement risk management approaches at the site.

2.0 INVESTIGATION

This additional investigation provided data to further evaluate the lateral extent of petroleum hydrocarbons in groundwater near the Site, and to evaluate the possibility of other hydrocarbon plumes impacting the Site. Activities conducted during this investigation include installation of an upgradient well, soil and groundwater sampling, and collection and analyses of a product sample.

2.1 MW-6 Installation

In April 1996, monitoring well MW-6 was constructed southwest of the Site to provide additional data for the analysis of groundwater gradient. MW-6 was installed in the public right-of-way on the northwest corner of the Jefferson Street and 17th Street intersection. The well was drilled using 8-inch-diameter hollow-stem augers and was completed using 2-inch-diameter Schedule 40 flush-threaded PVC pipe. The well was constructed to a total depth of 35.5 feet bgs with 10 feet of 0.02-inch slotted screen. The annulus was filled with No. 2/12 sand from the bottom of the boring to a depth approximately 2 feet above the top of the screen interval followed by 2 feet of bentonite pellets hydrated with water. The remainder of the annular space was filled with cement. The monitoring well was secured with a locking cap and completed with a flush-mounted steel well cover.

The groundwater monitoring well was developed using a surge block/bailer technique and pumped until the water is visually free of turbidity. Pumping was continued until at least five well volumes of groundwater were removed.

Prior to the installation of MW-6, monitoring data indicated a northern groundwater gradient. However, groundwater elevation data gathered when MW-6 was installed showed a southern direction to the groundwater flow. HLA believes this apparent reversal of the gradient was the result of intensive dewatering activities being performed at two construction sites located within a block to the south of the Site. Since the completion of the dewatering activities in late 1996, the direction of groundwater flow has returned to north to northwest with a gradient ranging from 0.0025 to 0.0001 ft/ft.

2.2 Monitoring Well Sampling

Monitoring Wells MW-1A, MW-3, MW-4, MW-5, and MW-6 were last sampled on June 30, 1999, to satisfy ACHS quarterly groundwater monitoring requirements. At least three well casing volumes of water were purged from each well before sampling. A state-certified analytical laboratory analyzed water samples for TPH as gasoline (TPH gas), methyl t-butyl ether (MTBE), and BTEX. Table 1 contains a summary of historical groundwater monitoring analytical results. Laboratory reports are included in Appendix A.

2.3 Offsite Soil and Groundwater Investigation

On March 4, 1998, HLA collected additional offsite soil and groundwater information at six locations, shown on Plate 1. Gregg Drilling and Testing, Inc. of Martinez, California advances five boring with a cone penetrometer test (CPT) rig. This rig uses hydraulically driven rods that are pushed into the soil. The CPT rig is capable of measuring stratigraphy characteristics and collecting groundwater and soil samples.

The cone penetrometer equipment measures the cone bearing pressure (Qc), sleeve friction (Fs) and pore water pressure (U) at the tip of the rod as it pushes through the soil. The friction ratio, Fs/Qc, is used to characterize the type of soil encountered as the rods are advanced. The pore pressure measurements determine whether the soil is in a saturated zone or not. CPT technology to log the soil characteristics was used at three of the boring in this investigation.

The results of the CPT data are presented in Appendix B.

Two soil samples were collected in each boring with the exception of CPT-5; one at the near surface beneath the concrete or asphalt and one at or near the capillary fringe (semi-saturated soils directly above the groundwater table). The samples were collected in ¾-inch stainless steel tubes, which were immediately sealed with Teflon tape and end caps and placed in an iced cooler for storage. Groundwater samples were collected through temporary well casings that were placed in the borings using a stainless-steel bailer. The groundwater samples were contained in 40-milliliter glass vials and placed in an iced cooler for storage. All samples were transported to a state certified laboratory under chain-of-custody protocol and analyzed for TPH gas, BTEX, and MTBE. Laboratory reports are included in Appendix A.

The six borings were located in the parking lanes of 17th Street, 18th Street, San Jefferson Street and San Pablo Boulevard. Two of the borings (CPT-1 and CPT-2) were located upgradient of the Site and the remaining four borings (CPT-3 through -6) were located downgradient to define the lateral extent of the plume.

2.4 Product Sample

On April 2, 1998, HLA collected a sample of the free-phase product from the oil-water separator at the onsite groundwater extraction and treatment system. The product was extracted with groundwater from MW-1A and MW-4 before entering the oil water separator, where the laminar flow condition allows product to separate from the groundwater. The product gathers in a series of weirs in sufficient quantities to allow collection of a reasonably pure sample of product.

HLA stored the sample in a cooled container and sent it under chain-of-custody protocol to Friedman and Bruya, Inc. (Friedman) of Seattle, Washington for analysis. Friedman is an environmental chemical laboratory, which specializes in product analysis. The sample was analyzed for hydrocarbon characterization by gas chromatography with a flame ionization detector (GC/FID method); for paraffins, iosparaffins, aromatics, naphthenes and olefins (PIANO) by gas chromatography with mass spectrometry (GC/MS method); and for the presence of organic lead by inductively coupled plasma (ICP). The completed summary report from Friedman is included in Appendix C.

3.0 RESULTS

The following section discusses results of this investigation based on CPT data, soil and groundwater samples, historical groundwater monitoring, and analysis a product sample. The CPT data presents information about the local soil statigraphy. The soil and groundwater samples are used to present information on the extent of the existing hydrocarbon plume. The groundwater monitoring data shows the changes of groundwater conditions over time. The free-phase product analysis presents information relating to the source of the product.

3.1 Quarterly Groundwater Monitoring Results

Results from the most resent quarterly groundwater-monitoring event indicate a decline in the petroleum hydrocarbon concentrations in the wells. This is further supported by the absence of free-phase product in the monitoring wells and in the oil-water separator. Graphs D-1 through D-5 in Appendix D show declining dissolved hydrocarbon concentration in monitoring wells after free-product removal was complete. These graphs show declining concentrations of TPH gas with a less pronounced decline for BTEX. Except for a detection of 0.5 micrograms per liter (µg/L) ethylbenzene in December 1997, no petroleum hydrocarbons have been detected in MW-6. The results of the last monitoring event are presented on Plate 2 and historical results are summarized on Table 1.

3.2 CPT Data

CPT data was collected at CPT-1, CPT-2, and CPT-3 (presented in Appendix A) that confirmed HLA's previous assessments of the local soil stratigraphy. The area consists of 10 to 15 feet of silty-sand and clay fill material with an underlying sandy-clay unit containing more permeable sand lenses. The groundwater level was found approximately 24 to 26 feet bgs, which are consistent historic groundwater level measurements.

3.3 Soil and Groundwater Chemical Analyses Results

3.3.1 Soil Samples

The chemical analysis results from six soil samples collected in the upper two feet at each of the sample locations (CPT-1 through CPT-6) are presented on Plate 3. Results from soil samples collected at or near the capillary fringe at five of the CPT locations are presented on Plate 4; a capillary fringe sample from CPT-5 was not obtained due to refusal at 17 feet bgs.

MTBE was not detected in any of the soil samples analyzed and no petroleum hydrocarbons were observed, with the following two minor exceptions at location CPT-2:

- The shallow soil sample (1.0 to 1.5 feet bgs) was reported to contain xylenes at 6 microgram per kilogram (µg/kg).
- The capillary-fringe soil sample (24 to 24.5 feet bgs) contained TPH gas at 4.3 mg/kg.

Table 2 summarizes chemical analysis results from the soil samples and the laboratory report is located in Appendix C.

3.3.2 Groundwater Samples

Chemical analyses results from five groundwater samples collected from CPT locations 1, 2, 3, 4, and 6 are presented on Plate 5; the CPT rod could not be advanced to groundwater depth at location CPT-5.

None of the samples contained detectable concentrations MTBE. Groundwater from four of the locations contained low TPH gas concentrations ranging from 0.42 milligrams per liter (mg/L) at CPT-6 to 0.05

mg/L at CPT-4. CPT-6 also contained the only benzene detected at 1.2 µg/L. The only other detectable hydrocarbons in the groundwater samples were from CPT-2, which contained toluene and xylenes at 0.6 and 2 µg/L, respectively. The chemical analysis results of the groundwater samples are summarized in Table 3 and the laboratory report is located in Appendix C.

3.4 Product Sample Results

Friedman analyzed the product sample from the oil-water separator for hydrocarbon characterization. Based on background information provided by HLA, Friedman summarized their analysis of the product characteristics. A copy of Friedman's report is located in Appendix B.

Friedman found that the sample appeared be aged unweathered leaded gasoline. The product appeared aged because of the low proportion of the most volatile constituents (specifically n-butane) compared to what is normally found in gasoline. However, the sample did not appear significantly weathered by either water solubilization or evaporative processes.

The sample was found to contain concentrations of organic lead normally found in leaded gasoline. The sample was not found to contain any MTBE or other alcohol and ethers found in most gasoline produced after 1990.

4.0 CONCLUSIONS

HLA has identified the following conclusions based on the results of this investigation.

4.1 Completion of Free Product Recovery

- Free-product recovery is complete. Groundwater monitoring results and CPT data indicate that free product is no longer present at the Site. Free product has not been observed at the Site since 1997.
- The product removed from the Blue Print Services facility at 1700 Jefferson Street is likely to have been from a release prior to BPS's ownership of the site because the released product appears to be leaded gasoline which was not stored by BPS.
- The majority of hydrocarbon mass recovered from the site has been associated with free product recovery (98 percent); the dissolved mass removed during 7 years of groundwater extraction is comparatively negligible to the free product mass.

4.2 Extent and Disposition of Dissolved Hydrocarbons

- The petroleum hydrocarbon plume at the Site has not migrated substantially offsite.
- No carcinogenic compounds were found above the Maximum Contaminate Levels for drinking water set by the State of California in the offsite CPT borings.
- With the removal of free-phase product, the hydrocarbon plume appears to be stable and groundwater quality at the Site has greatly improved. Groundwater quality is anticipated to continue improving with natural attenuation.
- The use of ORC (as suggested in the CAP) may enhance biodegradation rates and accelerate natural attenuation.

4.3 Treatment System Status

- The treatment system has achieved its primary purpose of removing free product from the Site. More than four quarters have passed without the observation of free product in any well on- or offsite. This situation warrants the discontinuation of treatment operations based on the CAP (*HLAc, 1997*) and suggestions from ACHCS (*ACHCS, 1997*).
- Groundwater extraction is no longer an efficient method of site remediation because the treatment system was designed for free product recovery and due to the relatively low hydraulic conductivity in area (thus low flow rates of the extraction wells). The current system would not be able to extract significant amounts of dissolved hydrocarbons in the groundwater if it were to continue operating.

5.0 RECOMMENDATIONS

HLA provides the following recommendations based on the results of this investigation and the CAP findings:

1. Turn off the recovery system now that free product recovery is complete.
2. Accelerate natural attenuation by installing ORC socks in wells MW-1A, MW-3, MW-4, and MW- 5. The ORC socks will serve to increase the dissolved oxygen content in the groundwater thus enhancing the natural biodegradation of the remaining hydrocarbon constituents. The ORC will be installed from the bottom of each well to near the top of groundwater surface. Three weeks prior to groundwater monitoring the socks will be removed from the wells and the dissolved oxygen (DO) levels in the groundwater at each well will be measured. During the quarterly groundwater event, the DO will again be measured and after sampling is complete the ORC socks will be replaced in the wells.
3. Proceed with RBCA and implement risk management approaches at the Site after one year of ORC application.

6.0 REFERENCES

ACHCS, 1997. *Letter to Blue Print Service Company,* Alameda County Health Care Service, September 11.

EPA, 1988. *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA*, U.S. Environmental Protection Agency.

HLAa, 1987. *Soil Investigation, City Blue Production Facility, 1700 Jefferson Street, Oakland California,* Harding Lawson Associates. May 4.

HLAb, 1987. *Final Report, Ground-Water Investigation, City Blue Production Facility, 1700 Jefferson Street, Oakland California,* Harding Lawson Associates. November 3.

HLAc, 1997. *Response and Corrective Action Plan, STID 4148, 1700 Jefferson Street, Oakland California,* Harding Lawson Associates. November 11.

HLAd, 1998. *Quarterly Report, April 1, 1998 through June 30, 1998, Blue Print Services Company,, 1700 Jefferson Street, Oakland California,* Harding Lawson Associates. June 18.

Table 1. Groundwater Monitoring Analytical Results
Blue Print Service Facility
1700 Jefferson Street
Oakland, California

	Date Sampled																							
TPHg (mg/l)	8/1/91	9/30/92	3/30/93	1/13/94	4/13/94	6/29/94	12/8/94	4/3/95	6/27/95	9/19/95	12/13/95	3/6/96	6/11/96	9/19/96	12/23/96	3/27/97	6/4/97	9/26/97	12/23/97	3/31/98	6/18/98	8/28/98	12/2/98	3/10/99	6/30/99
MW-1	FP	FP	FP	FP	FP	FP	FP	NA	NA	NA	NA	NA	FP	FP	FP	FP	68	59	41	44	32	26	26	26	18
MW-1A	350	FP	FP	FP	170	95	190	67	53	52	62	200	140	100	FP	66	54	73	66	51	50	15	41	10	18
MW-3	74	FP	FP	FP	FP	39	4,600	51	20	6.2	19	7	16	6	FP	FP	85	47	32	32	16	17	3.2	9.6	7.9
MW-4	86	FP	FP	FP	58	16	92	33	13	14	11	110	260	95	FP	37	24	41	48	NA	25	48	10	11	8.8
MW-5	120	51	74	80	63	64	59	51	41	50	45	51	48	48	45	44	35	36	39	48	17	16	15	23	7.7
MW-6	--	--	--	--	--	--	--	--	--	--	--	--	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)	ND(0.05)
Benzene (µg/l)																									
MW-1	FP	FP	FP	FP	FP	FP	FP	NA	NA	NA	NA	NA	FP	FP	FP	FP	2,200	6,000	6,800	8,300	1,100	8,600	9,200	8,200	7,000
MW-1A	17,000	FP	FP	FP	17,000	16,000	13,000	11,000	11,000	8,900	9,900	14,000	18,000	16,000	FP	12,000	11,000	10,000	10,000	9,100	11,000	1,100	8,500	2,300	6,400
MW-3	1,600	FP	FP	FP	FP	3,200	1,500	1,100	270	70	220	120	170	45	FP	FP	8,500	610	640	690	180	84	39	86	31
MW-4	1,500	FP	FP	FP	1,500	1,300	1,700	1,200	1,300	2,200	630	2,600	6,600	9,900	FP	2,600	2,600	2,900	6,000	NA	2,000	9,700	1,700	2,300	1,800
MW-5	20,000	13,000	16,000	19,000	14,000	29,000	13,000	15,000	12,000	1,600	13,000	15,000	12,000	12,000	12,000	11,000	8,900	7,900	13,000	10,000	9,500	5,400	8,400	14,000	5,200
MW-6	--	--	--	--	--	--	--	--	--	--	--	--	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.30)
Toluene (µg/l)																									
MW-1	FP	FP	FP	FP	FP	FP	FP	NA	NA	NA	NA	NA	FP	FP	FP	14,000	4,500	3,000	3,000	3,700	3,800	2,300	4,300	5,900	5,800
MW-1A	31,000	FP	FP	FP	31,000	21,000	21,000	13,000	9,900	9,200	11,000	22,000	28,000	22,000	FP	15,000	12,000	16,000	16,000	11,000	15,000	830	11,000	1,900	7,800
MW-3	4,600	FP	FP	FP	FP	2,900	4,200	2,300	550	140	480	170	270	30	FP	FP	13,000	6,000	5,300	3,800	1,500	1,100	85	540	330
MW-4	6,200	FP	FP	FP	2,300	790	4,100	3,400	1,600	2,100	470	3,600	19,000	19,000	FP	6,900	3,200	5,000	11,000	NA	460	11,000	610	2,100	3,000
MW-5	14,000	5,900	5,000	8,200	3,500	5,400	3,800	2,200	2,100	2,700	2,100	2,800	2,900	4,500	2,200	1,100	560	270	500	400	310	160	120	300	270
MW-6	--	--	--	--	--	--	--	--	--	--	--	--	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.30)
Ethylbenzene (µg/l)																									
MW-1	FP	FP	FP	FP	FP	FP	FP	NA	NA	NA	NA	NA	FP	FP	FP	FP	1,500	1,600	1,400	1,100	550	730	820	870	950
MW-1A	3,000	FP	FP	FP	2,100	1,500	1,400	910	500	710	790	2,700	2,800	2,100	FP	1,400	1,000	1,400	1,400	1,100	870	31	720	1,600	660
MW-3	670	FP	FP	FP	FP	580	6,000	580	190	68	140	49	68	15	FP	FP	2,400	930	800	870	490	430	25	250	200
MW-4	1,000	FP	FP	FP	520	51	310	280	77	110	14	780	3,700	2,000	FP	540	140	350	580	NA	ND(15)	890	ND(15)	88	150
MW-5	1,900	1,400	1,800	1,400	1,500	2,800	1,800	2,800	1,400	2,000	16,000	2,000	2,000	2,300	2,700	1,900	1,500	1,500	1,900	2,000	420	1,100	1,500	1,800	1,100
MW-6	--	--	--	--	--	--	--	--	--	--	--	--	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	0.5	ND(0.5)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.30)
Xylene (µg/l)																									
MW-1	FP	FP	FP	FP	FP	FP	FP	NA	NA	NA	NA	NA	FP	FP	FP	FP	11,000	8,600	6,600	4,300	3,000	2,100	2,800	3,500	2,500
MW-1A	22,000	FP	FP	FP	14,000	12,000	11,000	9,800	6,300	6,800	5,300	22,000	19,000	14,000	FP	100	7,200	8,500	12,000	6,800	5,800	3,000	6,700	2,300	4,100
MW-3	4,300	FP	FP	FP	FP	4,300	95,000	4,800	1,700	500	1,700	440	1,500	300	FP	FP	16,000	5,900	5,900	5,200	3,700	3,800	360	2,300	1,800
MW-4	7,300	FP	FP	FP	3,200	3,400	5,400	5,800	1,800	2,100	1,800	10,000	28,000	13,000	FP	5,500	3,500	4,800	8,200	NA	6,400	5,000	2,300	1,600	2,700
MW-5	4,900	2,600	2,700	2,700	2,100	4,500	2,900	4,500	1,600	2,100	1,900	2,400	2,700	4,000	6,500	2,800	1,700	1,300	1,700	2,200	850	900	840	1,100	690
MW-6	--	--	--	--	--	--	--	--	--	--	--	--	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	ND(0.60)	ND(0.60)	ND(0.60)	ND(0.60)	ND(0.60)
MTBE (µg/l)																									
MW-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FP	FP	ND(500)	ND(500)	300	420	ND(50)	ND(50)	ND(50)	ND(50)	ND(25)
MW-1A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,800	ND(500)	ND(500)	1,900	300	ND(50)	ND(50)	ND(50)	ND(50)	ND(25)
MW-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FP	FP	ND(500)	ND(100)	ND(300)	350	ND(25)	ND(50)	ND(50)	ND(25)	ND(25)
MW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,400	ND(300)	ND(500)	270	NA	ND(50)	ND(50)	ND(50)	ND(25)	ND(25)
MW-5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	600	300	ND(100)	ND(500)	ND(1000)	350	ND(10)	ND(50)	ND(50)	ND(50)	ND(25)
MW-6	--	--	--	--	--	--	--	--	--	--	--	--	NA	NA	ND(5)	ND(5)	ND(5)	ND(5)	ND(5)	ND(5)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)

TPHg = total petroleum hydrocarbons as gasoline
MTBE = methyl t-butyl ether
(mg/l) milligrams per liter
(µg/l) micrograms per liter
ND = Not detected above the reporting limit in parenthesis
NA = Not analyzed
FP = Free Product
-- = Well did not exist at date indicated

Table 2. Chemical Results from Soil Sampling
Blue Print Sevices, Company
1700 Jefferson
Feburary 19, 1998

SOIL RESULTS

Date Sampled	Sample ID	Sample Location	Benzene (µg/kg)	Toluene (µg/kg)	Ethylbenzene (µg/kg)	Xylenes, total (µg/kg)	TPH gas (mg/kg)	MTBE (µg/kg)
19-Feb-98	9809S001	CPT-1 @ 1'-1.5'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50
19-Feb-98	9809S005	CPT-1 @ 24'-24.5'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50
19-Feb-98	9809S002	CPT-2 @ 1.0'-1.5'	ND<5	ND<5	ND<5	6	ND<1	ND<50
19-Feb-98	9809S003	CPT-2 @ 24'-24.5'	ND<30	ND<30	ND<30	ND<30	4.3	ND<300
19-Feb-98	9809S006	CPT-3 @ 1.5'-1.8'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50
19-Feb-98	9809S010	CPT-3 @ 23'-23.5'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50
19-Feb-98	9809S007	CPT-4 @ 0.5'-1.0'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50
19-Feb-98	9809S008	CPT-4 @ 23'-23.5'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50
19-Feb-98	9809S009	CPT-5 @ 0.5'-1.0'	ND<10	ND<10	ND<10	ND<10	ND<2	ND<100
19-Feb-98	9809S004	CPT-6 @ 0.5'-1.0'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50
19-Feb-98	9809S011	CPT-6 @ 23'-23.5'	ND<5	ND<5	ND<5	ND<5	ND<1	ND<50

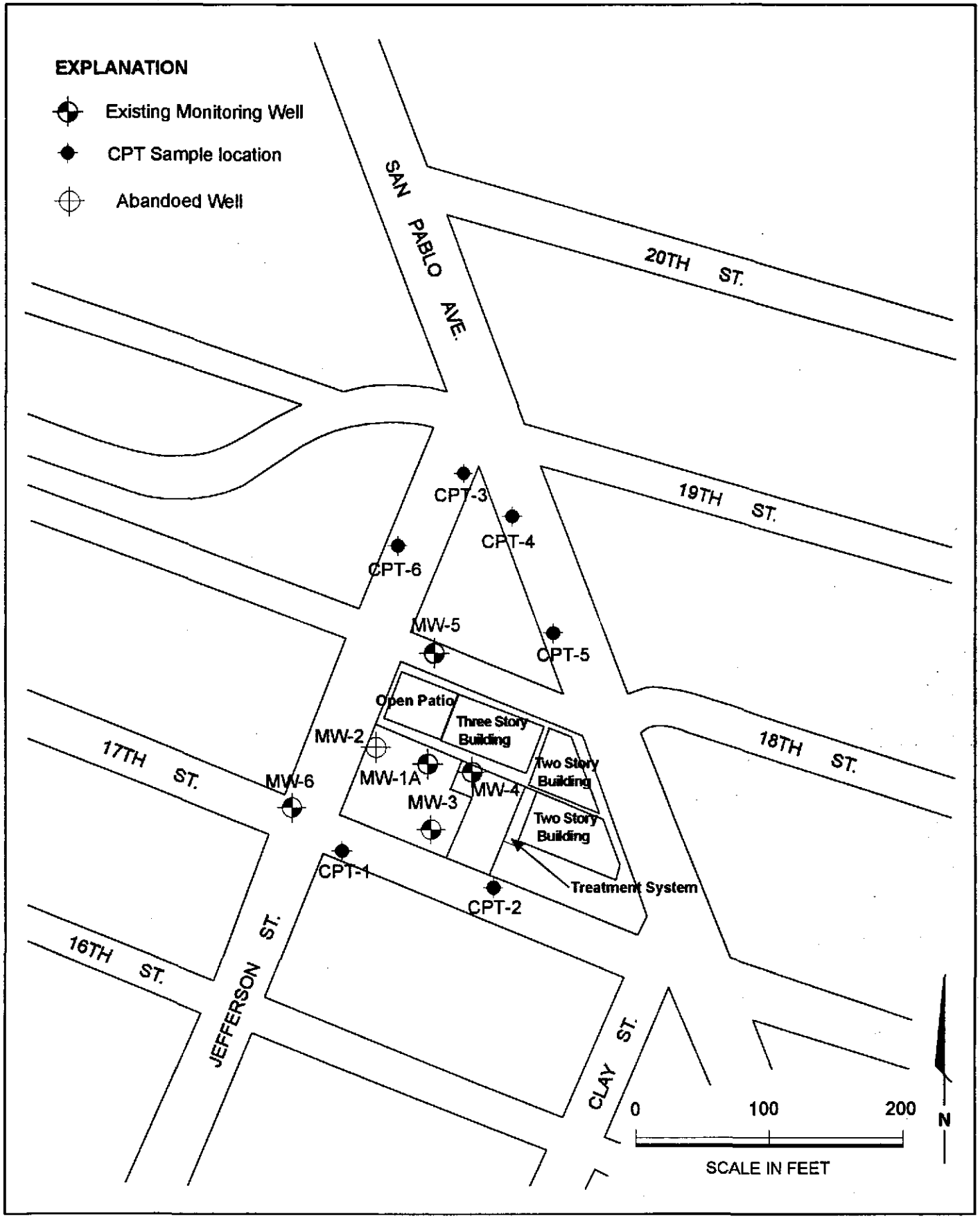
ND<5 Not detected above a reporting limit of 5
(µg/kg) micrograms per kilogram
(mg/kg) milligrams per kilograms

Table 3. Chemical Results from Soil and Groundwater Sampling
Blue Print Sevices, Company
1700 Jefferson
Feburary 19, 1998

GROUNDWATER RESULTS

Date Sampled	Sample ID	Sample Location	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes, total (µg/L)	TPH gas (mg/L)	MTBE (µg/L)
19-Feb-98	9808GW02	CPT-1	ND<0.5	ND<0.5	ND<0.5	ND<2	ND<0.05	ND<5
19-Feb-98	9808GW01	CPT-2	ND<0.5	0.6	ND<0.5	2	0.20	ND<5
19-Feb-98	9808GW04	CPT-3	ND<0.5	ND<0.5	ND<0.5	ND<2	0.18	ND<5
19-Feb-98	9808GW03	CPT-4	ND<0.5	ND<0.5	ND<0.5	ND<2	0.05	ND<5
19-Feb-98	9808GW05	CPT-6	1.2	ND<0.5	ND<0.5	ND<2	0.42	ND<5

ND<5 Not detected above a reporting limit of 5
(µg/L) micrograms per liter
(mg/L) milligrams per liter

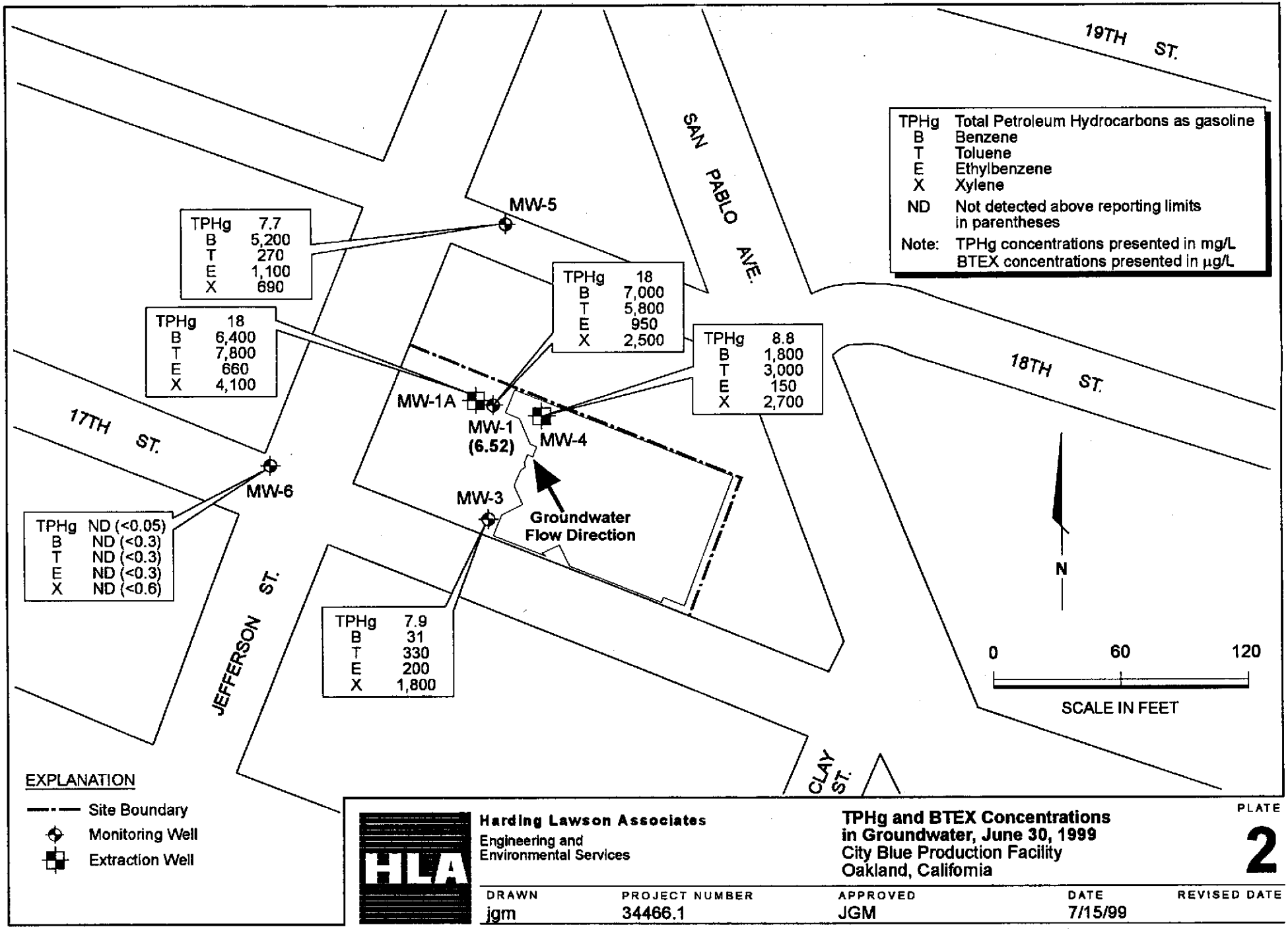


Harding Lawson Associates
Engineering and
Environmental Services

City Blue Groundwater Investigation
1700 Jefferson Street
Oakland, California 94612

PLATE
1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
jgm	34466.1		03/04/98	

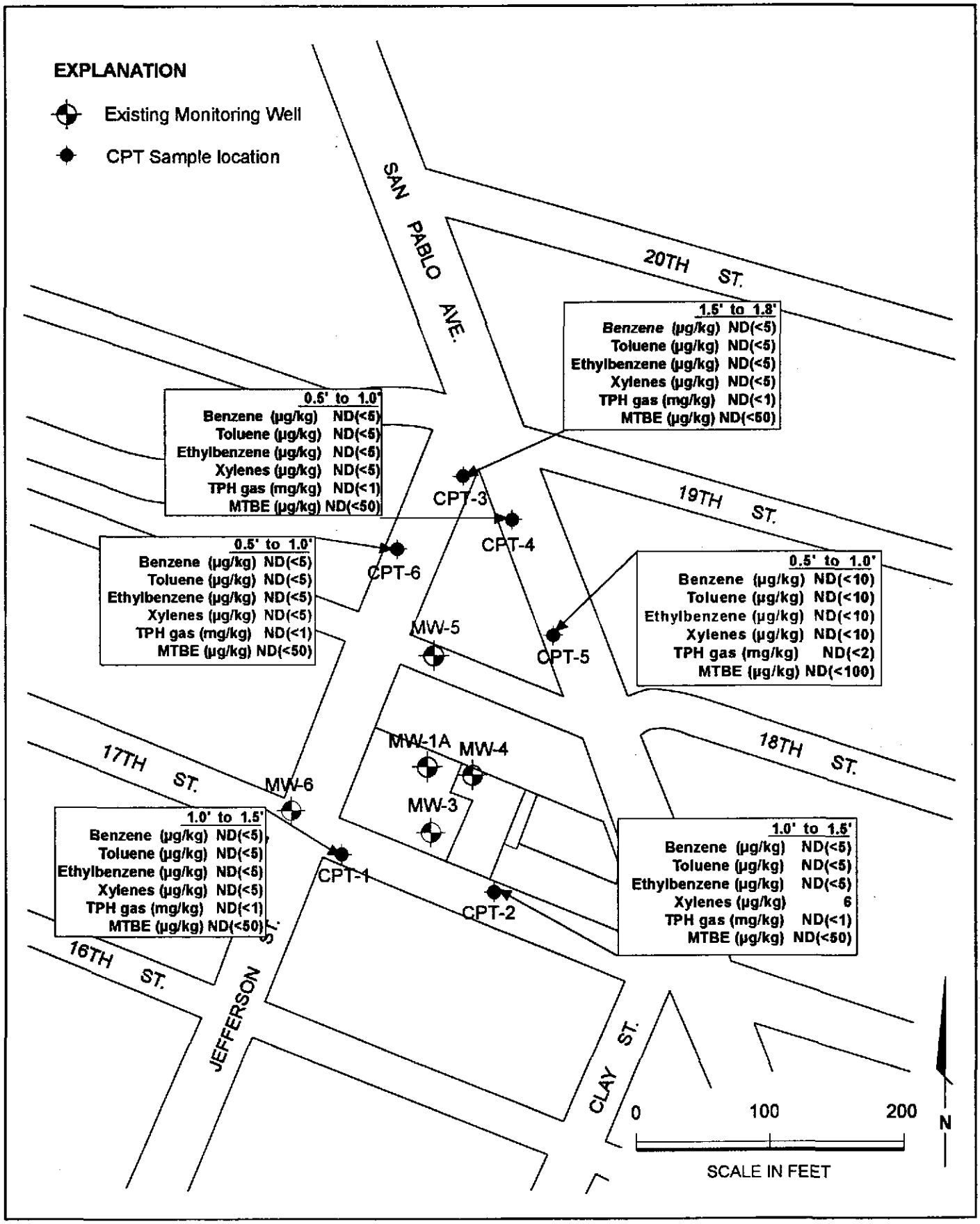


Harding Lawson Associates
Engineering and Environmental Services

TPHg and BTEX Concentrations in Groundwater, June 30, 1999
City Blue Production Facility
Oakland, California

PLATE **2**

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
jgm	34466.1	JGM	7/15/99	

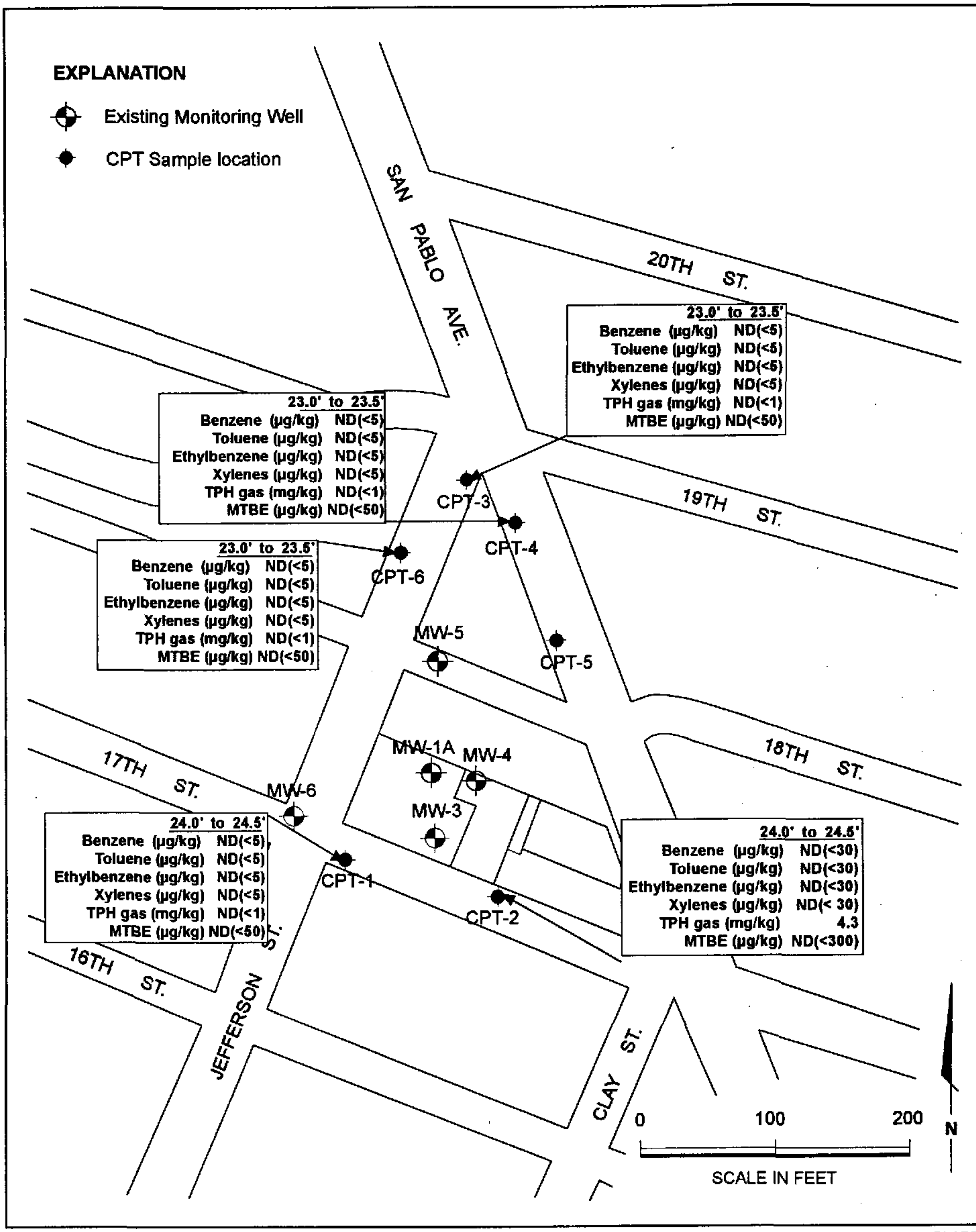


Harding Lawson Associates
Engineering and Environmental Services

City Blue Groundwater Investigation
Results of Shallow Soil Samples
1700 Jefferson Street
Oakland, California 94612

PLATE **3**

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
jgm	34466.1		03/04/98	

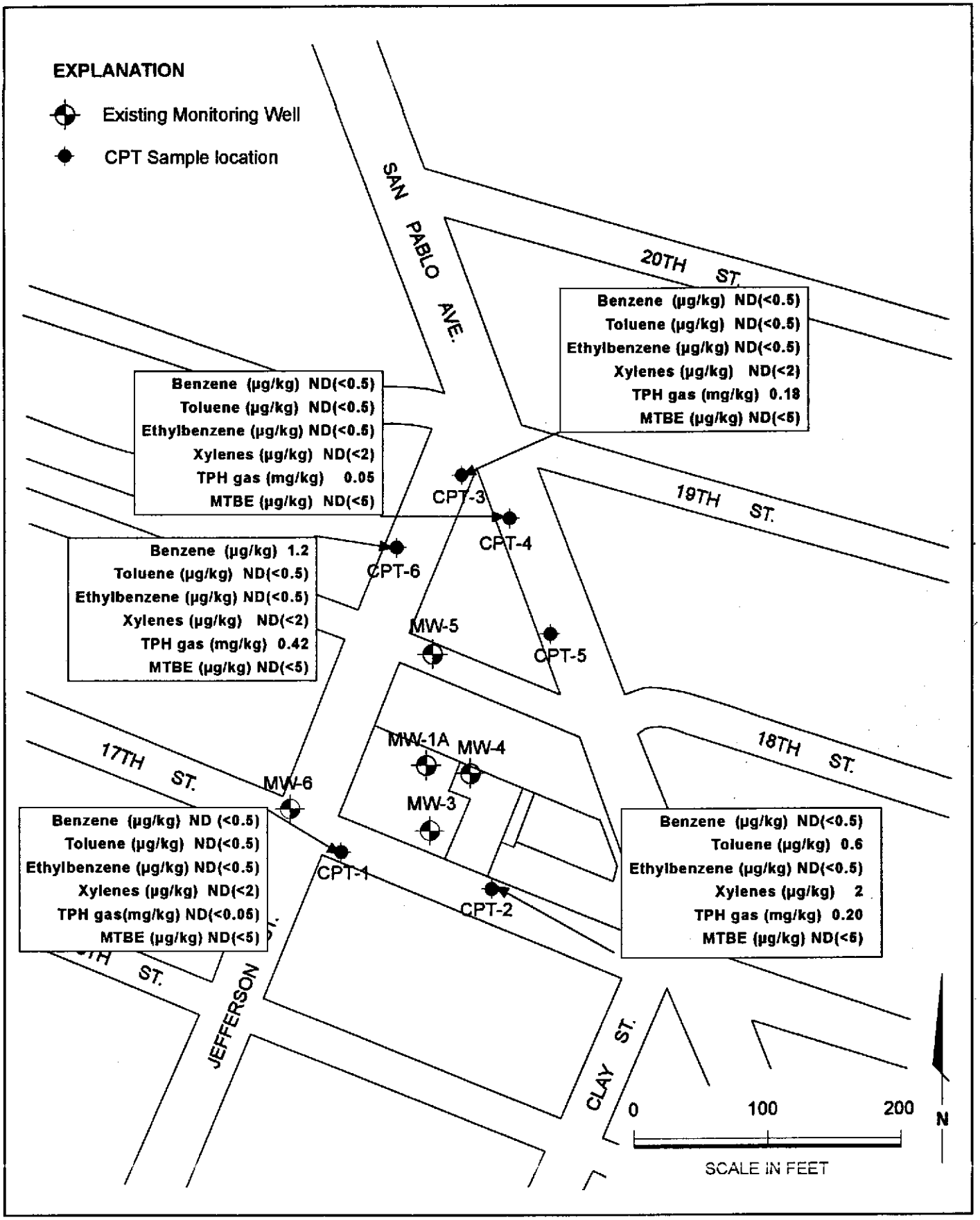


Harding Lawson Associates
Engineering and Environmental Services

City Blue Groundwater Investigation
Results of Capillary Fringe Soil Samples
1700 Jefferson Street
Oakland, California 94612

PLATE **4**

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
jgm	34466.1		03/04/98	



Harding Lawson Associates
Engineering and Environmental Services

City Blue Groundwater Investigation
Results of Groundwater Samples
1700 Jefferson Street
Oakland, California 94612

PLATE **5**

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
jgm	34466.1		03/04/98	

APPENDIX A

LABORATORY DATA

Harding Lawson Associates
1855 Gateway Boulevard, Suite 500
Concord, California 94520
(510) 687-9660

R-3,5-3

9802255 ~~9802243~~

CHAIN OF CUSTODY FORM

Lab: AEN 1678

Samplers: James M'Carty

Job Number: 34466-1

Name/Location: City Blue, BPS Oakland

Project Manager: James M'Carty

Recorder: James M'Carty (Signature Required)

MATRIX					# CONTAINERS & PRESERV.					SAMPLE NUMBER OR LAB NUMBER			DATE				STATION DESCRIPTION/ NOTES	LAB NO
Water	Sediment	Soil	Oil		Unpres.	H_2SO_4	HNO_3	HCL	Ice	Yr	Wk	Seq	Yr	Mo	Day	Time		
X								3	X	9	8	0802GW01	9	8	02	1945	CPT-2 @ 27-30'	01A-C
X								3	X	9	8	0802GW02	9	8	02	1910	CPT-1 @ 27'-30'	02A-C
X								3	X	9	8	0802GW03	9	8	02	1915	CPT-4 @ 27'-30'	03A-C
X								3	X	9	8	0802GW04	9	8	02	1610	CPT-3 @ 27-30'	04A-C
X								3	X	9	8	0802GW05	9	8	02	1720	CPT-6 @ 27'-30'	05A-C
X								3	X	9	8	06						
X								3	X			07						

ANALYSIS REQUESTED																				
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	METALS	EPA 8015M/TPHg	EPA 8020/BTEX	EPA 8015M/TPHd.o	TPHg/BTEX/MTBE												
								X												
								X												
								X												
								X												
								X												

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME 2/20 1115
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME 2/20 1425
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

SAMPLE CONDITION WHEN RECEIVED BY THE LABORATORY

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

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9802255
CLIENT PROJECT ID: 34466-1

Quality Control and Project Summary

All laboratory quality control parameters were found to be within established limits.

Definitions

Laboratory Control Sample (LCS)/Method Spike(s): Control samples of known composition. LCS and Method Spike data are used to validate batch analytical results.

Matrix Spike(s): Aliquot of a sample (aqueous or solid) with added quantities of specific compounds and subjected to the entire analytical procedure. Matrix spike and matrix spike duplicate QC data are advisory.

Method Blank: An analytical control consisting of all reagents, internal standards, and surrogate standards carried through the entire analytical process. Used to monitor laboratory background and reagent contamination.

Not Detected (ND): Not detected at or above the reporting limit.

Relative Percent Difference (RPD): An indication of method precision based on duplicate analysis.

Reporting Limit (RL): The lowest concentration routinely determined during laboratory operations. The RL is generally 1 to 10 times the Method Detection Limit (MDL). Reporting limits are matrix, method, and analyte dependent and take into account any dilutions performed as part of the analysis.

Surrogates: Organic compounds which are similar to analytes of interest in chemical behavior, but are not found in environmental samples. Surrogates are added to all blanks, calibration and check standards, samples, and spiked samples. Surrogate recovery is monitored as an indication of acceptable sample preparation and instrumental performance.

D: Surrogates diluted out.

#: Indicates result outside of established laboratory QC limits.

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808GW04
AEN LAB NO: 9802255-04
AEN WORK ORDER: 9802255
CLIENT PROJ. ID: 34466-1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/03/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	**EPA 8020**				
Benzene	71-43-2	ND	0.5	ug/L	02/26/98
Toluene	108-88-3	ND	0.5	ug/L	02/26/98
Ethylbenzene	100-41-4	ND	0.5	ug/L	02/26/98
Xylenes, Total	1330-20-7	ND	2	ug/L	02/26/98
Purgeable HCs as Gasoline	5030/GCFID	0.18 *	0.05	mg/L	02/26/98
Methyl t-Butyl Ether	1634-04-4	ND	5	ug/L	02/26/98

Non-target compounds included in gasoline result.

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808GW02
AEN LAB NO: 9802255-02
AEN WORK ORDER: 9802255
CLIENT PROJ. ID: 34466-1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/03/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	0.5	ug/L	02/26/98
Toluene	108-88-3	ND	0.5	ug/L	02/26/98
Ethylbenzene	100-41-4	ND	0.5	ug/L	02/26/98
Xylenes, Total	1330-20-7	ND	2	ug/L	02/26/98
Purgeable HCs as Gasoline	5030/GCFID	ND	0.05	mg/L	02/26/98
Methyl t-Butyl Ether	1634-04-4	ND	5	ug/L	02/26/98

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

American Environmental Network

Certificate of Analysis

DOHS Certification: 1172 AIHA Accreditation: 11134

HARDING ASSOC.

MAR 9 1998

HARDING LAWSON ASSOCIATES
383 FOURTH ST., STE. 300
OAKLAND, CA 94607

ATTN: JAMES McCARTY
CLIENT PROJ. ID: 34466-1
CLIENT PROJ. NAME: CITY BLUE/OAKD
C.O.C. NUMBER: 1678

REPORT DATE: 03/03/98

DATE(S) SAMPLED: 02/19/98

DATE RECEIVED: 02/20/98

AEN WORK ORDER: 9802255

PROJECT SUMMARY:

On February 20, 1998, this laboratory received 5 water sample(s).

Client requested sample(s) be analyzed for chemical parameters. Results of analysis are summarized on the following page(s). Please see quality control report for a summary of QC data pertaining to this project.

Samples will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Samples may be archived by prior arrangement.

If you have any questions, please contact Client Services at (510) 930-9090.

Larry Klein
Laboratory Director

Harding Lawson Associates
1855 Gateway Boulevard, Suite 500
Concord, California 94520
(510) 687-9660

CHAIN OF CUSTODY FORM

930245

Lab: AEN 1631

Samplers: James McCarthy, Valerie Harris

Job Number: 3241-606 1

Name/Location: City Elec, EBS Oakland

Project Manager: James McCarthy

Recorder: (Signature Required)

CODE	MATRIX: Water	Sediment	Soil	Oil	# CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	HCL	Ice	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Day	Time	STATION DESCRIPTION/ NOTES
			X		1				1	9	8	08501	7	8	02	19	0723	CPT-1 @ 1'-1'-6"
			X		1				1			02					0815	CPT-2 @ 11" - 14"
			X		1				1			03					1000	CPT-2 @ 24'-6"
			X		1				1			04					1030	CPT-6 @ SURFACE
			X		1				1			05					1116	CPT-1 @ 24'-6"
			X		1				1			06					1120	CPT-3 @ 1'-6" - 1'-10"
			X		1				1			07					1150	CPT-4 @ SURFACE
			X		1				1			08					1350	CPT-4 @ 23'-6"
			X		1				1			09					1425	CPT-5
			X		1				1			10					1545	CPT-3 @ 23'-6"

ANALYSIS REQUESTED

EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	METALS	EPA 8015M/TPHg	EPA 8020/BTEX	EPA 8015M/TPHd.o	TPH-g/BTEX/MTBE
								X
								X
								X
								X
								X
								X
								X
								X
								X
								X

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME 2/20/92 1115
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME 2/20 1425
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

SAMPLE CONDITION WHEN RECEIVED BY THE LABORATORY

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

QUALITY CONTROL DATA

METHOD: EPA 8020, 5030 GCFID

AEN JOB NO: 9802248
INSTRUMENT: H
MATRIX: SOIL

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery Fluorobenzene
03/04/98	9808S001	01	102
03/04/98	9808S002	02	101
03/05/98	9808S003	03	101
03/04/98	9808S004	04	101
03/04/98	9808S005	05	100
03/04/98	9808S006	06	102
03/04/98	9808S007	07	101
03/04/98	9808S008	08	101
03/05/98	9808S009	09	101
03/04/98	9808S010	10	102
03/04/98	9808S011	11	102
QC Limits:			70-130

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808S011
AEN LAB NO: 9802248-11
AEN WORK ORDER: 9802248
CLIENT PROJ. ID: 34466.1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/09/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	5	ug/kg	03/04/98
Toluene	108-88-3	ND	5	ug/kg	03/04/98
Ethylbenzene	100-41-4	ND	5	ug/kg	03/04/98
Xylenes, Total	1330-20-7	ND	5	ug/kg	03/04/98
Purgeable HCs as Gasoline	5030/GCFID	ND	1	mg/kg	03/04/98
Methyl t-Butyl Ether	1634-04-4	ND	50	ug/kg	03/04/98

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808S009
AEN LAB NO: 9802248-09
AEN WORK ORDER: 9802248
CLIENT PROJ. ID: 34466.1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/09/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	10	ug/kg	03/05/98
Toluene	108-88-3	ND	10	ug/kg	03/05/98
Ethylbenzene	100-41-4	ND	10	ug/kg	03/05/98
Xylenes, Total	1330-20-7	ND	10	ug/kg	03/05/98
Purgeable HCs as Gasoline	5030/GCFID	ND	2	mg/kg	03/05/98
Methyl t-Butyl Ether	1634-04-4	ND	100	ug/kg	03/05/98

Reporting limits elevated due to matrix interference.

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808S007
AEN LAB NO: 9802248-07
AEN WORK ORDER: 9802248
CLIENT PROJ. ID: 34466.1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/09/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	5	ug/kg	03/04/98
Toluene	108-88-3	ND	5	ug/kg	03/04/98
Ethylbenzene	100-41-4	ND	5	ug/kg	03/04/98
Xylenes, Total	1330-20-7	ND	5	ug/kg	03/04/98
Purgeable HCs as Gasoline	5030/GCFID	ND	1	mg/kg	03/04/98
Methyl t-Butyl Ether	1634-04-4	ND	50	ug/kg	03/04/98

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808S005
AEN LAB NO: 9802248-05
AEN WORK ORDER: 9802248
CLIENT PROJ. ID: 34466.1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/09/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	5	ug/kg	03/04/98
Toluene	108-88-3	ND	5	ug/kg	03/04/98
Ethylbenzene	100-41-4	ND	5	ug/kg	03/04/98
Xylenes, Total	1330-20-7	ND	5	ug/kg	03/04/98
Purgeable HCs as Gasoline	5030/GCFID	ND	1	mg/kg	03/04/98
Methyl t-Butyl Ether	1634-04-4	ND	50	ug/kg	03/04/98

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808S003
AEN LAB NO: 9802248-03
AEN WORK ORDER: 9802248
CLIENT PROJ. ID: 34466.1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/09/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	30	ug/kg	03/05/98
Toluene	108-88-3	ND	30	ug/kg	03/05/98
Ethylbenzene	100-41-4	ND	30	ug/kg	03/05/98
Xylenes, Total	1330-20-7	ND	30	ug/kg	03/05/98
Purgeable HCs as Gasoline	5030/GCFID	4.3 *	5	mg/kg	03/05/98
Methyl t-Butyl Ether	1634-04-4	ND	300	ug/kg	03/05/98

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

HARDING LAWSON ASSOCIATES

SAMPLE ID: 9808S001
AEN LAB NO: 9802248-01
AEN WORK ORDER: 9802248
CLIENT PROJ. ID: 34466.1

DATE SAMPLED: 02/19/98
DATE RECEIVED: 02/20/98
REPORT DATE: 03/09/98

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	5	ug/kg	03/04/98
Toluene	108-88-3	ND	5	ug/kg	03/04/98
Ethylbenzene	100-41-4	ND	5	ug/kg	03/04/98
Xylenes, Total	1330-20-7	ND	5	ug/kg	03/04/98
Purgeable HCs as Gasoline	5030/GCFID	ND	1	mg/kg	03/04/98
Methyl t-Butyl Ether	1634-04-4	ND	50	ug/kg	03/04/98

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

DISTRIBUTION

Groundwater Investigation
Blue Print Service Company
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August 13, 1998

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JGM/MAS/mlw/34966/036946R

Harding Lawson Associates
383 Fourth Street, Third Floor
Oakland, California 94607
(510) 451-1001 - Phone
(510) 451-3165 - Fax

CHAIN OF CUSTODY FORM

KSWD

№ 2308

Lab: CLS

Samplers: Heather Lee

Number: 46559-1

e/Location: City Blue GW Monitoring

ect Manager: Jim McCarty

Recorder: Heather D Lee (Signature Required)

MATRIX				# CONTAINERS & PRESERV.					SAMPLE NUMBER OR LAB NUMBER				DATE				STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED																			
Water	Sediment	Soil	Oil	Unpres.	H_2SO_4	HNO_3	HCL	Ice	Yr	Wk	Seq		Yr	Mo	Day	Time		EPA 8010	EPA 8020	EPA 8260	EPA 8270	METALS	EPA 8015M/TPHG	EPA 8020/BTEX + MTBE	EPA 8015M/TPHd,o										
X							3	X	MW	6			99	06	30	0740							X	X										
X							3	X	MW	5			99	06	30	0818							X	X										
X							3	X	MW	3			99	06	30	0910							X	X										
X							3	X	MW	1			99	06	30	0927							X	X										
X							3	X	MW	4			99	06	30	0937							X	X										
X							3	X	MW	1	A		99	06	30	0942							X	X										

LAB NUMBER		DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
Wk	Seq				Standard TAT

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Heather D Lee	RECEIVED BY: (Signature)	DATE/TIME 7/11/99 1100
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) J Pineda	DATE/TIME 7-1 1730

METHOD OF SHIPMENT

SAMPLE CONDITION WHEN RECEIVED BY THE LABORATORY

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

Harding Lawson Associates
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

07/15/99

Attention: **Jim McCarty**

Reference: **Analytical Results**

Project Name: **City Blue GW Monitoring**
Project No.: **46559-1**
Date Received: **07/01/99**
Chain Of Custody: **2308**

CLS ID No.: **R3006**
CLS Job No.: **823006**

The following analyses were performed on the above referenced project:

No. of Samples	*Turnaround Time*	*Analysis Description*
6	10 Days	TPH as Gasoline, BTEX and MTBE

These samples were received by CLS Labs in a chilled, intact state and accompanied by a valid chain of custody document.

Calibrations for analytical testing have been performed in accordance to and pass the EPA's criteria for acceptability.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D.
Laboratory Director

CLS Labs

Analysis Report: **Total Petroleum Hydrocarbons, EPA Method 8015**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**
Client ID No.: **MW-6**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-1A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (mg/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	0.0200	106

MW-6

Analyte	CAS No.	Results (mg/L)	Rep. Limit (mg/L)	Dilution (factor)
TPH as Gasoline	N/A	ND	0.050	1.0

ND = Not detected at or above indicated Reporting Limit

Analysis Report: **Total Petroleum Hydrocarbons, EPA Method 8015**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**
Client ID No.: **MW-5**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-2A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (mg/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	0.500	88

MW-5

Analyte	CAS No.	Results (mg/L)	Rep. Limit (mg/L)	Dilution (factor)
TPH as Gasoline	N/A	7.7	1.3	25

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: **Total Petroleum Hydrocarbons, EPA Method 8015**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/12/99**
Date Reported: **07/14/99**
Client ID No.: **MW-3**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-3A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (mg/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	0.500	90

MW-3

Analyte	CAS No.	Results (mg/L)	Rep. Limit (mg/L)	Dilution (factor)
TPH as Gasoline	N/A	7.9	1.3	25

ND = Not detected at or above indicated Reporting Limit

Analysis Report: **Total Petroleum Hydrocarbons, EPA Method 8015**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**
Client ID No.: **MW-1**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-4A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (mg/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	0.500	85

MW-1

Analyte	CAS No.	Results (mg/L)	Rep. Limit (mg/L)	Dilution (factor)
TPH as Gasoline	N/A	18	1.3	25

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: **Total Petroleum Hydrocarbons, EPA Method 8015**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/13/99**
Date Reported: **07/14/99**
Client ID No.: **MW-4**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-5A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (mg/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	0.500	95

MW-4

Analyte	CAS No.	Results (mg/L)	Rep. Limit (mg/L)	Dilution (factor)
TPH as Gasoline	N/A	8.8	1.3	25

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: **Total Petroleum Hydrocarbons, EPA Method 8015**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**
Client ID No.: **MW-1A**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-6A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (mg/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	0.500	87

MW-1A

Analyte	CAS No.	Results (mg/L)	Rep. Limit (mg/L)	Dilution (factor)
TPH as Gasoline	N/A	18	1.3	25

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: **Total Petroleum Hydrocarbons, EPA Method 8015**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

MB SURROGATE

Analyte	CAS No.	Surr Conc. (mg/L)	MB Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	0.0200	107

METHOD BLANK

Analyte	CAS No.	Results (mg/L)	Reporting Limit (mg/L)
TPH as Gasoline	N/A	ND	0.050

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: **EPA 8020, BTEX and MTBE**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**
Client ID No.: **MW-6**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-1A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (ug/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	20.0	106

MW-6

Analyte	CAS No.	Results (ug/L)	Rep. Limit (ug/L)	Dilution (factor)
Methyl t-butyl ether	1634-04-4	ND	1.0	1.0
Benzene	71-43-2	ND	0.30	1.0
Toluene	108-88-3	ND	0.30	1.0
Ethylbenzene	100-41-4	ND	0.30	1.0
Xylenes, total	1330-20-7	ND	0.60	1.0

ND = Not detected at or above indicated Reporting Limit

Analysis Report: **EPA 8020, BTEX and MTBE**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/13/99**
Date Reported: **07/14/99**
Client ID No.: **MW-5**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-2A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (ug/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	500	101

MW-5

Analyte	CAS No.	Results (ug/L)	Rep. Limit (ug/L)	Dilution (factor)
Methyl t-butyl ether	1634-04-4	ND	25	25
Benzene	71-43-2	5200	75	250
Toluene	108-88-3	270	7.5	25
Ethylbenzene	100-41-4	1100	7.5	25
Xylenes, total	1330-20-7	690	15	25

ND = Not detected at or above indicated Reporting Limit

Analysis Report: **EPA 8020, BTEX and MTBE**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/12/99**
Date Reported: **07/14/99**
Client ID No.: **MW-3**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-3A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (ug/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	500	100

MW-3

Analyte	CAS No.	Results (ug/L)	Rep. Limit (ug/L)	Dilution (factor)
Methyl t-butyl ether	1634-04-4	ND	25	25
Benzene	71-43-2	31	7.5	25
Toluene	108-88-3	330	7.5	25
Ethylbenzene	100-41-4	200	7.5	25
Xylenes, total	1330-20-7	1800	15	25

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: EPA 8020, BTEX and MTBE
Purge and Trap, EPA Method 5030

Client: Harding Lawson Associates
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: City Blue GW Monitoring

Date Sampled: 06/30/99
Date Received: 07/01/99
Date Extracted: 07/09/99
Date Analyzed: 07/09/99
Date Reported: 07/14/99
Client ID No.: MW-1

Project No.: 46559-1
Contact: Jim McCarty
Phone: (510)451-1001

Lab Contact: James Liang
Lab ID No.: R3006-4A
Job No.: 823006
COC Log No.: 2308
Batch No.: 25961
Instrument ID: GC018
Analyst ID: SCOTTF
Matrix: WATER

SURROGATE

Analyte	CAS No.	Surr Conc. (ug/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	500	99

MW-1

Analyte	CAS No.	Results (ug/L)	Rep. Limit (ug/L)	Dilution (factor)
Methyl t-butyl ether	1634-04-4	ND	25	25
Benzene	71-43-2	7000	150	500
Toluene	108-88-3	5800	150	500
Ethylbenzene	100-41-4	950	7.5	25
Xylenes, total	1330-20-7	2500	300	500

ND = Not detected at or above indicated Reporting Limit

Analysis Report: EPA 8020, BTEX and MTBE
Purge and Trap, EPA Method 5030

Client: Harding Lawson Associates
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: City Blue GW Monitoring

Date Sampled: 06/30/99
Date Received: 07/01/99
Date Extracted: 07/09/99
Date Analyzed: 07/13/99
Date Reported: 07/14/99
Client ID No.: MW-4

Project No.: 46559-1
Contact: Jim McCarty
Phone: (510)451-1001

Lab Contact: James Liang
Lab ID No.: R3006-5A
Job No.: 823006
COC Log No.: 2308
Batch No.: 25961
Instrument ID: GC018
Analyst ID: SCOTTF
Matrix: WATER

SURROGATE

Analyte	CAS No.	Surr Conc. (ug/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	500	103

MW-4

Analyte	CAS No.	Results (ug/L)	Rep. Limit (ug/L)	Dilution (factor)
Methyl t-butyl ether	1634-04-4	ND	25	25
Benzene	71-43-2	1800	150	500
Toluene	108-88-3	3000	150	500
Ethylbenzene	100-41-4	150	7.5	25
Xylenes, total	1330-20-7	2700	15	25

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: **EPA 8020, BTEX and MTBE**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Sampled: **06/30/99**
Date Received: **07/01/99**
Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**
Client ID No.: **MW-1A**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006-6A**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

SURROGATE

Analyte	CAS No.	Surr Conc. (ug/L)	Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	500	100

MW-1A

Analyte	CAS No.	Results (ug/L)	Rep. Limit (ug/L)	Dilution (factor)
Methyl t-butyl ether	1634-04-4	ND	25	25
Benzene	71-43-2	6400	300	1000
Toluene	108-88-3	7800	300	1000
Ethylbenzene	100-41-4	660	7.5	25
Xylenes, total	1330-20-7	4100	600	1000

ND = Not detected at or above indicated Reporting Limit

Analysis Report: **EPA 8020, BTEX and MTBE**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

MB SURROGATE

Analyte	CAS No.	Surr Conc. (ug/L)	MB Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	20.0	111

METHOD BLANK

Analyte	CAS No.	Results (ug/L)	Reporting Limit (ug/L)
Methyl t-butyl ether	1634-04-4	ND	1.0
Benzene	71-43-2	ND	0.30
Toluene	108-88-3	ND	0.30
Ethylbenzene	100-41-4	ND	0.30
Xylenes, total	1330-20-7	ND	0.60

ND = Not detected at or above indicated Reporting Limit

CLS Labs

Analysis Report: **EPA 8020, BTEX and MTBE**
Purge and Trap, EPA Method 5030

Client: **Harding Lawson Associates**
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: **City Blue GW Monitoring**

Date Extracted: **07/09/99**
Date Analyzed: **07/09/99**
Date Reported: **07/14/99**

Project No.: **46559-1**
Contact: **Jim McCarty**
Phone: **(510)451-1001**

Lab Contact: **James Liang**
Lab ID No.: **R3006**
Job No.: **823006**
COC Log No.: **2308**
Batch No.: **25961**
Instrument ID: **GC018**
Analyst ID: **SCOTTF**
Matrix: **WATER**

MS SURROGATE

Analyte	CAS No.	MS Surr. Conc. (ug/L)	MS Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	20.0	103

MATRIX SPIKE

Analyte	CAS No.	MS Conc. (ug/L)	MS Recovery (percent)
Benzene	71-43-2	20.0	96
Toluene	108-88-3	20.0	106
Ethylbenzene	100-41-4	20.0	104
Xylenes, total	1330-20-7	60.0	106

MSD SURROGATE

Analyte	CAS No.	Surr. Conc. (ug/L)	MSD Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	20.0	104

MATRIX SPIKE DUPLICATE

Analyte	CAS No.	MSD Conc. (ug/L)	MSD Recovery (percent)
Benzene	71-43-2	20.0	96
Toluene	108-88-3	20.0	106
Ethylbenzene	100-41-4	20.0	104
Xylenes, total	1330-20-7	60.0	106

RELATIVE % DIFFERENCE

Analyte	CAS No.	Relative Percent Difference (percent)

Analysis Report: EPA 8020, BTEX and MTBE
Purge and Trap, EPA Method 5030

Client: Harding Lawson Associates
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: City Blue GW Monitoring

Date Extracted: 07/09/99
Date Analyzed: 07/09/99
Date Reported: 07/14/99

Project No.: 46559-1
Contact: Jim McCarty
Phone: (510)451-1001

Lab Contact: James Liang
Lab ID No.: R3006
Job No.: 823006
COC Log No.: 2308
Batch No.: 25961
Instrument ID: GC018
Analyst ID: SCOTTF
Matrix: WATER

RELATIVE % DIFFERENCE(cont.)

Analyte	CAS No.	Relative Percent Difference (percent)
Benzene	71-43-2	0
Toluene	108-88-3	0
Ethylbenzene	100-41-4	0
Xylenes, total	1330-20-7	0

CLS Labs

Analysis Report: EPA 8020, BTEX and MTBE
Purge and Trap, EPA Method 5030

Client: Harding Lawson Associates
Engineering and Environmental
383 4th Street, Third Floor
Oakland, CA 94607

Project: City Blue GW Monitoring

Date Extracted: 07/09/99
Date Analyzed: 07/09/99
Date Reported: 07/14/99

Project No.: 46559-1
Contact: Jim McCarty
Phone: (510)451-1001

Lab Contact: James Liang
Lab ID No.: R3006
Job No.: 823006
COC Log No.: 2308
Batch No.: 25961
Instrument ID: GC018
Analyst ID: SCOTTF
Matrix: WATER

LCS SURROGATE

Analyte	CAS No.	LCS Conc. (ug/L)	LCS Surrogate Recovery (percent)
o-Chlorotoluene	95-49-8	20.0	104

LAB CONTROL SAMPLE

Analyte	CAS No.	LCS Conc. (ug/L)	LCS Recovery (percent)
Benzene	71-43-2	20.0	94
Toluene	108-88-3	20.0	106
Ethylbenzene	100-41-4	20.0	106
Xylenes, total	1330-20-7	60.0	109

APPENDIX B

CONE PENETROMETER TEST DATA FROM GREGG IN-SITU, INC.

PRESENTATION OF CONE PENETRATION TEST DATA

BLUE PRINT PROJECT

OAKLAND, CA

Prepared for:

HARDING & LAWSON ASSOCIATES
Oakland, California

Prepared by:

GREGG IN SITU, INC.
Martinez, California

Prepared on:

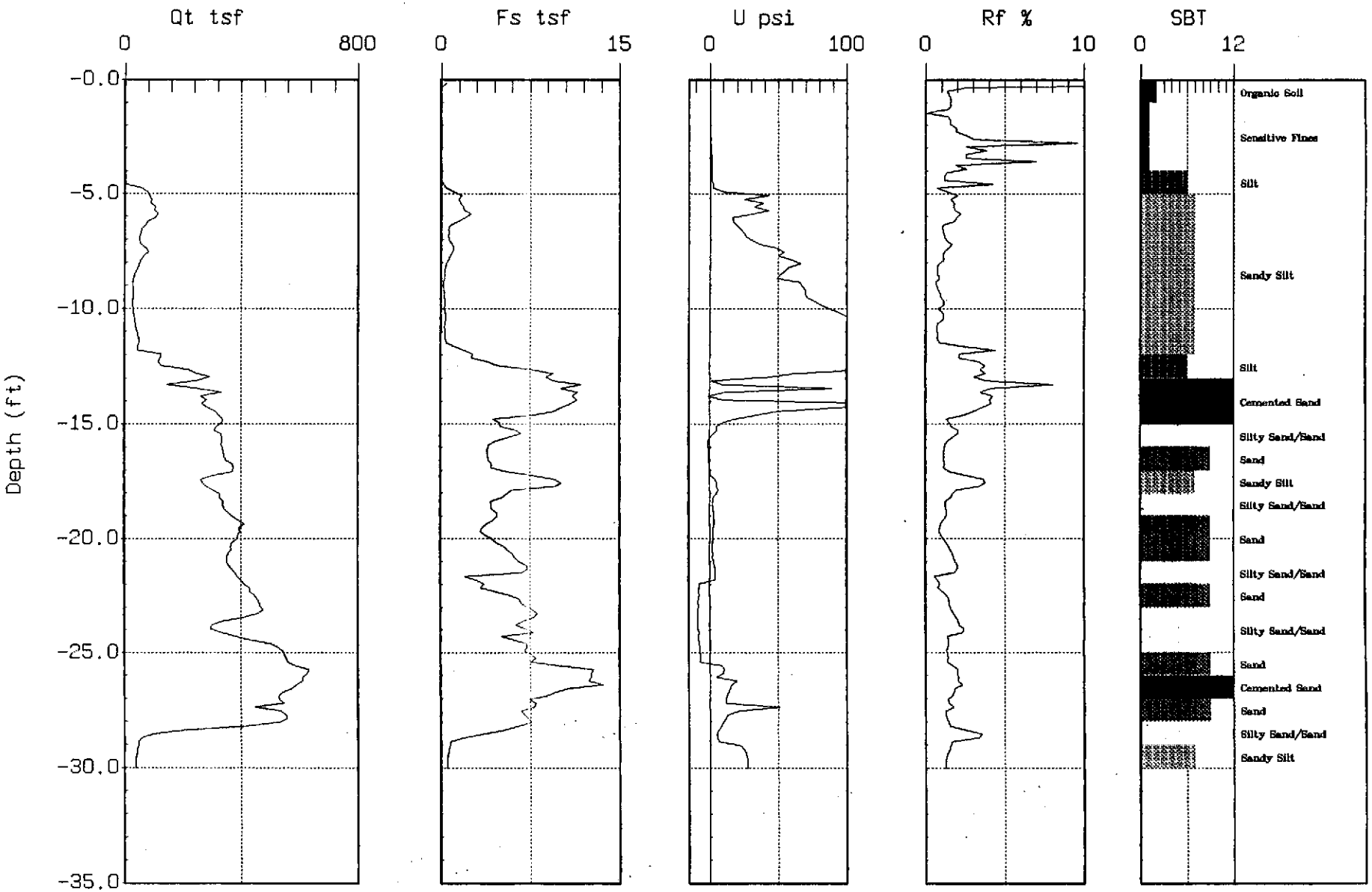
February 23, 1998

GREGG

HLA

Site : BLUE PRINT
Location : CPT-03

Engineer : J. McCARTY
Date : 02/19/98



Max. Depth: 30.02 (ft)

Depth Inc.: 0.164 (ft)

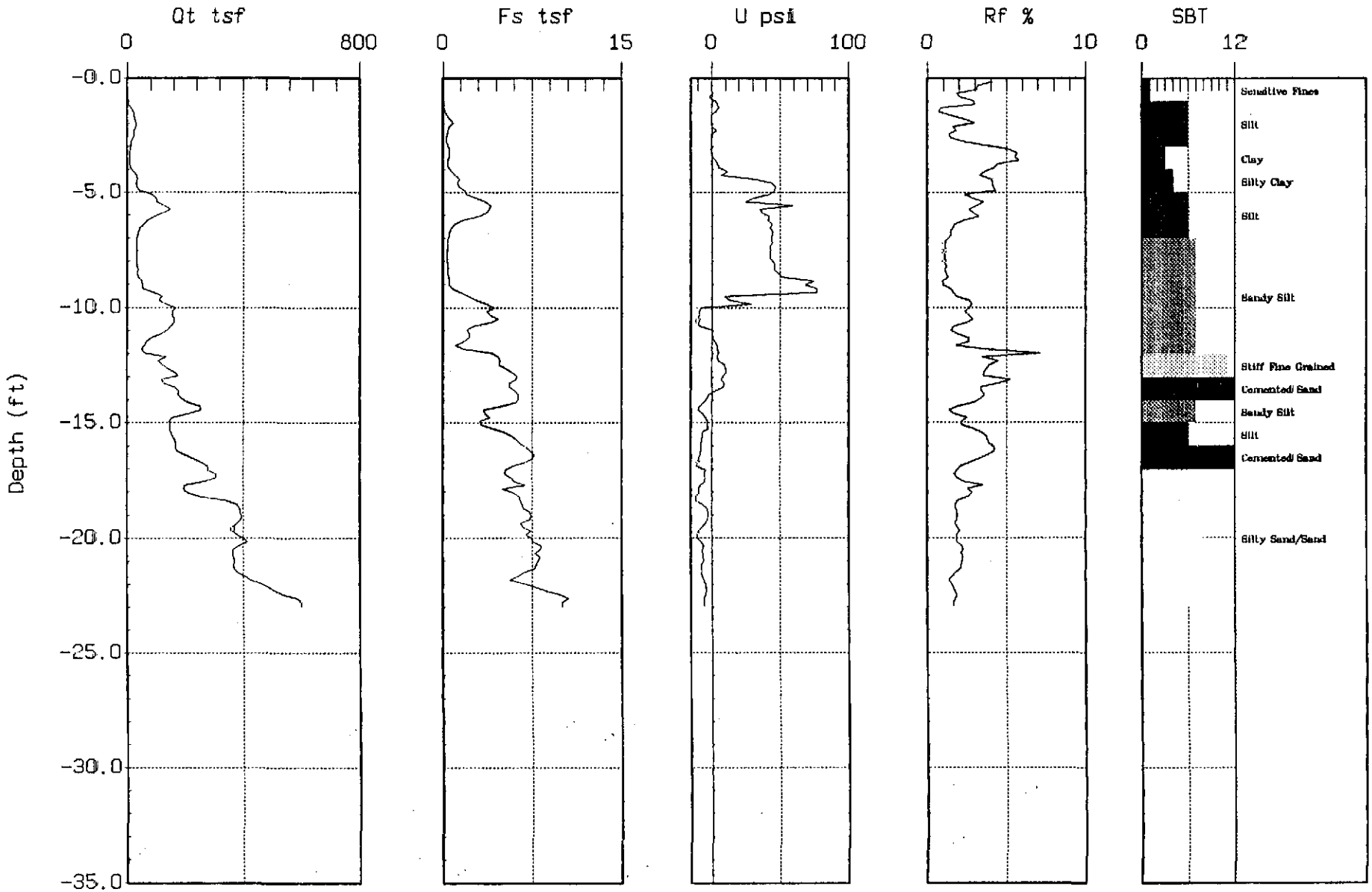
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

HLA

Site : BLUE PRINT
Location : CPT-01

Engineer : J. McCARTY
Date : 02/19/98



Max. Depth: 22.97 (ft)

Depth Inc.: 0.164 (ft)

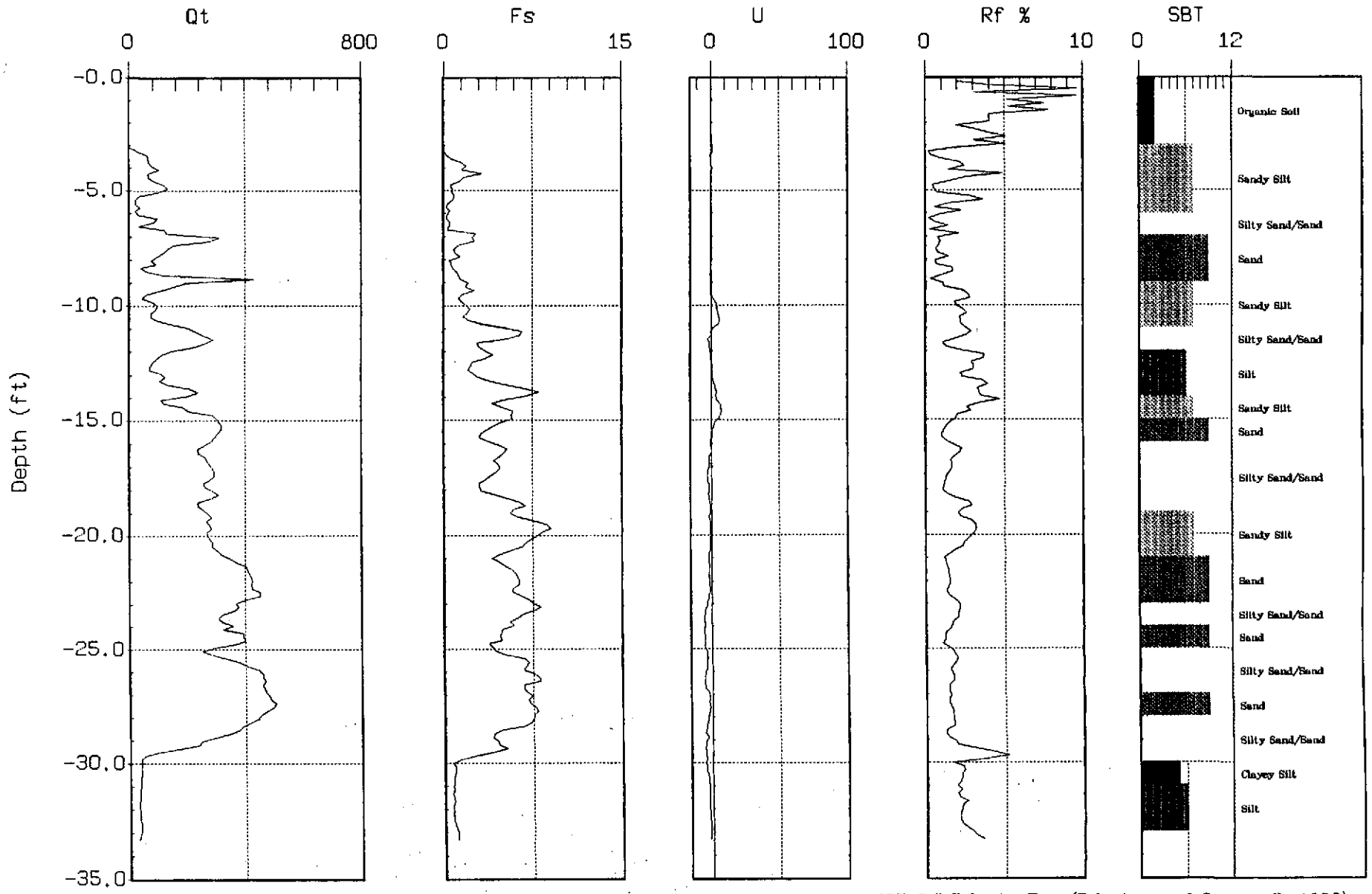
SBT: Soil Behavior Type (Robertson and Campanella 1988)

GREGG

HLA

Site : BLUE PRINT
Location : CPT-02

Engineer : J. MAcCARTY
Date : 02/19/98



Max. Depth: 33.30 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

HLA

Contractor: GREGG IN SITU
CPT-01
Project: BLUE PRINT
Tot. Unit Wt. (avg) : 120 pcf

Date: 02/19/98
J. McCARTY
Water table (feet) : 26.24672

DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
1	0.80	0.02	2.51	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
2	18.72	0.35	1.89	0.09	sandy silt to clayey silt	UNDFND	UNDFD	7	1.5
3	18.50	0.39	2.09	0.15	sandy silt to clayey silt	UNDFND	UNDFD	7	1.5
4	10.31	0.48	4.64	0.22	clay	UNDFND	UNDFD	10	.8
5	41.81	1.46	3.50	0.28	clayey silt to silty clay	UNDFND	UNDFD	20	3.4
6	114.95	3.47	3.01	0.33	sandy silt to clayey silt	UNDFND	UNDFD	44	9.5
7	44.90	0.78	1.74	0.39	silty sand to sandy silt	50-60	38-40	14	UNDEFINED
8	31.30	0.34	1.07	0.45	silty sand to sandy silt	40-50	34-36	10	UNDEFINED
9	39.13	0.44	1.11	0.51	silty sand to sandy silt	40-50	36-38	12	UNDEFINED
10	111.25	2.55	2.29	0.57	silty sand to sandy silt	70-80	42-44	36	UNDEFINED
11	153.42	3.47	2.26	0.63	silty sand to sandy silt	80-90	42-44	49	UNDEFINED
12	71.42	2.17	3.03	0.69	sandy silt to clayey silt	UNDFND	UNDFD	27	5.8
13	140.00	5.23	3.74	0.75	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
14	157.65	6.00	3.81	0.81	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
15	204.30	4.18	2.05	0.87	sand to silty sand	80-90	42-44	49	UNDEFINED
16	155.10	5.16	3.33	0.93	sandy silt to clayey silt	UNDFND	UNDFD	>50	12.8
17	216.41	7.03	3.25	0.98	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
18	256.82	5.67	2.21	1.04	sand to silty sand	>90	42-44	>50	UNDEFINED
19	324.79	6.57	2.02	1.10	sand to silty sand	>90	44-46	>50	UNDEFINED
20	377.90	7.03	1.86	1.16	sand to silty sand	>90	44-46	>50	UNDEFINED
21	379.93	7.89	2.08	1.23	sand to silty sand	>90	44-46	>50	UNDEFINED
22	401.53	6.86	1.71	1.29	sand to silty sand	>90	44-46	>50	UNDEFINED
23	555.32	9.51	1.71	1.35	sand to silty sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

HLA

Contractor: GREGG IN SITU
CPT-02
Project: BLUE PRINT
Tot. Unit Wt. (avg) : 120 pcf

Date: 02/19/98
J. MAcCARTY
Water table (feet) : 26.24672

DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
1	0.23	0.01	4.32	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
2	0.20	0.01	5.00	0.09	undefined	UNDFND	UNDFD	UDF	UNDEFINED
3	0.49	0.01	2.62	0.15	undefined	UNDFND	UNDFD	UDF	UNDEFINED
4	68.19	0.96	1.41	0.22	silty sand to sandy silt	70-80	44-46	22	UNDEFINED
5	94.11	1.35	1.44	0.28	sand to silty sand	80-90	44-46	23	UNDEFINED
6	26.89	0.49	1.80	0.33	sandy silt to clayey silt	UNDFND	UNDFD	10	2.2
7	128.71	1.09	0.85	0.39	sand	80-90	44-46	25	UNDEFINED
8	141.58	1.24	0.88	0.45	sand	80-90	44-46	27	UNDEFINED
9	155.75	1.14	0.73	0.51	sand	80-90	44-46	30	UNDEFINED
10	89.92	1.74	1.94	0.57	silty sand to sandy silt	70-80	40-42	29	UNDEFINED
11	113.25	2.68	2.36	0.63	silty sand to sandy silt	70-80	40-42	36	UNDEFINED
12	234.26	4.56	1.95	0.69	sand to silty sand	>90	44-46	>50	UNDEFINED
13	89.75	2.77	3.09	0.75	sandy silt to clayey silt	UNDFND	UNDFD	34	7.4
14	167.50	5.58	3.33	0.81	sandy silt to clayey silt	UNDFND	UNDFD	>50	13.8
15	201.28	5.23	2.60	0.87	silty sand to sandy silt	80-90	42-44	>50	UNDEFINED
16	303.98	3.71	1.22	0.93	sand	>90	44-46	>50	UNDEFINED
17	254.84	4.74	1.86	0.98	sand to silty sand	>90	42-44	>50	UNDEFINED
18	276.98	3.72	1.34	1.04	sand	>90	42-44	>50	UNDEFINED
19	266.23	5.30	1.99	1.10	sand to silty sand	>90	42-44	>50	UNDEFINED
20	273.35	7.56	2.77	1.16	silty sand to sandy silt	>90	42-44	>50	UNDEFINED
21	297.88	6.17	2.07	1.23	sand to silty sand	>90	42-44	>50	UNDEFINED
22	405.85	5.67	1.40	1.29	sand	>90	44-46	>50	UNDEFINED
23	418.85	6.49	1.55	1.35	sand	>90	44-46	>50	UNDEFINED
24	337.73	6.41	1.90	1.41	sand to silty sand	>90	42-44	>50	UNDEFINED
25	350.35	4.39	1.25	1.48	sand	>90	42-44	>50	UNDEFINED
26	386.36	6.69	1.73	1.54	sand to silty sand	>90	42-44	>50	UNDEFINED
27	467.97	7.32	1.56	1.58	sand	>90	44-46	>50	UNDEFINED
28	476.47	7.45	1.56	1.61	sand	>90	44-46	>50	UNDEFINED
29	344.04	5.25	1.53	1.64	sand	>90	42-44	>50	UNDEFINED
30	106.15	3.08	2.90	1.67	sandy silt to clayey silt	UNDFND	UNDFD	41	8.6
31	35.45	0.77	2.17	1.70	sandy silt to clayey silt	UNDFND	UNDFD	14	2.8
32	31.39	0.69	2.19	1.73	sandy silt to clayey silt	UNDFND	UNDFD	12	2.4
33	33.87	0.78	2.32	1.75	sandy silt to clayey silt	UNDFND	UNDFD	13	2.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

HLA

Contractor: GREGG IN SITU
CPT-03
Project: BLUE PRINT
Tot. Unit Wt. (avg) : 120 pcf

Date: 02/19/98
J. McCARTY
Water table (feet) : 26.24672

DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
1	0.67	0.07	10.47	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
2	0.67	0.01	1.24	0.09	undefined	UNDFND	UNDFD	UDF	UNDEFINED
3	0.34	0.01	2.90	0.15	undefined	UNDFND	UNDFD	UDF	UNDEFINED
4	0.42	0.01	2.36	0.22	undefined	UNDFND	UNDFD	UDF	UNDEFINED
5	37.05	0.55	1.48	0.28	silty sand to sandy silt	50-60	38-40	12	UNDEFINED
6	100.78	1.87	1.86	0.33	silty sand to sandy silt	80-90	44-46	32	UNDEFINED
7	59.75	0.76	1.27	0.39	silty sand to sandy silt	60-70	40-42	19	UNDEFINED
8	62.46	0.76	1.22	0.45	silty sand to sandy silt	60-70	40-42	20	UNDEFINED
9	32.83	0.24	0.74	0.51	silty sand to sandy silt	40-50	34-36	10	UNDEFINED
10	27.16	0.26	0.96	0.57	silty sand to sandy silt	<40	32-34	9	UNDEFINED
11	33.75	0.30	0.89	0.63	silty sand to sandy silt	40-50	34-36	11	UNDEFINED
12	57.45	1.11	1.93	0.69	silty sand to sandy silt	50-60	36-38	18	UNDEFINED
13	185.71	6.16	3.32	0.75	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
14	251.57	10.84	4.31	0.81	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
15	308.26	7.91	2.57	0.87	silty sand to sandy silt	>90	44-46	>50	UNDEFINED
16	325.48	5.37	1.65	0.93	sand to silty sand	>90	44-46	>50	UNDEFINED
17	351.28	4.02	1.14	0.98	sand	>90	44-46	>50	UNDEFINED
18	298.16	8.08	2.71	1.04	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
19	337.37	4.65	1.38	1.10	sand	>90	44-46	>50	UNDEFINED
20	391.13	3.87	0.99	1.16	sand	>90	44-46	>50	UNDEFINED
21	362.87	5.48	1.51	1.23	sand	>90	44-46	>50	UNDEFINED
22	382.97	4.96	1.29	1.29	sand	>90	44-46	>50	UNDEFINED
23	448.31	5.61	1.25	1.35	sand	>90	44-46	>50	UNDEFINED
24	372.08	7.34	1.97	1.41	sand to silty sand	>90	42-44	>50	UNDEFINED
25	488.66	6.70	1.37	1.48	sand	>90	44-46	>50	UNDEFINED
26	595.47	10.59	1.78	1.54	sand to silty sand	>90	44-46	>50	UNDEFINED
27	563.29	10.40	1.85	1.58	sand to silty sand	>90	44-46	>50	UNDEFINED
28	528.32	7.39	1.40	1.61	sand	>90	44-46	>50	UNDEFINED
29	145.47	3.11	2.14	1.64	silty sand to sandy silt	70-80	36-38	46	UNDEFINED
30	39.48	0.53	1.34	1.67	silty sand to sandy silt	<40	<30	13	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

APPENDIX C

PRODUCT SAMPLE REPORT FROM FRIEDMAN AND BRUYA, INC.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Jensen, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

March 25, 1998

James McCarty, Project Manager
Harding Lawson Associates
383 4th Street, Suite 300
Oakland, CA 94607

Dear Mr. McCarty:

Included are the results from the testing of material submitted on February 5, 1998 from your 34466-4 project.

Introduction

Sample 9806TPHg was submitted for hydrocarbon characterization by GC/FID and ECD, and for characterization of PIANO (paraffins, isoparaffins, aromatics, naphthenes and olefins) constituents by GC/MS. It was also analyzed for the presence of organic lead. Sample 9806TPHg consisted of an amber liquid. We were asked to evaluate the material present in the sample. Of particular interest was if the material present was consistent with a previous release of leaded gasoline, a more recent release of unleaded gasoline, or a mixture of the two.

Background

Key to the identification of an unknown material is the boiling range of the compounds present. This is because the boiling point of a compound provides information on the physical properties that this compound will impart on a material. For example, low boiling compounds easily evaporate and are common constituents present in crude oil, as well as compounds created in various refining processes. These commonly include normal alkanes, or *n*-alkanes, from crude oil and aromatic hydrocarbons typically from refining processes involving cracking or reformulating. These compounds can often be identified as a particular pattern of peaks, which gives an indication of the type of fuel present.

The boiling range of a material can be established using a gas chromatograph (GC). In general, the volatile material comes out or elutes first from the GC and appears

close to time zero on the resulting GC trace. The remaining material elutes in increasing boiling point order as the GC run progresses. By knowing the boiling point of selected compounds, a standard can be used to correlate a boiling point with a particular retention time on a GC trace. A GC trace using a flame ionization detector (FID) of a standard consisting of normal alkanes is provided for reference purposes. In addition, a GC trace using an electron capture detector (ECD) is also provided. The data from this trace can be used to look for evidence of non-hydrocarbon compounds like organic lead, or compounds containing chlorine and sulfur. The PIANO analysis by GC with a mass spectrometer (MS) provides detailed chemical composition, and summarizes the relative percent of each class of compound in each boiling range. Also included in the PIANO analysis is information on the presence of alcohols and ethers, high octane blending components which are used to meet oxygenated fuel requirements.

Two factors are key to determining approximate release dates for material found in the environment. The first is assessing the level of degradation which has occurred in the product. Certain compounds commonly found in petroleum products will degrade more quickly than others. Specifically, the most volatile compounds will be lost faster than the less volatile. Also, as a product ages, microorganisms preferentially digest the *n*-alkanes, leaving the other constituents behind. Therefore, the absence of volatile constituents and/or *n*-alkanes in a product which would normally contain them is an indication that the product is degraded. The presence of fuel additives can also provide information about approximate release dates. For example, alcohols and ethers are highly water soluble, therefore their presence typically indicates a recent release. The second factor which is needed to determine an approximate release date is information about the conditions at the site where the product was found. Conditions such as soil porosity, contact with groundwater, temperature and biological activity will affect the rate of degradation of a product at a particular location.

Results

The material present in sample 9806TPHg is indicative of gasoline. This low boiling distillate appears as a pattern of peaks eluting from approximately 2 to 14 minutes on the GC/FID trace. The detailed chemical composition provided by the GC/MS analysis indicated the loss of some of the most volatile constituents such as *n*-butane. However, both the GC/FID and GC/MS analyses indicate that significant weathering has not occurred by either water solubilization or evaporative processes. The gasoline identified in sample 9806TPHg can be characterized as relatively undegraded. No alcohols or ethers were detected in the sample. Organic lead was detected at a level of 830 ppm, or approximately 2.4 grams of lead per gallon of gasoline.

Discussion

In a February 23, 1998 fax the following site information was given. The soil in the area tends to be silt and clays overlaying fine grained silty sand. The depth to groundwater is approximately 25 feet and there is a low permeable silty sand layer below the groundwater table. The area is covered by buildings, asphalt and small landscaped plots. Three USTs were removed from the site in October 1987, at which time holes were noted in the USTs and a release of fuel into the soil and possibly groundwater was noted. Subsequent testing of monitoring wells showed free product layers which were up to one to two feet thick. From October 1987 to the present, product has been removed from the site either manually or with a groundwater extraction system. Nearly 5,000 pounds of product have been removed to date. Sample 9806TPHg was taken from an oil/water separator which is currently in operation. The asphalt covering, low soil porosity and large release/thick product layers all act to slow the rate of degradation. It is likely that pockets of product may remain relatively undegraded for months to years.

Conclusion

Based on the site conditions provided, the gasoline in sample 9806TPHg is consistent with a previous release of leaded gasoline, and does not appear to contain material from a more recent release of unleaded gasoline. If material from a more recent release of unleaded gasoline were present we would expect to see lower levels of lead, due to dilution. We would also expect to see the presence of *n*-butane and oxgenated compounds. The gasoline in sample 9806THPg is likely from a pocket of leaded gasoline which has remained protected and, is therefore relatively undegraded.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions. We will hold your samples for 30 days before disposal unless directed otherwise.

Sincerely,

FRIEDMAN & BRUYA, INC.

Charlene Jensen
Chemist

Enclosures
FAX: (510)451-~~1001~~ 3165
HL40325R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Extracted: 02/09/98
Date Analyzed: 02/09/98

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR FINGERPRINT CHARACTERIZATION BY CAPILLARY GAS CHROMATOGRAPHY USING A FLAME IONIZATION DETECTOR (FID) AND ELECTRON CAPTURE DETECTOR (ECD)

Sample ID	GC Characterization
9806TPHg	The GC trace using the flame ionization detector (FID) showed the presence of low boiling compounds. The patterns displayed by these peaks are indicative of gasoline. The low boiling compounds appeared as a pattern of peaks eluting from *n*-C_7 to *n*-C_{14}. The GC/FID trace showed the presence of peaks that appeared to be indicative of benzene, toluene, ethylbenzene, the xylenes and C3-benzenes. These compounds are characteristic of the constituents commonly found in gasoline. The GC/ECD trace showed the possible presence of tetramethyl and tetraethyl lead, common additives to leaded gasolines. The large peak seen near 25 minutes on the GC/FID trace is pentacosane, added as a quality assurance check for this GC analysis. There is a second surrogate present that is seen on the GC/ECD trace at about 26 minutes which is dibutyl chlorendate.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Analyzed: 03/13/98

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS

Results Reported as % by Weight

Laboratory ID 803021-01
Client ID 9806TPHg

Compound	Weight Percent
Propane	<0.01
Methanol	<0.01
Isobutane	<0.01
Ethanol	<0.01
n-Butane	<0.01
t-2-Butene	<0.01
c-2-Butene	<0.01
Isopropanol	<0.01
3-Methyl-1-butene	<0.01
Isopentane	0.09
tert-Butanol	<0.01
1-Pentene	<0.01
2-Methyl-1-butene	0.01
n-Propanol	<0.01
n-Pentane	0.11
t-2-Pentene	0.02
c-2-Pentene	0.01
2-Methyl-2-butene	0.04
MTBE	<0.01
sec-Butanol	<0.01
4-Methyl-1-pentene	0.02
Isobutanol	<0.01
2,3-Dimethylbutane	0.13
Cyclopentane	0.08
2-Methylpentane	0.63
DIPE	<0.01
3-Methylpentane	0.55
n-Butanol	<0.01
1-Hexene	0.05
ETBE	<0.01
n-Hexane	0.77

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Analyzed: 03/13/98

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS

Results Reported as % by Weight

Laboratory ID 803021-01
Client ID 9806TPHg

Compound	Weight Percent
t-2-Hexene	0.05
2-Methyl-2-pentene	0.05
c-2-Hexene	0.02
2,2-Dimethylpentane	0.04
2,4-Dimethylpentane	0.21
Methylcyclopentane	1.04
2,2,3-Trimethylbutane	0.02
Benzene	0.19
1-Methylcyclopentene	<0.01
TAME	<0.01
3,3-Dimethylpentane	0.08
Cyclohexane	0.50
2-Methylhexane	1.17
2,3-Dimethylpentane	0.65
1,1-Dimethylcyclopentane	0.09
3-Methylhexane	1.38
c-1,3-Dimethylcyclopentane	<0.01
3-Ethylpentane	0.12
Isooctane	1.35
t-1,2-Dimethylcyclopentane	<0.01
1-Heptene	0.14
n-Heptane	1.71
t-3-Heptene	<0.01
c-3-Heptene	0.64
t-2-Heptene	0.02
c-2-Heptene	0.04
2,2-Dimethylhexane	0.08
2,5-Dimethylhexane	0.35
Methylcyclohexane	2.14
2,4-Dimethylhexane	0.42
Ethylcyclopentane	0.50
t-1,c-2,4-Trimethylcyclopentane	0.54

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Analyzed: 03/13/98

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS

Results Reported as % by Weight

Laboratory ID 803021-01
Client ID 9806TPHg

Compound	Weight Percent
t-1,c-2,3-Trimethylcyclopentane	0.52
2,2,3-Trimethylpentane	0.54
Toluene	2.67
2,3-Dimethylhexane	0.83
2-Methylheptane	1.21
3-Methylheptane	1.28
4-Methylheptane	0.46
3-Ethylhexane	0.22
1-Octene	0.08
1,2,3-Trimethylcyclopentane	0.14
t-1,2-Dimethylcyclohexane	0.83
n-Octane	1.33
1-Ethyl-1-methylcyclopentane	0.06
c-2-Octene	<0.01
c-1,2-Dimethylcyclohexane	0.28
Isopropylcyclopentane	0.22
2,5-Dimethylheptane	0.40
3,5-Dimethylheptane	0.11
n-Propylcyclopentane	0.15
Ethylbenzene	1.22
2,3-Dimethylheptane	0.28
3,4-Dimethylheptane	0.11
2-Methyloctane	0.47
m-Xylene	2.04
p-Xylene	4.87
3-Methyloctane	0.82
1-Nonene	<0.01
3,3-Diethylpentane	<0.01
4-Nonene	<0.01
o-Xylene	2.46
n-Nonane	0.80
Isobutylcyclopentane	0.04

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Analyzed: 03/13/98

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS

Results Reported as % by Weight

Laboratory ID 803021-01
Client ID 9806TPHg

Compound	Weight Percent
t-2-Nonene+c-2-Nonene	<0.01
Isopropylbenzene	0.20
3,3-Dimethyloctane	0.03
n-Butylcyclopentane	0.10
n-Propylbenzene	0.76
2,3-Dimethyloctane	0.09
1-Methyl-3-ethylbenzene	3.43
1-Methyl-4-ethylbenzene	1.77
2-Methylnonane	<0.01
3-Ethyloctane	0.08
3-Methylnonane	0.34
1,3,5-Trimethylbenzene	1.57
1-Methyl-2-ethylbenzene	1.14
1,2,4-Trimethylbenzene	5.34
tert-Butylbenzene	<0.01
n-Decane	0.49
Isobutylbenzene	0.14
Isopropylcyclohexane	<0.01
sec-Butylbenzene	0.12
1-Methyl-3-isopropylbenzene	0.26
sec-Butylcyclohexane	<0.01
1-Methyl-4-isopropylbenzene	0.10
1,2,3-Trimethylbenzene	1.30
Indan	0.77
1-Methyl-3-n-propylbenzene	1.13
1-Methyl-4-n-propylbenzene	0.70
n-Butylbenzene	0.56
1,3-Dimethyl-5-ethylbenzene	0.10
1,2-Diethylbenzene	1.40
1-Methyl-2-n-propylbenzene	0.54
1,4-Dimethyl-2-ethylbenzene	0.75
1,2-Dimethyl-4-ethylbenzene	1.19

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Analyzed: 03/13/98

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS

Results Reported as % by Weight

Laboratory ID 803021-01
Client ID 9806TPHg

Compound	Weight Percent
1,3-Dimethyl-2-ethylbenzene	0.72
1,2-Dimethyl-3-ethylbenzene	0.14
n-Undecane	0.30
1,2,4,5-Tetramethylbenzene	0.25
2-Methylbutylbenzene	0.11
1-tert-Butyl-2-methylbenzene	<0.01
n-Pentylbenzene	<0.01
Methylindan	1.26
1-tert-Butyl-3,5-dimethylbenzene	<0.01
1-tert-Butyl-4-ethylbenzene	<0.01
n-Dodecane	0.22
1,3,5-Triethylbenzene	<0.01
1,2,4-Triethylbenzene	<0.01
Naphthalene	1.05
n-Hexylbenzene	<0.01
2-Methylnaphthalene	0.58
n-Tridecane	0.06
1-Methylnaphthalene	0.26
n-Tetradecane	0.02
n-Pentadecane	0.01

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Analyzed: 03/13/98

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS

Results Reported as % by Weight

PIANO SUMMARY

Laboratory ID 803021-01
Client ID 9806TPHg

	Weight Percent
Total Identified Compounds	69.87
Oxygenated Compounds	<0.01
Hydrocarbon Compounds	69.87
Unidentified Compounds	30.13
Total	100.00

	Paraffins	Isoparaffins	Aromatics	Naphthenes	Olefins	Total
C3	<0.01				<0.01	<0.01
C4	<0.01	<0.01			<0.01	<0.01
C5	0.11	0.09		0.08	0.10	0.38
C6	0.77	1.31	0.19	1.54	0.17	3.97
C7	1.71	3.68	2.67	2.73	0.84	11.62
C8	1.33	6.73	10.59	2.73	0.08	21.47
C9	0.80	2.19	16.27	0.14	<0.01	19.41
C10	0.49	0.54	10.40	<0.01		11.44
C11	0.30		0.95			1.25
C12	0.22		<0.01			0.22
C13	0.06					0.06
C14	0.02					0.02
C15	0.01					0.01
Total	5.84	14.54	41.07	7.22	1.20	69.87

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4
Date Extracted: 03/02/98
Date Analyzed: 03/03/98

RESULTS FROM THE ANALYSIS OF PRODUCT SAMPLE FOR ORGANIC LEAD BY ICP (METHOD 6010)

Results Reported as µg/g (ppm)

Sample ID	Organic Lead
9806TPHg	830
Method Blank	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 03/25/98
Date Received: 02/05/98
Project: 34466-4

QUALITY ASSURANCE RESULTS FOR ORGANIC LEAD BY METHOD 6010 MODIFIED

Laboratory Code: 802021-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
Organic Lead	ug/g (ppm)	830	850	2	0-20

Laboratory Code: 802021-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	% Recovery MS	% Recovery MSD	Acceptance Criteria	RPD
Organic Lead	ug/g (ppm)	117	830	ai	ai	80-120	ai

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	% Recovery LCS	% Recovery LCSD	Acceptance Criteria	RPD
Organic Lead	ug/g (ppm)	117	107	108	80-120	1

ai - The amount spiked was insufficient to give meaningful recovery data.

CHAIN OF CUSTODY FORM

Harding Lawson Associates
1855 Gateway Boulevard, Suite 500
~~Concord, California 94520~~ → 383 4th Street Suite 300 Oakland CA 94607

Lab: Friedman & Bruya, Inc No. 1271

Samplers: James McCarty

Job Number: 34466-4

Name/Location: City Blue, Oakland

Project Manager: James McCarty

Recorder: James McCarty (Signature Required)

SOURCE CODE	MATRIX: Product	Water	Sediment	Soil	Oil	# CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	HCL	Ice	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Day	Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	METALS	EPA 8015M/TPHg	EPA 8020/BTEX	EPA 8015M/TPHd,o	Fingerprinting Org Pb by ICP per J.M. 2-23-98	PSHG per JM 3-6-98
1	X					3				X	98	06	TPHg	98	04	02	0815	oil/water separator									X	X

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
						Std TAT
						Result to James McCarty at above address
						FAX 510 451-3165
						Phone 510 628-3220

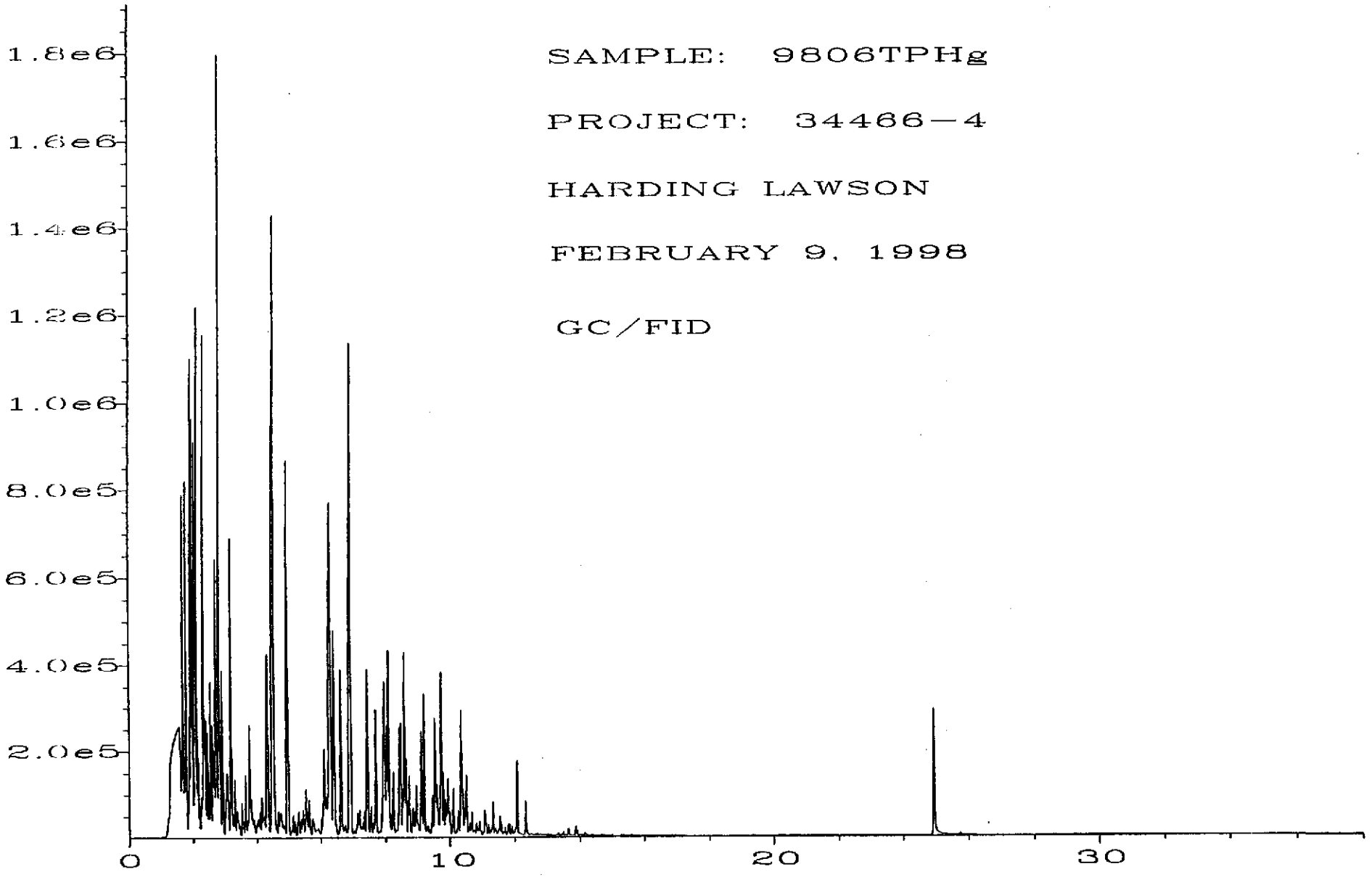
CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) James McCarty	RECEIVED BY: (Signature) F.B.I. Inc.	DATE/TIME 7/5/98 10A
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

METHOD OF SHIPMENT: UPS / cooler w/ blue ice

SAMPLE CONDITION WHEN RECEIVED BY THE LABORATORY:

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



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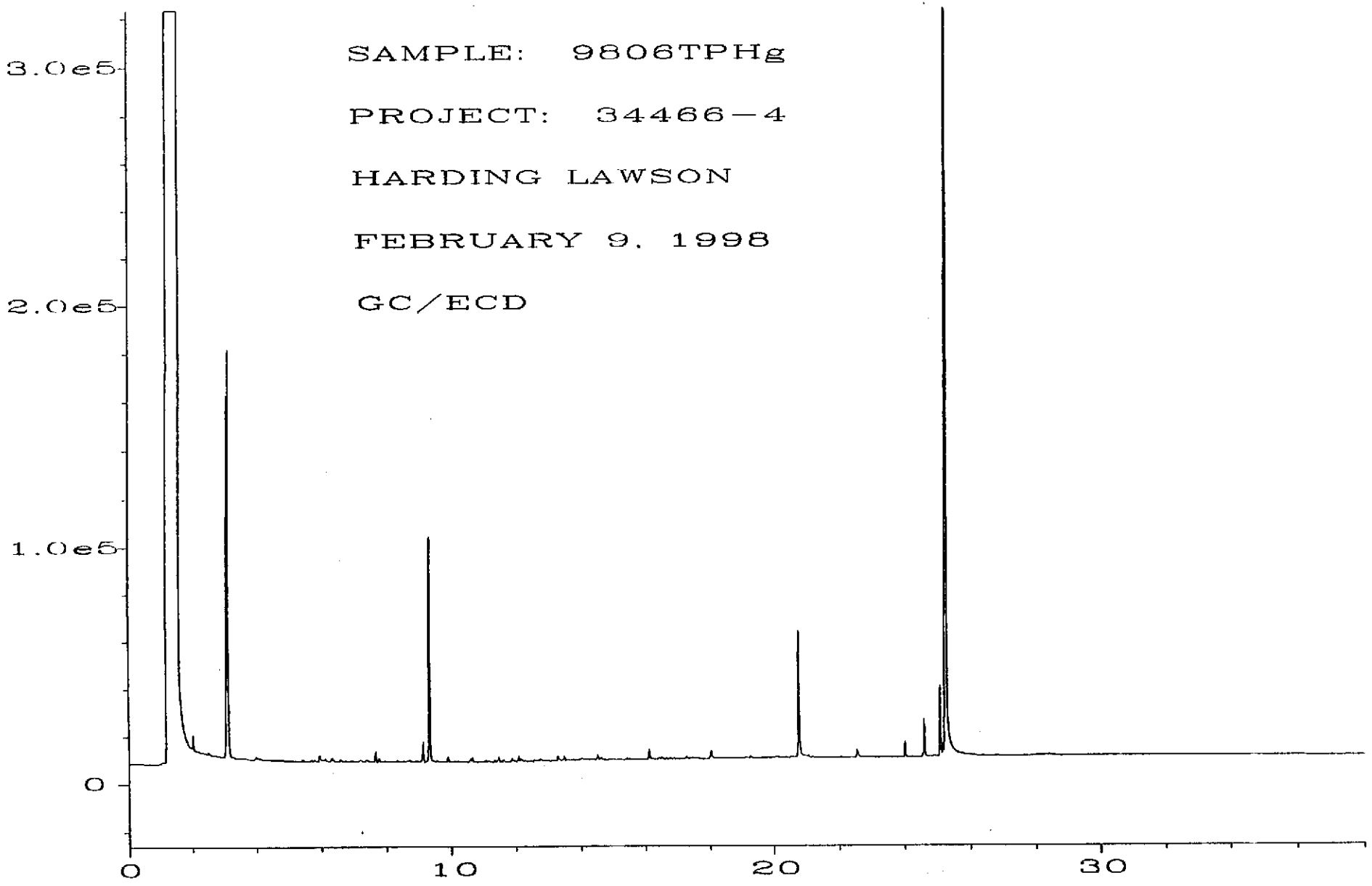

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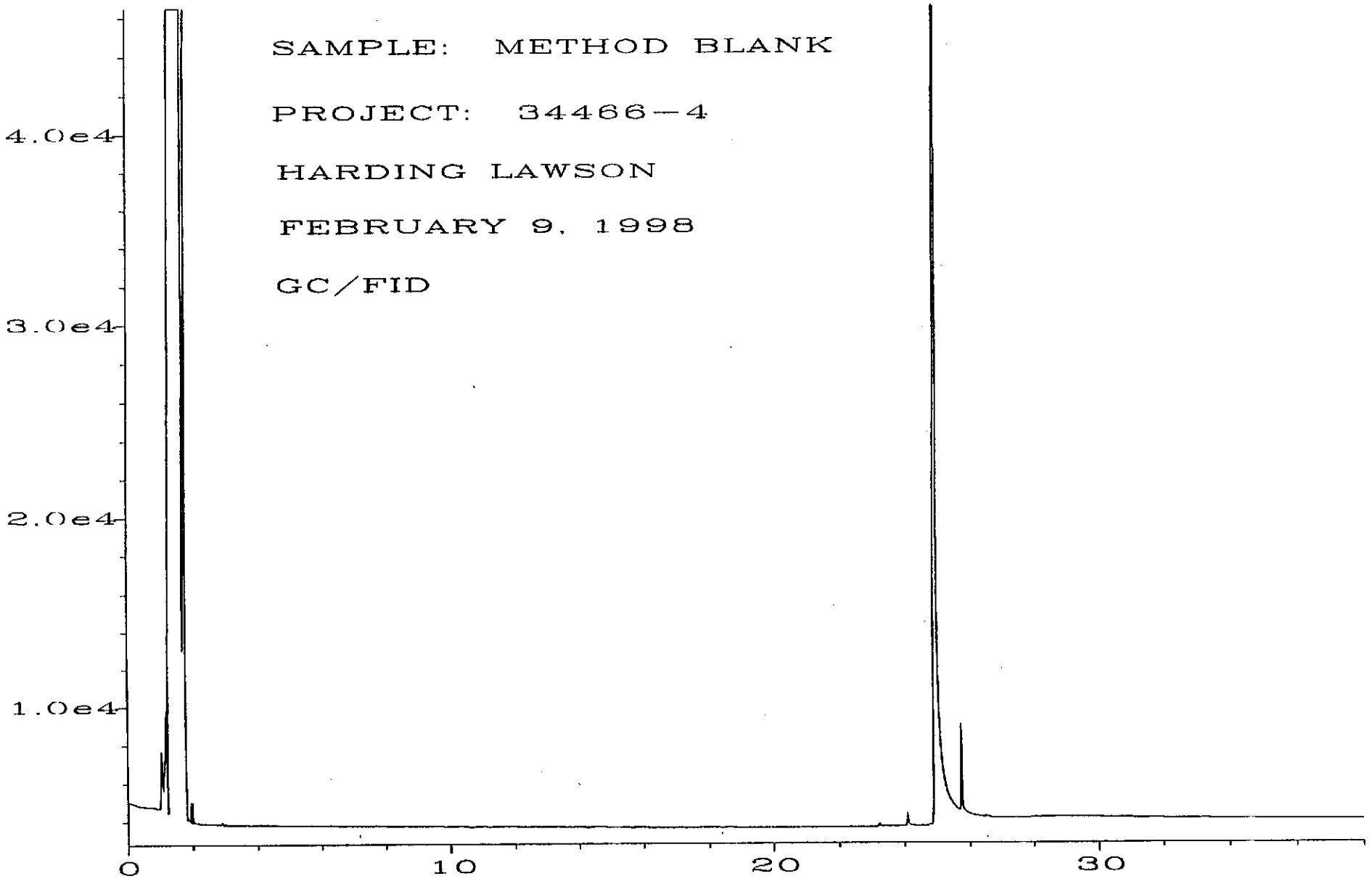

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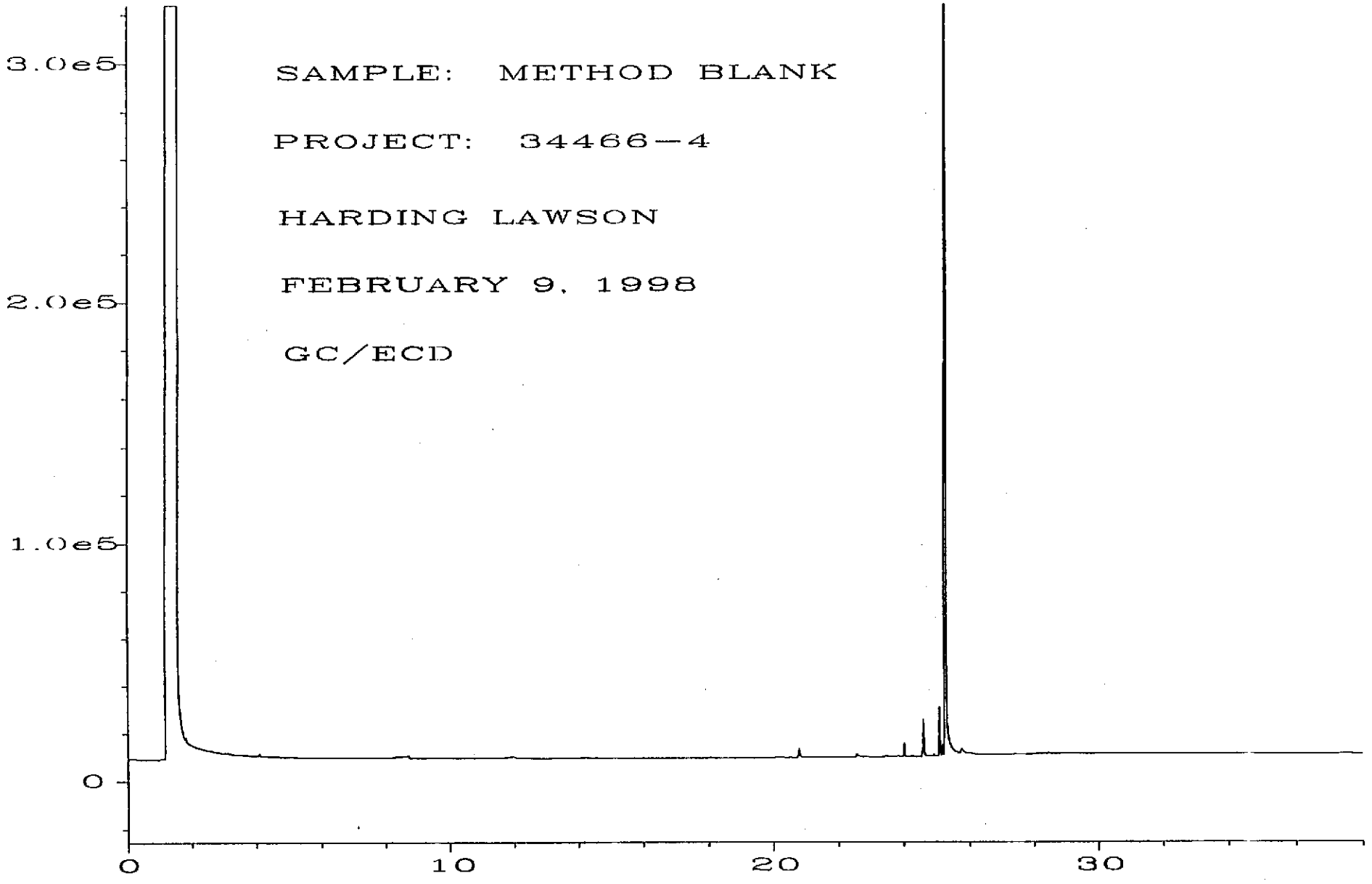

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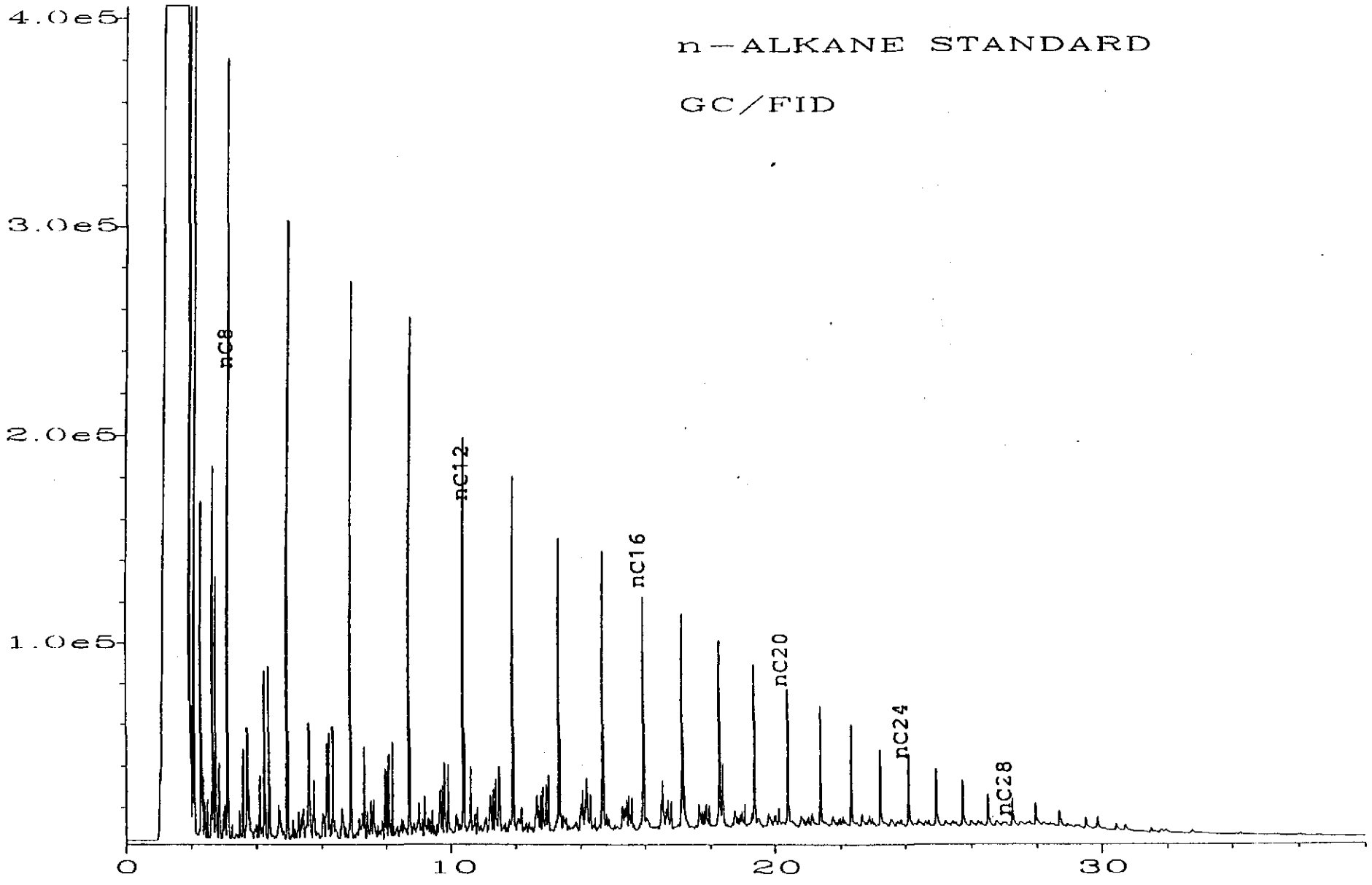

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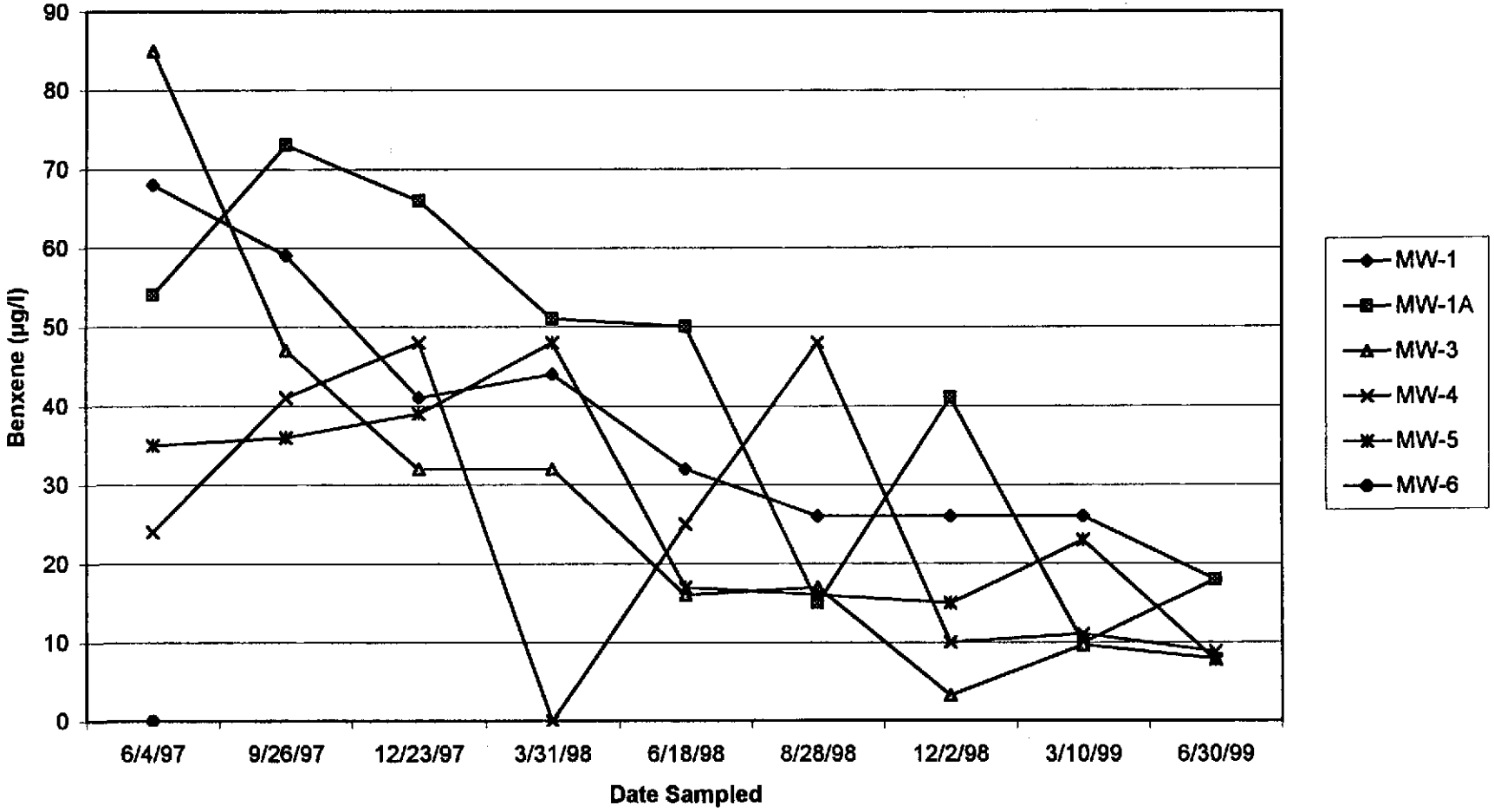
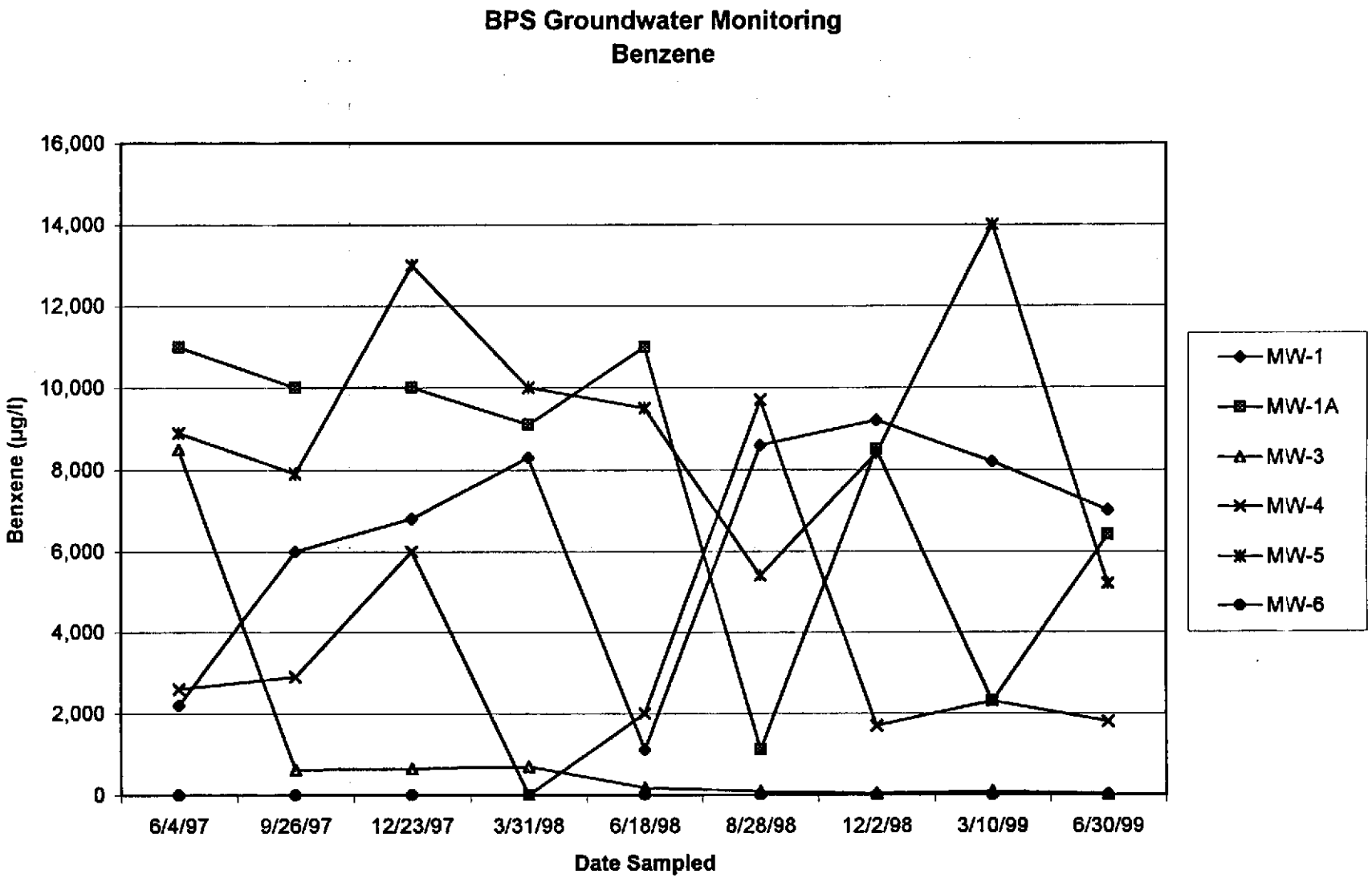
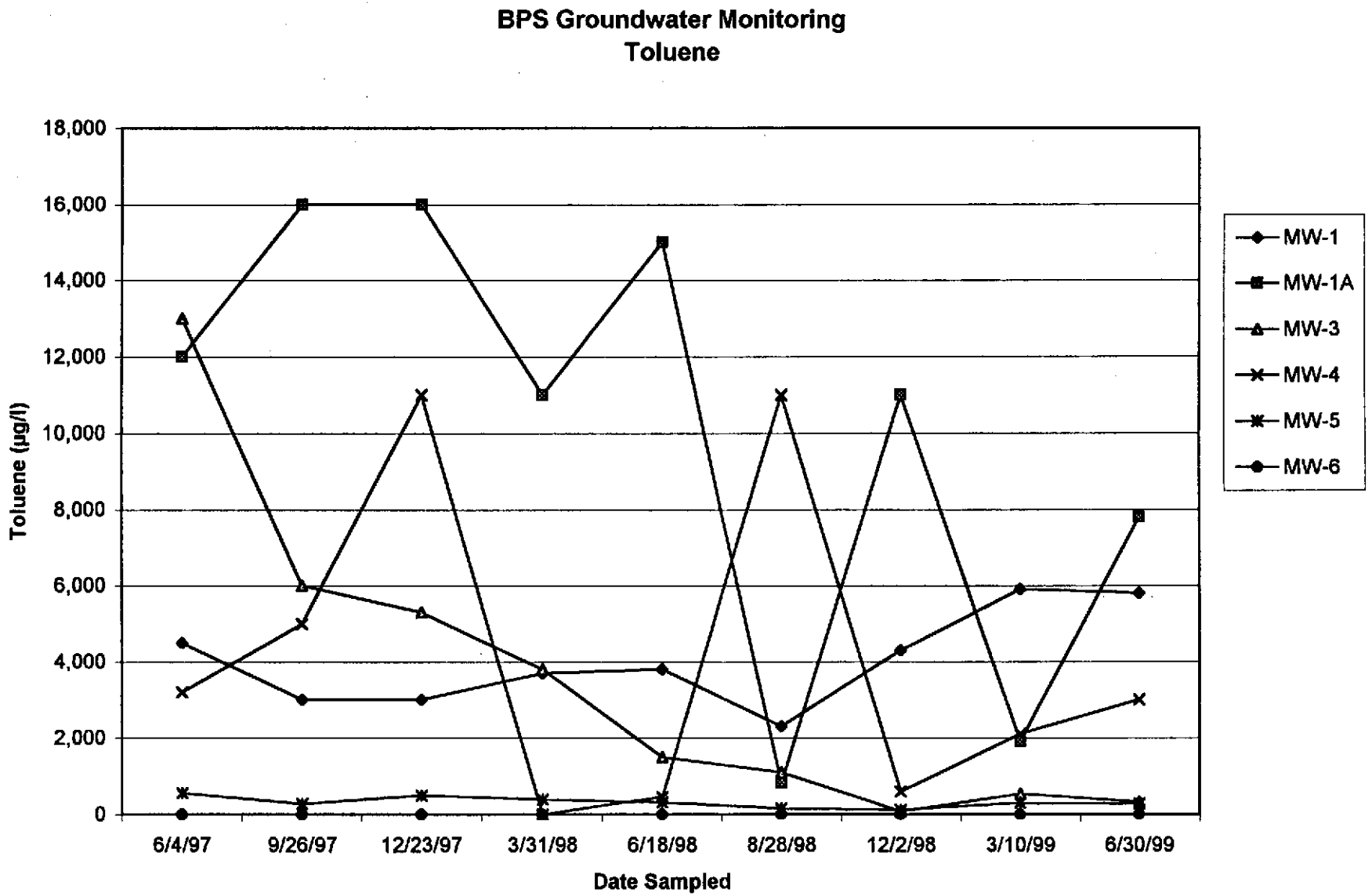
APPENDIX D

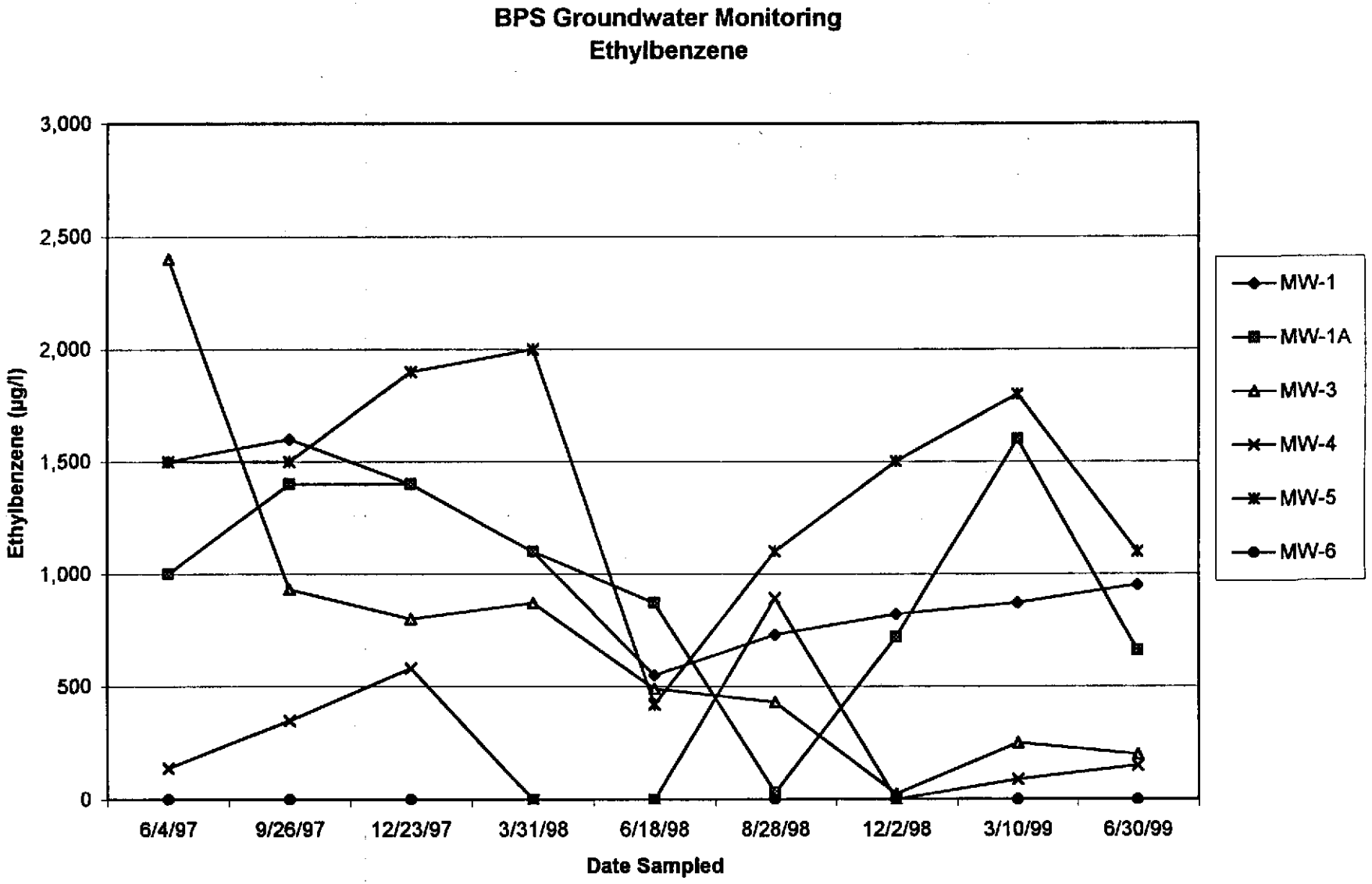
GROUNDWATER CONCENTRATION GRAPHS

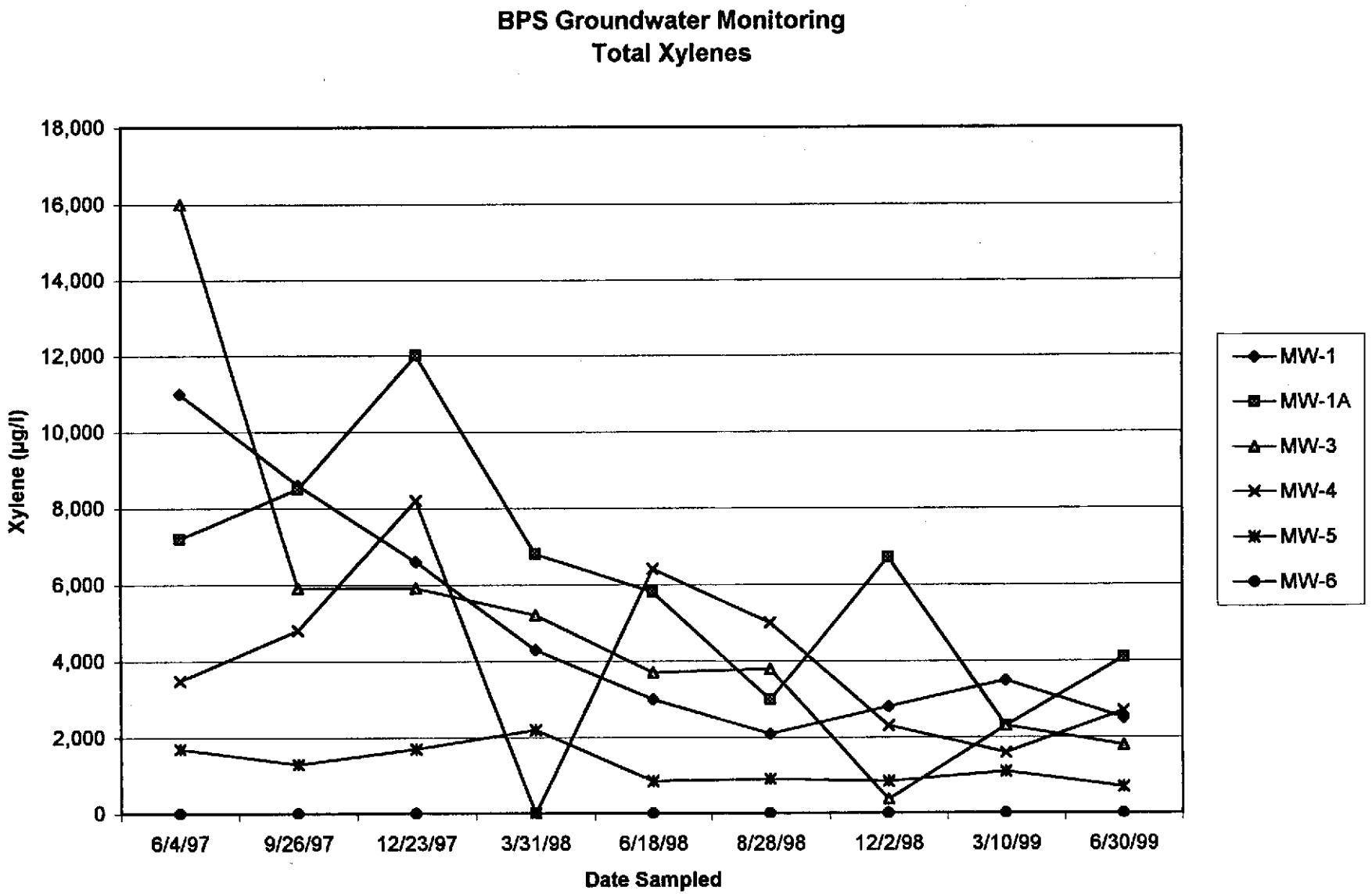
BPS Groundwater Monitoring
TPH Gasoline




BPS Groundwater Monitoring
Benzene
Benxene (µg/l)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
6/4/97
9/26/97
12/23/97
3/31/98
6/18/98
8/28/98
12/2/98
3/10/99
6/30/99
Date Sampled
MW-1
MW-1A
MW-3
MW-4
MW-5
MW-6


BPS Groundwater Monitoring
Toluene
Toluene (µg/l)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
6/4/97
9/26/97
12/23/97
3/31/98
6/18/98
8/28/98
12/2/98
3/10/99
6/30/99
Date Sampled
MW-1
MW-1A
MW-3
MW-4
MW-5
MW-6


BPS Groundwater Monitoring
Ethylbenzene
Ethylbenzene (µg/l)
3,000
2,500
2,000
1,500
1,000
500
0
6/4/97
9/26/97
12/23/97
3/31/98
6/18/98
8/28/98
12/2/98
3/10/99
6/30/99
Date Sampled
MW-1
MW-1A
MW-3
MW-4
MW-5
MW-6


BPS Groundwater Monitoring
Total Xylenes
Xylene (µg/l)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
6/4/97
9/26/97
12/23/97
3/31/98
6/18/98
8/28/98
12/2/98
3/10/99
6/30/99
Date Sampled
MW-1
MW-1A
MW-3
MW-4
MW-5
MW-6

DISTRIBUTION

Groundwater Investigation
Blue Print Service Company
1700 Jefferson Street
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July 27, 1999

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Quality Control Reviewer

Valerie Harris
Project Engineer

JGM/MAS/mlw/34466/037292R