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BROWN AND CALDWELL

FINAL

NOVEMBER 1995 GROUNDWATER SAMPLING REPORT HOBBS, NEW MEXICO FACILITY

BJ SERVICES COMPANY, U.S.A.

APRIL 9, 1996

A Report Prepared for:

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FINAL
NOVEMBER 1995 GROUNDWATER SAMPLING REPORT
HOBBS, NEW MEXICO FACILITY
BJ SERVICES COMPANY, U.S.A.

Project No. 2832.10

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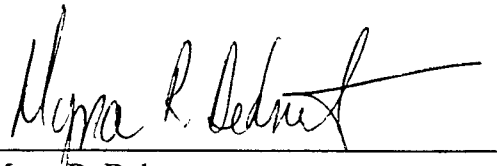

Myna R. Dehnert
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April 9, 1996

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1.0 INTRODUCTION

Brown and Caldwell conducted the field activities associated with the November 1995 quarterly groundwater sampling event at BJ Services Company, U.S.A. (BJ Service) facility located at 2708 West County Road, in Hobbs, New Mexico. The facility layout is shown on Figure 1. The New Mexico Oil Conservation Division (OCD) requires quarterly groundwater monitoring for hydrocarbon constituents, as the result of a diesel fuel release. The underground storage tank (UST) fueling system at the facility is now inactive and comprised one, 6,000-gallon gasoline tank and one 10,000-gallon diesel tank. During the November 1995 sampling event, groundwater samples were collected and analyzed for total benzene, ethylbenzene, toluene, and total xylene (BETX).

This report presents the results of the groundwater sampling event conducted for BJ Services and includes a description of the field activities and a summary of the analytical results. Also included is a groundwater potentiometric surface map and hydrocarbon distribution map.

2.0 GROUNDWATER SAMPLING AND ANALYSES

On November 14 and 15, 1995 Brown and Caldwell purged and sampled the groundwater monitoring wells to determine concentrations of dissolved-phase hydrocarbons in the groundwater at the facility. The following sections describe the activities conducted during this sampling event.

2.1 Groundwater Measurements and Sampling

A total of 10 monitoring wells were sampled during the quarterly sampling event. A Site Map depicting the locations of the monitoring wells is presented as Figure 1. As noted in previous sampling reports, monitoring well MW-2 can not be located and is assumed to have been destroyed during facility activities such as grading.

Groundwater level measurements were obtained from all monitoring wells prior to purging and sampling the wells. The groundwater levels were obtained with an oil/water interface probe and recorded to the nearest 0.01 foot. A cumulative table of groundwater elevation data is presented on Table 1. The groundwater elevation data indicates that the general groundwater flow direction is towards the east with a hydraulic gradient of 0.009 ft/ft. A Potentiometric Surface Map is presented in Figure 2. No phase-separated hydrocarbons were detected in the monitoring wells at the facility. The lack of phase-separated hydrocarbons in monitoring wells MW-1 and MW-4 is attributed to the start up of the biosparging system.

Groundwater samples were collected from all monitoring wells on November 15, 1995. The samples were collected after purging the wells (hand bailing) with dedicated disposable bailers to remove at least three well volumes or until the well became dry. Field parameter measurements for pH, conductivity, and temperature were collected after each well volume was purged. Two consecutive readings within five percent were used to indicate that groundwater had stabilized. The parameters in each monitoring well typically stabilized after two well volumes had been removed; however, at least three well volumes were removed from each well.

Additional groundwater parameters were measured to assess the potential for natural attenuation purposes during the purging and sampling activities. These parameters were dissolved oxygen and dissolved ferrous iron. All field parameter readings were recorded in the field log book and are listed on the Groundwater Sampling Forms included in Appendix A.

Following recovery, the groundwater samples were collected from each monitoring well using a new, 3-foot long, 1/2-inch I.D., disposable polyethylene bailer. Each sample was transferred to laboratory prepared, clean glass and/or plastic containers sealed with Teflon®-lined lids; labeled; and placed on ice in an insulated cooler for shipment via overnight courier to BC Analytical in Glendale, California. Each cooler was accompanied by completed chain-of-custody documentation.

All field measurement equipment was decontaminated prior to and after each use. Decontamination procedures used consisted of washing with fresh water and a non-phosphate detergent and rinsed with deionized (DI) water. Purged water and excess water generated by equipment cleaning operations was placed into 55-gallon drums and transferred to the on-site drum staging area located in the northeast corner of the facility for classification and future disposal by BJ Services.

2.2 Results of Groundwater Analyses

Groundwater samples collected during this sampling event were analyzed for benzene, ethylbenzene, toluene, and total xylenes (BETX) by EPA Method 8020 and total petroleum hydrocarbons (TPH) by EPA Method 8015 Modified. Total concentrations of BETX constituents above the laboratory detection limit were reported in the groundwater samples obtained from each monitoring well. Total benzene concentrations ranged from below the method detection limit of 0.3 micrograms per liter (µg/L) in MW-5 and MW-8 to 8,900 µg/L in MW-6. Total BETX concentrations ranged from 0.52 µg/L in MW-8 to 34,300 µg/L in MW-6. TPH concentrations ranged from below the detection limit of 0.100 milligrams per liter (mg/L) to 57 mg/L in MW-6. A cumulative summary of analytical results for groundwater samples is included as Table 2. Figure 3 illustrates the distribution of selected target analytes, which include benzene, total BETX, and TPH. The laboratory analytical reports and chain of custody record are included in Appendix B.

3.0 REMEDIATION SYSTEM

Brown and Caldwell submitted a Remedial Action Plan (RAP) to the New Mexico OCD in May 1994. Based on the results from previous investigations conducted by Brown and Caldwell and Roberts/Schornick and Associates, Inc. (RSA), Brown and Caldwell recommended the installation of a biosparging system. The biosparging system simultaneously treats contaminants in the soil residual (adsorbed phase) and in the soil moisture (dissolved phase), and removes the volatile contaminants. The biosparging system operates by injecting air into the saturated zone and extracting air from the vadose zone through a network of wells and piping. The continuous flushing of air through the saturated zone increases the dissolved oxygen concentration in the groundwater and the soil moisture in the capillary fringe and vadose zone. The higher the dissolved oxygen content facilitates indigenous microorganisms to accelerate biodegradation of the contaminants. The flushing of the air also strips the volatile and semivolatile contaminants.

The OCD approved the RAP on August 11, 1994. The installation of the biosparging system was conducted between August 2 through 24, 1995. A total of nineteen combined injection/extraction wells, 3 vacuum extraction wells, associated piping, and two extraction blowers and one injection blower were installed. The biosparaging system layout is presented in Figure 4. The vapors recovered during the extraction process are discharged to the atmosphere in accordance with the State of New Mexico Air Quality Regulations.

During system start up, blower operating parameters, such as flow rate, pressure, and vapor temperature were monitored and recorded on system operation data sheets. Effluent air samples were collected periodically to monitor the bioremediation process and emission rate. The system operation data sheets corresponding to the effluent sampling are included in Appendix C. A summary of the analytical results for the air emissions is included as Table 3 and emission calculations are included in Appendix D. The laboratory analytical reports and chain-of-custody documentation are included in Appendix E.

The soil vapor extraction blower (Gast blower Model R6340R-50) is typically operated at 24 inches of water vacuum and flow rate of 130 cfm. However, the blower is rated for a maximum capacity of 215 cfm. At this maximum capacity, the vacuum developed by the blower will be zero inches of water which will not be sufficient to extract any vapors from the subsurface. Therefore the blower cannot be operated at the maximum capacity and extract subsurface vapors at the facility. The maximum actual operating capacity of the of the blower is 134 cfm. At this flow rate and the actual maximum benzene level from the data collected during the system start-up - 990 ppm (09/20/95) show the maximum benzene emission rate is 1.87 lb/hour (8.19 tons/year). It should be noted that this high benzene level was observed only during the system start-up. The benzene levels have steadily decreased and typically ranges from 10 to 13 ppm (Table 3).

The air injection system has operated at an average flow of 28 cfm at 4.5 psig, 160°F. Total petroleum hydrocarbons (measured as TPH-gasoline) and benzene air emissions from the system were monitored using an Organic Vapor Meter (OVM) and confirmed with Drager tube measurements. Monthly air samples have been collected and analyzed for total petroleum hydrocarbons (TPH) using EPA Method 8015 (modified) and total volatile aromatic hydrocarbons, benzene, ethylbenzene, toluene, and total xylene (BETX) using EPA Method 5030/8020 (modified). The total BETX emissions ranged from 0.12 lb/hour to 10.95 lb/hour and TPH emissions ranged from 2.57 lb/hr to 16.62 lb/hr. During the start-up phase of the biosparging system, air samples indicated maximum total BETX and TPH emissions above the regulatory limit of 10 lb/hr at 10.95 and 27.41 lb/hr, respectively. The air injection system was shutdown immediately to reduce the emissions. This mode of biosparging system operation was (i.e. with the injection system shutoff) continued for a 4 week period. Subsequent OVM measurements and air sample results indicate total BETX and TPH emissions below the 10 lb/hour limit. The air injection system has recently been operated only during the day and the total BETX and TPH emissions are within the regulatory range mentioned above.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on information obtained during the quarterly groundwater sampling event.

4.1 Conclusions

- Groundwater flow is to the east with an average hydraulic gradient of 0.009 ft/ft.
- No phase-separated hydrocarbons were observed in monitor wells MW-1 and MW-4 since October 1995.
- Total BETX concentrations have decreased in monitor wells MW-3, MW-4, MW-7, MW-8, MW-9, and MW-10 indicating that the biosparging system is operating efficiently.
- Benzene concentrations in monitor wells MW-1 and MW-8 are below the New Mexico Water Quality Control Commission standard of 0.01 mg/L.

4.2 Recommendations

- Continue the quarterly groundwater sampling program and the operation and maintenance of the biosparging system.

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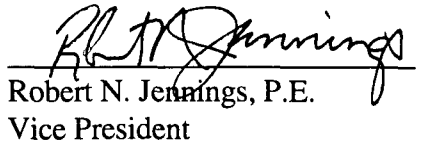


Robert N. Jennings, P.E.
Vice President

Tables

TABLES

Table 1.
Cumulative Groundwater Elevation Data
BJ Services/Western Hobbs Facility
Hobbs, New Mexico

Well ID	Date Measured	Top of Casing Elevation (ft) (relative)	Depth to Water from TOC (ft) (1)	Depth to Hydrocarbon from TOC (ft)	Hydrocarbon Thickness (ft)	Potentiometric Surface Elevation (ft)
MW-1	August 10, 1992	101.44	53.22	None	0.00	48.22
	February 9, 1993	101.44	53.03	None	0.00	48.41
	August 18, 1993	101.44	53.10	None	0.00	48.34
	January 26, 1994	101.44	53.31	None	0.00	48.13
	May 3, 1995	101.44	54.64	54.44	0.20	46.80
	July 31, 1995	101.44	54.14	None	0.00	47.30
	November 14, 1995	101.44	53.69	None	0.00	47.75
MW-2	August 10, 1992	101.5	52.82	None	0.00	48.68
	February 9, 1993	98.75	49.60	None	0.00	49.15
	August 18, 1993	98.75	49.71	None	0.00	49.04
	January 26, 1994	98.75	49.97	None	0.00	48.78
	May 3, 1995	98.75		**Well destroyed**		
MW-3	August 10, 1992	101.44	52.99	None	0.00	48.45
	February 9, 1993	101.44	52.72	None	0.00	48.72
	August 18, 1993	101.44	52.82	None	0.00	48.62
	January 26, 1994	101.44	53.05	None	0.00	48.39
	May 3, 1995	101.44	54.31	None	0.00	47.13
	July 31, 1995	98.76	51.24	None	0.00	47.52
	November 14, 1995	98.76	51.10	None	0.00	47.66
MW-4	August 10, 1992	99.33	50.55	None	0.00	48.78
	February 9, 1993	99.33	50.26	None	0.00	49.07
	August 18, 1993	99.33	50.38	None	0.00	48.95
	January 26, 1994	99.33	50.90	None	0.00	48.43
	May 3, 1995	99.33	54.51	51.06	3.45	44.82
	July 31, 1995	99.33	51.74	51.48	0.26	47.59
	November 14, 1995	99.33	51.03	None	0.00	48.30
MW-5	August 10, 1992	101.85	52.38	None	0.00	49.47
	February 9, 1993	101.85	52.06	None	0.00	49.79
	August 18, 1993	101.85	52.16	None	0.00	49.69
	January 26, 1994	101.85	52.50	None	0.00	49.35
	May 3, 1995	101.85	53.57	None	0.00	48.28
	July 31, 1995	101.85	53.27	None	0.00	48.58
	November 14, 1995	101.85	52.83	None	0.00	49.02
MW-6	February 9, 1993	99.25	50.58	None	0.00	48.67
	August 18, 1993	99.25	50.78	None	0.00	48.47
	January 26, 1994	99.25	51.00	None	0.00	48.25
	May 3, 1995	99.25	52.63	None	0.00	46.62
	July 31, 1995	99.25	51.90	None	0.00	47.35
	November 14, 1995	99.25	51.19	None	0.00	48.06
MW-7	February 9, 1993	98.96	50.53	None	0.00	48.43
	August 18, 1993	98.96	50.74	None	0.00	48.22
	January 26, 1994	98.96	51.01	None	0.00	47.95
	May 3, 1995	98.96	52.25	None	0.00	46.71
	July 31, 1995	98.96	51.92	None	0.00	47.04
	November 14, 1995	98.96	51.48	None	0.00	47.48
MW-8	February 9, 1993	99.12	50.48	None	0.00	48.64
	August 18, 1993	99.12	50.67	None	0.00	48.45
	January 26, 1994	99.12	50.96	None	0.00	48.16
	May 3, 1995	99.12	52.15	None	0.00	46.97
	July 31, 1995	99.12	51.77	None	0.00	47.35
	November 14, 1995	99.12	51.37	None	0.00	47.75

Table 1.
Cumulative Groundwater Elevation Data
BJ Services/Western Hobbs Facility
Hobbs, New Mexico

Well ID	Date Measured	Top of Casing Elevation (ft) (relative)	Depth to Water from TOC (ft) (1)	Depth to Hydrocarbon from TOC (ft)	Hydrocarbon Thickness (ft)	Potentiometric Surface Elevation (ft)
MW-9	April 22, 1993	99.18	49.73	None	0.00	49.45
	July 15, 1993	99.18	49.65	None	0.00	49.53
	August 18, 1993	99.18	49.85	None	0.00	49.33
	January 26, 1994	99.18	50.02	None	0.00	49.16
	May 3, 1995	99.18	51.35	None	0.00	47.83
	July 31, 1995	99.18	50.97	None	0.00	48.21
	November 14, 1995	99.18	50.43	None	0.00	48.75
MW-10	August 18, 1993	98.9	51.54	None	0.00	47.36
	January 26, 1994	98.9	51.90	None	0.00	47.00
	May 3, 1995	98.9	52.97	None	0.00	45.93
	July 31, 1995	98.9	52.87	None	0.00	46.03
	November 14, 1995	98.9	52.51	None	0.00	46.39
MW-11	August 18, 1993	98.82	51.92	None	0.00	46.90
	January 26, 1994	98.92	52.32	None	0.00	46.60
	May 3, 1995	98.92	53.38	None	0.00	45.54
	July 31, 1995	98.92	53.35	None	0.00	45.57
	November 14, 1995	98.92	52.96	None	0.00	45.96

Notes: (1) All measurements are recorded to the nearest 0.01 foot units.
(2) MW-2 could not be located and is assumed destroyed.

Table 2.

Cumulative Results of Analysis for Groundwater Samples

BJ Services/Western Hobbs Facility

Hobbs, New Mexico

Well ID	Sampling Date	Benzene[1] (ug/L)	Toluene[1] (ug/L)	Ethylbenzene[1] (ug/L)	Xylenes[1] (ug/L)	Total BTEX (ug/L)	TPH[2] (mg/L)
MW-1	8/10/92	5,550	12,090	2,160	7,370	27,170	NA [3]
	2/9/93	2,100	6,500	1,300	7,400	17,300	NA
	8/19/93	3,200	7,300	1,200	3,700	15,400	NA
	1/27/94	1,930	4,580	672	2,390	9,572	NA
	5/3/95	NS [4]	NS	NS	NS	NS	NS
	8/1/95	390	1,300	230	800	2,720	5.7
	11/15/95	880	1,800	300	970	3,950	6.8
MW-2	8/10/92	14.9	<4.0	<4.0	<4.0	14.9	NA
	2/9/93	<2.0	<2.0	<2.0	<6.0	ND [5]	NA
	8/19/93	100	12	3	13	128.0	NA
	1/27/94	<1.0	1.2	2	2.5	5.7	NA
	5/3/95	NS	NS	NS	NS	NS	NS
	8/1/95	NS	NS	NS	NS	NS	NS
	11/15/95	NS	NS	NS	NS	NS	NS
MW-3	8/10/92	304.9	2,099	6,760	1,586	10,749.9	NA
	2/9/93	130	<10.0	<10.0	190	320	NA
	8/19/93	560	3,100	630	1,900	6,190	NA
	1/27/94	1,070	5,380	510	3,120	10,080	NA
	5/4/95	770	3,300	470	1,800	6,340	NA
	8/1/95	490	2,900	890	1,600	5,880	14
	11/15/95	250	1,000	180	440	1,870	2.9
MW-4	8/10/92	2,594	10,360	2,160	6,740	21,854	NA
	2/9/93	5,200	15,000	2,200	10,000	32,400	NA
	8/19/93	3,000	12,000	<2,000	7,000	22,000	NA
	1/27/94	NS	NS	NS	NS	NS	NS
	5/3/95	NS	NS	NS	NS	NS	NS
	8/1/95	5,700	17,000	3,500	13,000	39,200	120
	11/15/95	490	1,600	310	1,100	3,500	5.2
MW-5	8/10/92	<4.0	<4.0	<4.0	<4.0	ND	NA
	2/9/93	<2.0	<2.0	<2.0	<6.0	ND	NA
	8/10/93	<2.0	<2.0	<2.0	<2.0	ND	NA
	1/27/94	8.7	29.9	4	11.3	53.9	NA
	5/3/95	3.7	5.3	0.92	4.6	14.5	NA
	8/1/95	<0.3	<0.3	<0.3	<0.6	ND	<0.100
	11/15/95	<0.3	1.2	<0.3	1.5	2.7	<0.100
MW-6	8/10/92	NS	NS	NS	NS	NS	NS
	2/9/93	7,000	19,000	3,100	7,200	36,300	NA
	8/19/93	8,100	19,000	3,500	6,400	37,000	NA
	1/27/94	7,960	20,200	3,830	6,150	38,140	NA
	5/4/95	11,000	17,000	2,900	6,000	36,900	NA
	8/1/95	8,300	12,000	2,500	5,100	27,900	60
	11/15/95	8,900	17,000	2,900	5,500	34,300	57

Table 2.

Cumulative Results of Analysis for Groundwater Samples

BJ Services/Western Hobbs Facility

Hobbs, New Mexico

Well ID	Sampling Date	Benzene[1] (ug/L)	Toluene[1] (ug/L)	Ethylbenzene[1] (ug/L)	Xylenes[1] (ug/L)	Total BTEX (ug/L)	TPH[2] (mg/L)
MW-7	8/10/92	NS	NS	NS	NS	NS	NS
	2/9/93	<2.0	<2.0	<2.0	<6.0	NS	NA
	8/19/93	<2.0	3	<2.0	<2.0	3.00	NA
	1/27/94	1.1	<1.0	<1.0	<1.0	1.10	NA
	5/3/95	52	3.4	0.67	2.8	58.87	NA
	8/1/95	22	2.2	0.85	2.8	27.85	<0.100
	11/15/95	8.4	0.77	<0.3	0.93	10.10	<0.100
MW-8	8/10/92	NS	NS	NS	NS	NS	NS
	2/9/93	<2.0	<2.0	<2.0	<6.0	ND	NA
	8/19/93	<2.0	<2.0	<2.0	<2.0	ND	NA
	1/27/94	<1.0	<1.0	<1.0	<1.0	ND	NA
	5/3/95	3	4.9	0.75	3.7	12.35	NA
	8/1/95	3.1	1.2	0.47	1.6	6.37	<0.001
080195[5]	8/1/95	3.6	1.5	0.51	1.5	7.11	<0.100
	11/15/95	<0.3	0.52	<0.3	<0.6	0.52	<0.100
MW-9	4/22/93	570	380	<50.0	870	1,820	NA
	7/15/93	121	7.3	3	458	589	NA
	8/19/93	390	290	40	250	970	NA
	1/27/94	327	357	51.1	293	1,028	NA
	5/3/95	380	110	19	120	629	NA
	8/1/95	660	410	91	310	1,471	6.2
	11/15/95	240	24	11	140	415	1.5
11159501[6]	11/15/95	170	18	10	120	318	1.9
MW-10	8/19/93	190	460	<200	240	890	NA
	1/27/94	13.4	4	5.5	33.6	56.5	NA
	5/4/95	980	15	11	84	1,090	NA
	8/1/95	1,300	32	32	100	1,464	3.6
	11/15/95	1,000	24	15	36	1,075	1.7
MW-11	8/19/93	<2.0	<2.0	<2.0	<2.0	ND	NA
	1/27/94	<1.0	<1.0	<1.0	<1.0	ND	NA
	5/4/95	<0.3	<0.3	<0.3	<0.6	ND	NA
	8/1/95	44	29	5.5	13	91.5	0.2
	11/15/95	190	2.8	6.2	11	210.0	0.4

Table 2.

Cumulative Results of Analysis for Groundwater Samples

BJ Services/Western Hobbs Facility

Hobbs, New Mexico

Well ID	Sampling Date	Benzene[1] (ug/L)	Toluene[1] (ug/L)	Ethylbenzene[1] (ug/L)	Xylenes[1] (ug/L)	Total BTEX (ug/L)	TPH[2] (mg/L)
Fresh Water Well	8/10/92	<4.0	<4.0	<4.0	<4.0	ND	NA
	2/9/93	77	10	<2.0	73	160.0	NA
	8/19/93	NS	NS	NS	NS	NS	NS
	1/27/94	<1.0	<1.0	<1.0	<1.0	ND	NA
	5/4/95	<0.3	<0.3	<0.3	<0.6	ND	NA
	8/1/95	NS	NS	NS	NS	NS	NS
	11/15/95	NS	NS	NS	NS	NS	NS
Field Blank 11159502	11/15/95	<0.3	0.42	<0.3	<0.6	0.42	<0.100

NOTES:
1) BTEX analyzed using EPA Method 8015 modified.
2) Total Petroleum Hydrocarbons (TPH) analyzed using EPA Method 8015 modified.
3) NA = Not analyzed.
4) NS = Not sampled.
5) ND = Concentration not detected above method detection limit.
6) Field duplicate collected from monitor well.

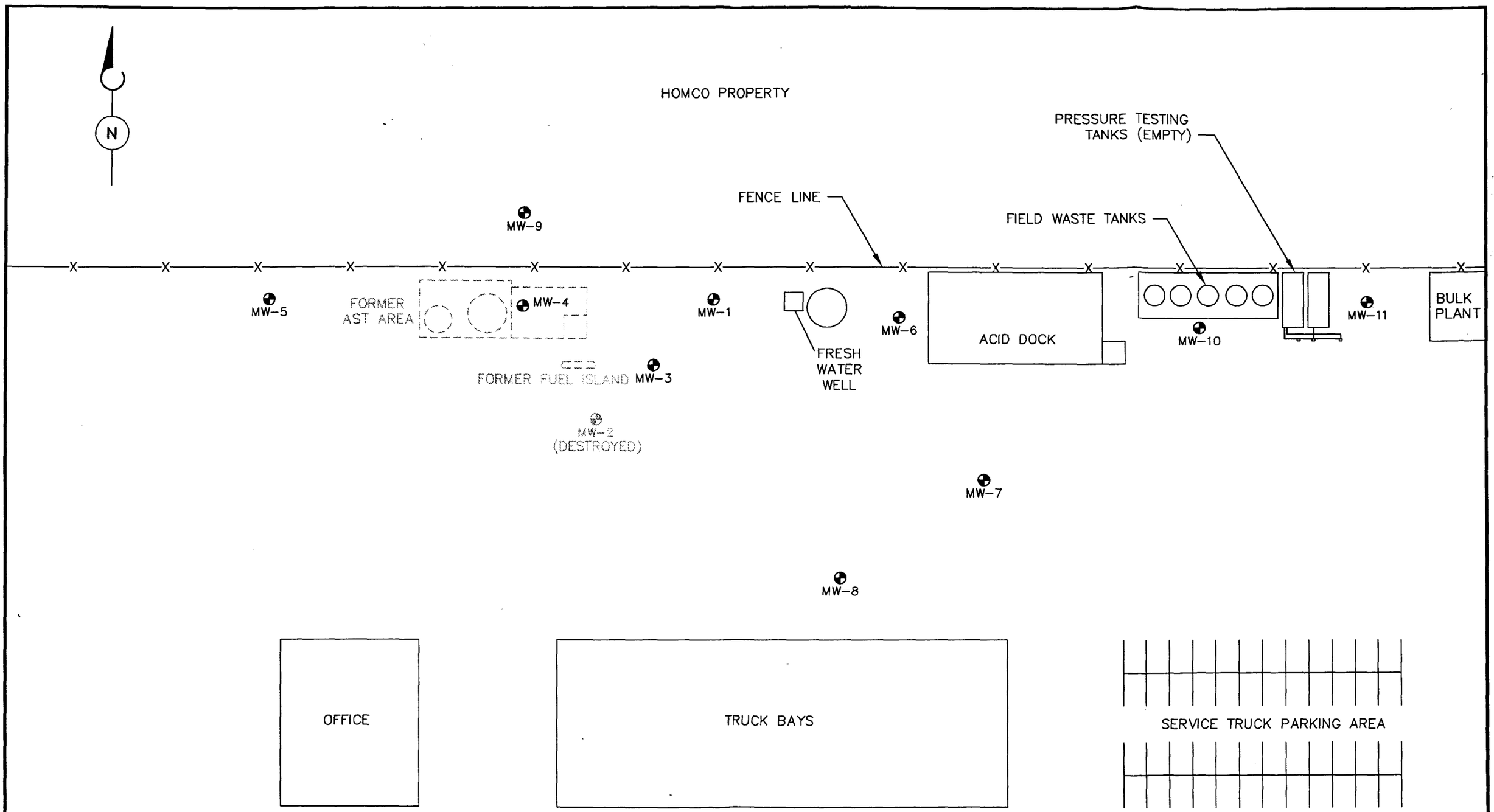
TABLE 3
Summary of Analytical Results for Air Emissions
BJ Services Company, USA
Hobbs, New Mexico

Sample Number	Date Sampled	Benzene (ppmv)	Ethyl-benzene (ppmv)	Toluene (ppmv)	Total Xylene (ppmv)	Total BETX (ppmv)	TPH (ppmv)	Discharge Rate (scfm)	Emission Rate Benzene (lb/hr)	Emission Rate Total BETX (lb/hr)	Emission Rate TPH (lb/hr)
Extraction [(1)]-1	9/19/95	790	340	1,100	920	3,150	9,700	131.03	1.26	6.05	16.62
Effluent [(2)]-1	9/20/95	990	560	2,500	1,600	5,650	16,000	131.03	1.58	10.95	27.41
Extraction-2	9/28/95	13	6	28	18	65	2,533	123.55	0.02	0.12	4.09
Effluent-4	11/07/95	15	12	58	36	121	1,500	131.10	0.02	0.24	2.57
Effluent-11159501	11/15/95	39	42	180	130	391	1,870	133.33	0.06	0.79	3.26

Notes:
(1) Extraction = Vacuum extraction blower in operation only.
(2) Effluent = Vacuum extraction and injection blowers in operation.
ppmv = parts per million by volume.
scfm = cubic feet per minute.

Figures

FIGURES



BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: U. Holmes DATE: 9/96
BROWN AND CALDWELL

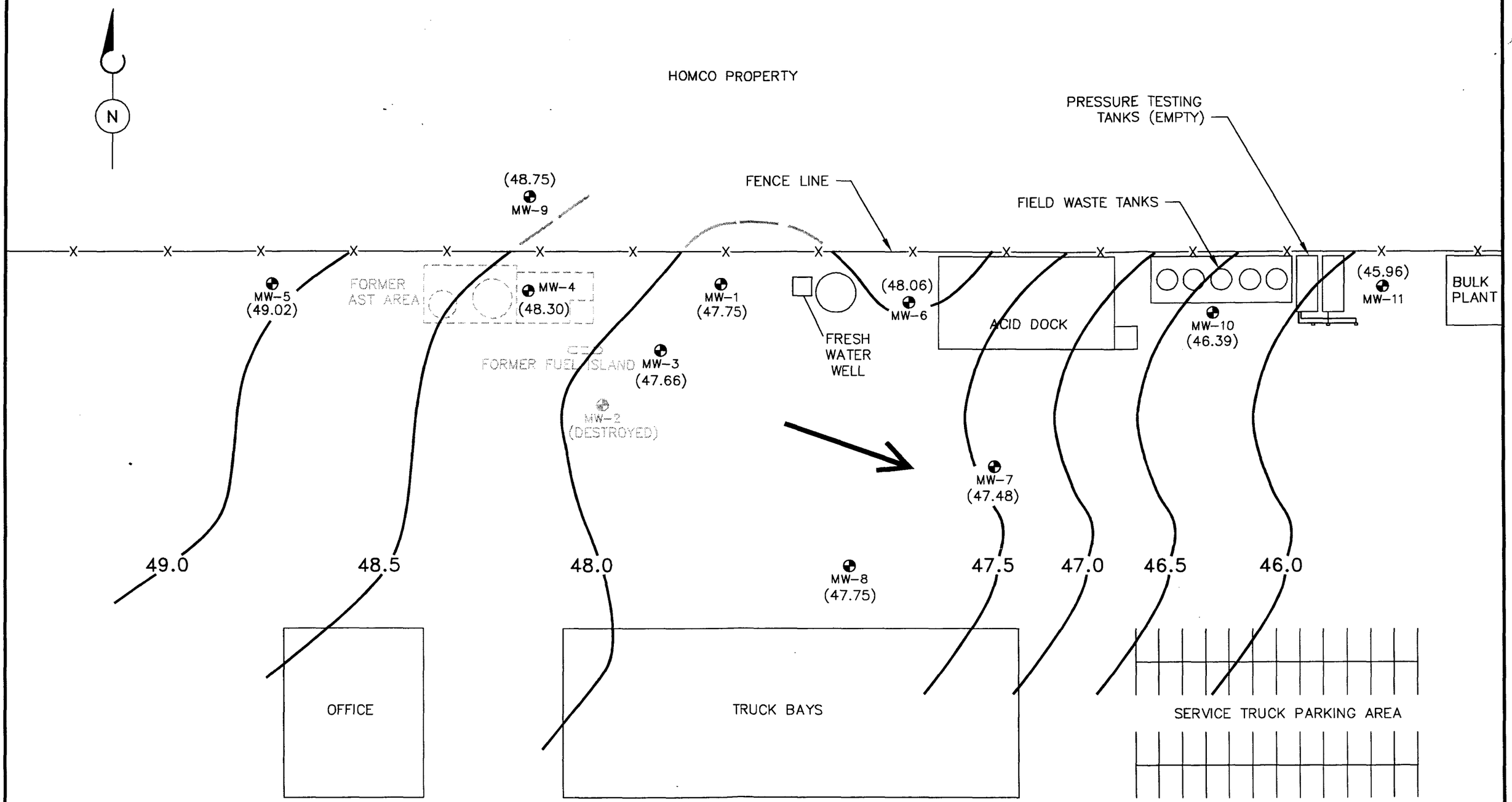
0 20 40
SCALE: 1" = 40'
DRAWN BY: DHD DATE 9/11
CHK'D BY: MCA DATE 9/96
APPROVED: ____ DATE ____

LEGEND

MW-8 MONITORING WELL LOCATION AND IDENTIFICATION

TITLE	SITE MAP
CLIENT	BJ SERVICES COMPANY, U.S.A.
SITE	HOBBS, NEW MEXICO
DATE	12/19/95
PROJECT NUMBER	2832-10
FIGURE NUMBER	1

T:\2832\SITEMAP 12/19/95 DHD



BROWN AND CALDWELL
HOUSTON, TEXAS

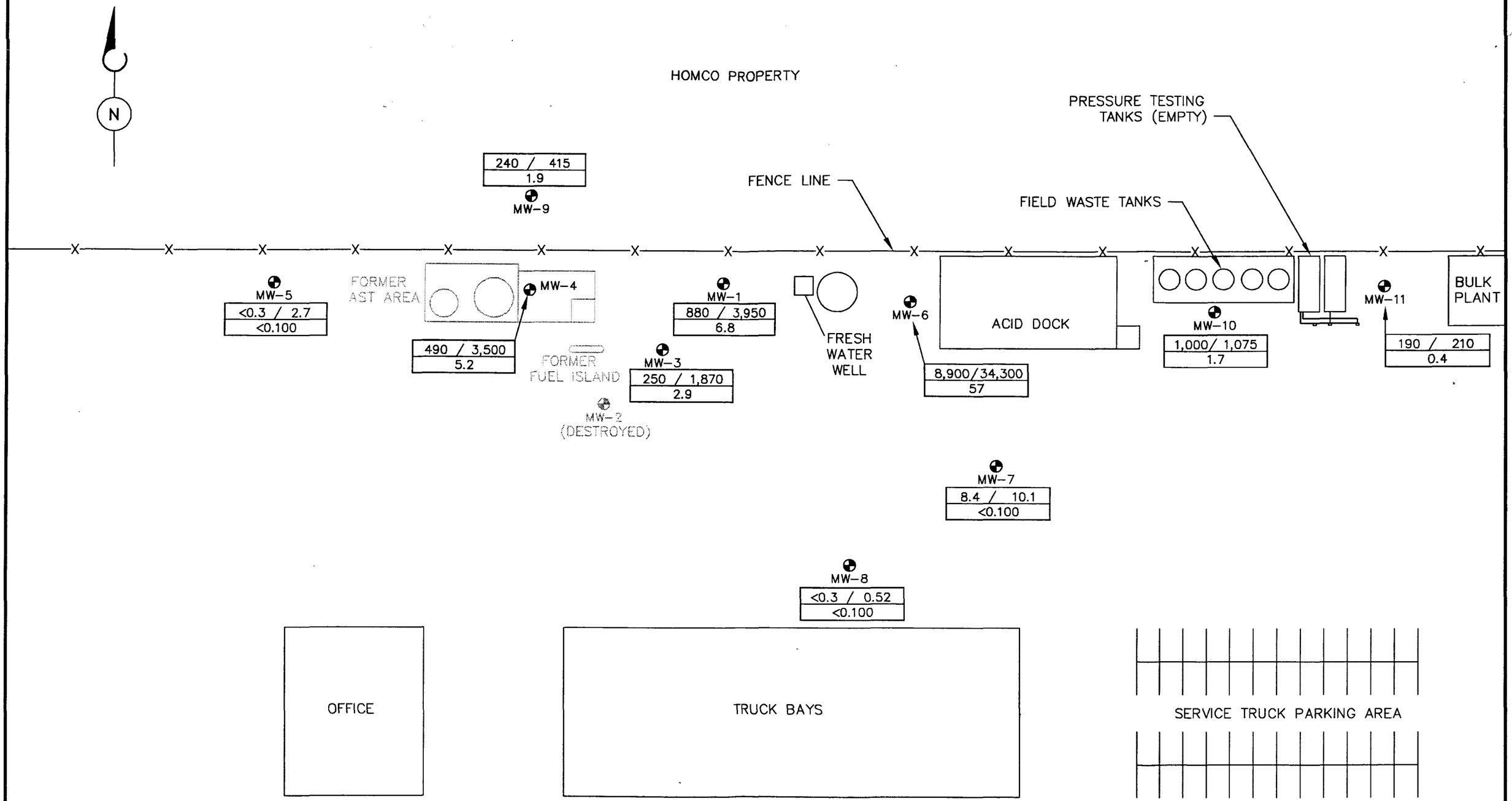
SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: M Dehnert DATE: 9/16
BROWN AND CALDWELL

0 20 40
SCALE: 1" = 40'
DRAWN BY: DHD DATE 9/6
CHK'D BY: MD DATE 9/16
APPROVED: _____ DATE _____

LEGEND
MW-8 (47.75) MONITORING WELL LOCATION AND IDENTIFICATION, WATER LEVEL
POTENTIOMETRIC SURFACE ELEVATION (FT)
GROUNDWATER FLOW DIRECTION

TITLE: POTENTIOMETRIC SURFACE MAP BASED ON MEASUREMENTS OBTAINED 11/14/95	DATE: 12/19/94
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 2832-10
SITE: HOBBS, NEW MEXICO	FIGURE NUMBER: 2

T:\2832\POTN1114 12/19/95 DHD



BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: 4/96
BROWN AND CALDWELL

0 20 40
SCALE: 1" = 40'
DRAWN BY: DHD DATE 9/11
CHK'D BY: MLH DATE 4/96
APPROVED: ____ DATE ____

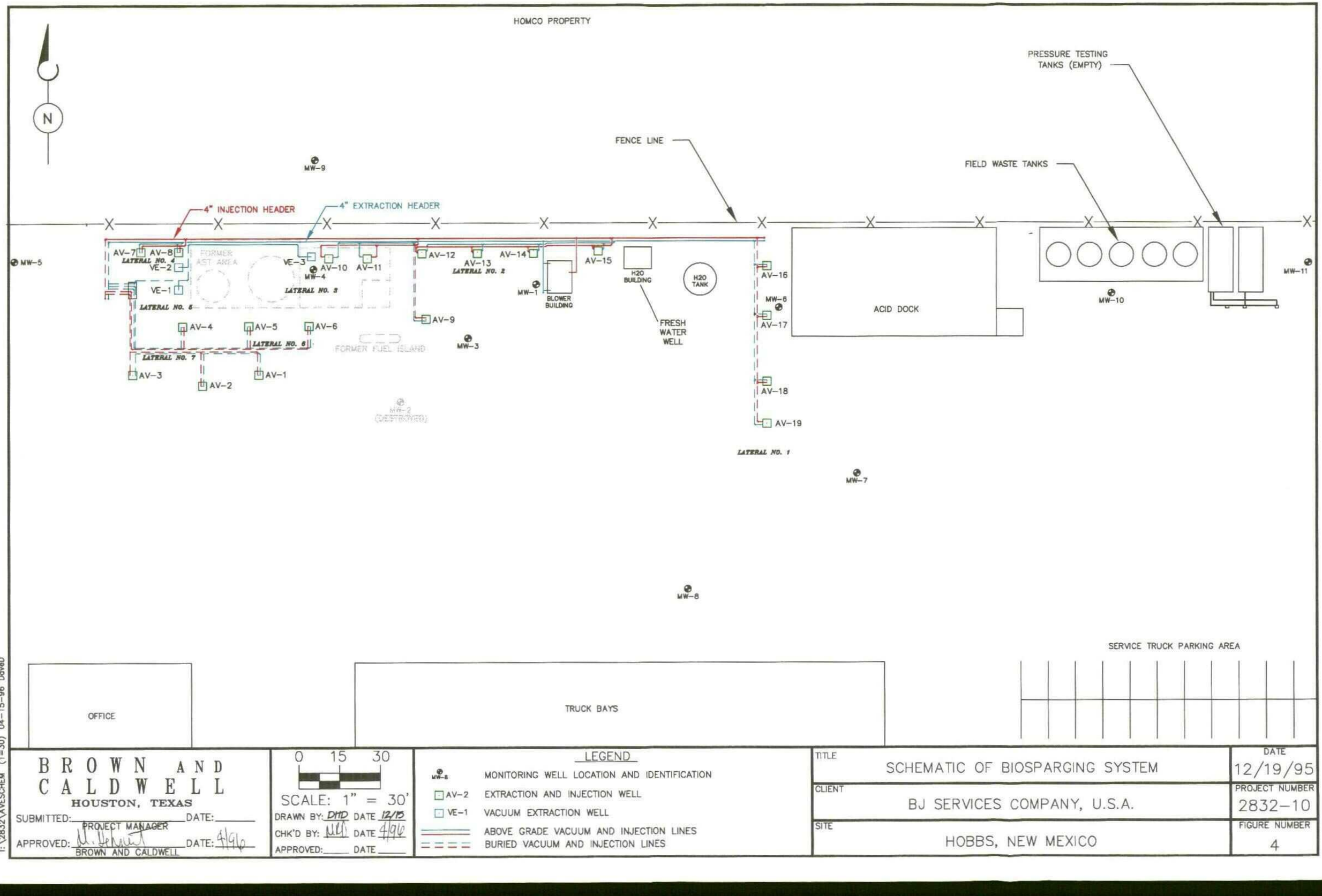
LEGEND

MW-8 — MONITORING WELL LOCATION AND IDENTIFICATION

240 / 318
1.9
BENZENE / TOTAL BTEX (ug/L)
TPH (mg/L)

TITLE: HYDROCARBON DISTRIBUTION MAP BASED ON GROUNDWATER SAMPLES COLLECTED ON 11/15/95
DATE: 12/19/95
CLIENT: BJ SERVICES COMPANY, U.S.A.
PROJECT NUMBER: 2832-10
SITE: HOBBS, NEW MEXICO
FIGURE NUMBER: 3

T:\2832\HYD1115 12/19/95 DHD



T:\2832\AVESCHEM (1=30) 04-15-96 DaveD

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: M. Dehmer DATE: 4/9/96
BROWN AND CALDWELL

0 15 30
SCALE: 1" = 30'

DRAWN BY: DHD DATE 12/15
CHK'D BY: MLL DATE 4/96
APPROVED: _____ DATE _____

LEGEND

- MW-8 — MONITORING WELL LOCATION AND IDENTIFICATION
- AV-2 — EXTRACTION AND INJECTION WELL
- VE-1 — VACUUM EXTRACTION WELL
- ABOVE GRADE VACUUM AND INJECTION LINES
- BURIED VACUUM AND INJECTION LINES

TITLE: SCHEMATIC OF BIOSPARGING SYSTEM	DATE: 12/19/95
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 2832-10
SITE: HOBBS, NEW MEXICO	FIGURE NUMBER: 4

Appendices

A

APPENDIX A

GROUNDWATER SAMPLING FORMS

Task 10 Log Book # _____

Job # 2832 Page ____ of ____

GROUNDWATER SAMPLING FIELD DATA SHEET

Well ID. No. MW-1	Purge Equipment: [X] Other Disp Poly; [ ] 1.40" Bennett Pump (Teflon Tubing); [ ] 1.80" Bennett Pump (Teflon Tubing); [ ] Meyers Pump (PVC Tubing); [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.; [ ] Stainless Bailer: O.D. 1.65" [ ] 1.85" [ ] 3.75" [ ] ___" [ ]; LENGTH [ ] 2 ft. [ ] 3 ft. [ ] 4 ft. [ ] ___ ft.; SERIAL NO. _____	Analytical Equipment: pH Meter: [ ] Beckman phi 21 [ ] Beckman phi 10 [ ] Orion SA250 [X] Other Paper; SERIAL NO. _____; Conductivity Meter: [ ] YSI Model 33 [ ] Orion 122 [X] Other HyDac; SERIAL NO. _____; Dissolved Oxygen Meter: [ ] YSI Model 50B; SERIAL NO. _____; Temperature Meter: [ ] Beckman phi 21 [ ] Beckman phi 10 [ ] Orion SA250 [X] Other HyDac; SERIAL NO. _____; Filtration Equipment: [ ] Geotech Peristaltic Pump [ ] Geotech 0.45 micron filter [ ] Dispos. 0.45 micron filter; Water Level Meter: [ ] Solinst SERIAL NO. _____
Casing Diameter 2" in.		
Casing Stickup MP 6.42 ft.		
Total Well Depth (from TOC) MP 53.69 64.42 ft.	Sample Equipment: [X] Other Disp Poly; [ ] 1.40" Bennett Pump (Teflon Tubing); [ ] 1.80" Bennett Pump (Teflon Tubing); [ ] Meyers Pump (PVC Tubing); [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.; [ ] Stainless Bailer: O.D. 1.65" [ ] 1.85" [ ] 3.75" [ ] ___" [ ]; LENGTH [ ] 2 ft. [ ] 3 ft. [ ] 4 ft. [ ] ___ ft.; SERIAL NO. _____	
Static Water Level (from TOC) 53.69 ft.		
Water Thickness 10.73 ft.		
Casing Volume 1.75 gal.		
Screened Interval (from GS) ft.		

Sampler's Initials MKD/KS	Time 1340	Date 11/4/95

Meter Calibration

pH ____ at ____ °C Time ____

pH ____ at ____ °C Time ____

Conductance Standard: _____ µmhos/cm at 25°C

Measured Value: _____ µmhos/cm at 25°C Time ____

Dissolved Oxygen Calibrated to _____ mg/l at _____ °C Time ____

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)

Start Point _____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Purge Containerized ? [X] Yes [ ] No Destination: Drum on-site

Sample Depth: (ft.) 54.0

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1340	INT.	-	53.69	65.3	9030	6.5				CLEAR SHEEN
1355	1 1/2	2.75	—	62.7	8960	6.5				
1410	2 1/2	5.5	—	66.7	9130	6.5				
1420	3.2	6.3	—	66.2	9060	6.5				
	Ferrous Iron =			0.25 mg/L						
	DO = 1.0 mg/L									
11/15/95 @ 0950 - collect full sample suite - BTEX + TPH only.										

Analyses Requested (see COC) (Full Suite) Partial Suite (explain)

QC Samples: GC/MS Rinse Blank Field Blank Trip Blank

Additional Analyses:

Additional Comments:

	Initial Readings:	Sample Readings:
[ ] HNu	TOC ____	TOC ____
[ ] OVA	BZ ____	BZ ____
[ ] Microtip	Bkgnd ____	Bkgnd ____

Protective Level: B C (D)

SERIAL NO. _____

HSO Signature: Myra Dehart

Condition of Well, Remarks:

Sampler's Signature: Myra Dehart

Task 10 Log Book # _____

Job # 2832 Page ____ of ____

GROUNDWATER SAMPLING FIELD DATA SHEET

Well ID. No.: MW-3

Casing Diameter: 2 in.

Casing Stickup: ____ ft.

Total Well Depth (from TOC): 64.31 ft.

Static Water Level (from TOC): 51.1 ft.

Water Thickness: 13.21 ft.

Casing Volume: 2.15 gal.

Screened Interval (from GS): ____ ft.

Purge Equipment
- [x] Other Disp Poly
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.		LENGTH	
1.65"	[ ]	[ ]	2 ft.
1.85"	[ ]	[ ]	3 ft.
3.75"	[ ]	[ ]	4 ft.
____	[ ]	[ ]	____ ft.

SERIAL NO. ____

Sample Equipment
- [x] Other Disp Poly
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.		LENGTH	
1.65"	[ ]	[ ]	2 ft.
1.85"	[ ]	[ ]	3 ft.
3.75"	[ ]	[ ]	4 ft.
____	[ ]	[ ]	____ ft.

SERIAL NO. ____

Purge Containerized ?
- [x] Yes [ ] No Destination: Drum On-Site

Analytical Equipment

pH Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Paper

SERIAL NO. ____

Conductivity Meter:
- [ ] YSI Model 33
- [ ] Orion 122
- [x] Other Hydac

SERIAL NO. ____

Dissolved Oxygen Meter:
- [ ] YSI Model 360

SERIAL NO. ____

Temperature Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Hydac

SERIAL NO. ____

Filtration Equipment:
- [ ] Geotech Peristaltic Pump
- [ ] Geotech 0.45 micron filter
- [ ] Dispo. 0.45 micron filter

Water Level Meter:
- [ ] Solinst

SERIAL NO. ____

Sampler's Initials	Time	Date
MRD/KS	1320	11/14/95

Meter Calibration

pH ____ = ____ at ____ °C Time ____

pH ____ = ____ at ____ °C Time ____

Conductance Standard: ____ µmhos/cm at 25°C

Measured Value: ____ µmhos/cm at 25°C Time ____

Dissolved Oxygen Calibrated to ____ mg/l at ____ °C Time ____

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)

Start Point ____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) ~51.8'

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1:25	Init	—	51.1	62.4	9890	6.5	NA			
1:50	1 1/2	3.2	—	64.3	10,290	6.5	NA			
2:05	2 1/2	5.5	—	66.1	10,200	6.5	NA			
2:25	3.2	7.5	—	67.0	9,930	6.5	NA			
		Ferrous Iron = 0.1 mg/L								
		DO = 0.8 mg/L							pH	
11/15/95	0840	Collect full sample suite – BTEX only								

Analyses Requested (see COC) Full Suite Partial Suite (explain)

QC Samples: GC/MS Rinse Blank Field Blank Trip Blank

Additional Analyses:

Additional Comments:

- [ ] HNu
- [ ] OVA
- [ ] Microtip

Initial Readings: TOC ____ BZ ____ Bkgnd ____

Sample Readings: TOC ____ BZ ____ Bkgnd ____

Protective Level: B C D

SERIAL NO. ____

HSO Signature: Myra Dehnert

Condition of Well, Remarks:

Sampler's Signature: Myra Dehnert

Task 10 Log Book # _____

Job # 2832 Page ____ of ____

GROUNDWATER SAMPLING FIELD DATA SHEET

Well ID. No.: MW-4

Casing Diameter: 2 in.

Casing Stickup: ____ ft.

Total Well Depth (from TOC): ~~51.74~~ ft.

Static Water Level (from TOC): 51.03 ft.

Water Thickness: N/A ft.

Casing Volume: 1.7 gal.

Screened Interval (from GS): ____ ft.

Purge Equipment
- [x] Other Disp Poly
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.	LENGTH
1.65" [ ]	[ ] 2 ft.
1.85" [ ]	[ ] 3 ft.
3.75" [ ]	[ ] 4 ft.
___ [ ]	[ ] ___ ft.

SERIAL NO. ____

Sample Equipment
- [x] Other Disp. Poly
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.	LENGTH
1.65" [ ]	[ ] 2 ft.
1.85" [ ]	[ ] 3 ft.
3.75" [ ]	[ ] 4 ft.
___ [ ]	[ ] ___ ft.

SERIAL NO. ____

Purge Containerized ?
- [x] Yes [ ] No Destination: Drum - on - site

Analytical Equipment

pH Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Paper

SERIAL NO. ____

Conductivity Meter:
- [ ] YSI Model 33
- [ ] Orion 122
- [x] Other Hy Dre

SERIAL NO. ____

Dissolved Oxygen Meter:
- [ ] YSI Model 50B

SERIAL NO. ____

Temperature Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Hy Dre

SERIAL NO. ____

Filtration Equipment:
- [ ] Geotech Peristaltic Pump
- [ ] Geotech 0.45 micron filter
- [ ] Dispos. 0.45 micron filter

Water Level Meter:
- [ ] Solinst

SERIAL NO. ____

Sampler's Initials	Time	Date
MRD/KS	440	11/14/95

Meter Calibration

pH ____ = ____ at ____ °C Time

pH ____ = ____ at ____ °C Time

Conductance Standard: ____ µmhos/cm at 25°C

Measured Value: ____ µmhos/cm at 25°C Time

Dissolved Oxygen Calibrated to ____ mg/l at ____ °C Time

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)

Start Point ____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) ~51.5'

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C/°F	Sp. Cond. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1440	INT	—	51.03	65.8	~~1050~~ 1105	6.4	NA			CLEAR HEAVY SHEEN
1505	1 1/2	2.75	—	62.6	1107	6.5	NA			
1515	2 1/2	5.5	—	65.3	1140	6.6	NA			
1520	3 1/4	7.0	—	64.7	1115	6.5	NA			
	Ferrous Iron =			0.9 mg/L						
	DO =	2.2 mg/L								
11/15/95	0930	collect full sample suite, BTEX + TPH								

Analyses Requested (see COC) Full Suite Partial Suite (explain)

QC Samples: GC/MS Rinse Blank Field Blank Trip Blank

Additional Analyses:

Additional Comments:

- [ ] HNu
- [ ] OVA
- [ ] Microtip

Initial Readings: TOC ____ BZ ____ Bkgnd ____

Sample Readings: TOC ____ BZ ____ Bkgnd ____

Protective Level: B C (D)

SERIAL NO. ____

HSO Signature: Myra Dehnert

Condition of Well, Remarks:

Sampler's Signature: Myra Dehnert

Task 10 Log Book # _____

Job # 2832 Page ____ of ____

GROUNDWATER SAMPLING FIELD DATA SHEET

Well ID. No.: MW-5

Casing Diameter: 2" in.

Casing Stickup: 2 ft.

Total Well Depth (from TOC): 64.60 ft.

Static Water Level (from TOC): 52.83 ft.

Water Thickness: 11.77 ft.

Casing Volume: 1.92 gal.

Screened Interval (from GS): ft.

Purge Equipment
- [x] Other Disp. Poly
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.		LENGTH	
1.65"	[ ]	[ ]	2 ft.
1.85"	[ ]	[ ]	3 ft.
3.75"	[ ]	[ ]	4 ft.
___"	[ ]	[ ]	___ ft.

SERIAL NO. _____

Sample Equipment
- [x] Other Disp Poly
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.		LENGTH	
1.65"	[ ]	[ ]	2 ft.
1.85"	[ ]	[ ]	3 ft.
3.75"	[ ]	[ ]	4 ft.
___"	[ ]	[ ]	___ ft.

SERIAL NO. _____

Purge Containerized ?
- [x] Yes [ ] No Destination: Drum on-site

Analytical Equipment

pH Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Hydac

SERIAL NO. _____

Conductivity Meter:
- [ ] YSI Model 33
- [ ] Orion 122
- [x] Other Hydac

SERIAL NO. _____

~~**Dissolved Oxygen Meter:**~~
- [ ] ~~YSI Model 58~~

SERIAL NO. _____

Temperature Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Hydac

SERIAL NO. _____

~~**Filtration Equipment:**~~
- [ ] ~~Geotech Peristaltic Pump~~
- [ ] ~~Geotech 0.45 micron filter~~
- [ ] Dispos. 0.45 micron filter

Water Level Meter:
- [ ] Solinst

SERIAL NO. _____

Sampler's Initials	Time	Date
KS/MRD	1440	11/14/95

Meter Calibration

pH ____ = ____ at ____ °C Time ____

pH ____ = ____ at ____ °C Time ____

Conductance Standard: ____ µmhos/cm at 25°C Time ____

Measured Value: ____ µmhos/cm at 25°C ____

Dissolved Oxygen Calibrated to ____ mg/l at ____ °C ____

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)

Start Point ____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) ~53.0'

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1440	Init	—	52.83	63	1076	6.5				CLEAR
1500	1 1/2	3.0	—	63.3	1045	6.5				Clear
1515	2 1/2	4.5	—	63.1	9848	6.5				
1525	3 1/4	5.25	—	63.1	9340	6.5				
		Ferrous Iron = 0.1 mg/L								
		DO = 2.6 mg/L								
11/15/95	0850	Collect full sample suite - BTEX only								

Analyses Requested (see COC) Full Suite Partial Suite (explain)

QC Samples: GC/MS Rinse Blank Field Blank Trip Blank

Additional Analyses:

Additional Comments:

- [ ] HNu
- [ ] OVA
- [ ] Microtip

Initial Readings: TOC ____ BZ ____ Bkgnd ____

Sample Readings: TOC ____ BZ ____ Bkgnd ____

Protective Level: B C (D)

SERIAL NO. ____

HSO Signature: Myra Schmidt

Condition of Well, Remarks:

Sampler's Signature: Myra Schmidt

Task 10 Log Book # _____

GROUNDWATER SAMPLING FIELD DATA SHEET

Job # 2832 Page ____ of ____

Well ID. No.	Purge Equipment	Analytical Equipment	Sampler's Initials	Time	Date
MW-6	☒ Other Disp. Poly ☐ 1.40" Bennett Pump (Teflon Tubing) ☐ 1.80" Bennett Pump (Teflon Tubing) ☐ Meyers Pump (PVC Tubing) ☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in. ☐ Stainless Bailer: O.D. LENGTH 1.65" ☐ ☐ 2 ft. 1.85" ☐ ☐ 3 ft. 3.75" ☐ ☐ 4 ft. ___ ☐ ☐ ___ ft. SERIAL NO. _____	**pH Meter:** ☐ Beckman phi 21 ☐ Beckman phi 10 ☐ Orion SA250 ☐ Other _____ SERIAL NO. _____ **Conductivity Meter:** ☐ YSI Model 33 ☐ Orion 122 ☒ Other HydAc SERIAL NO. _____ **Dissolved Oxygen Meter:** ☐ YSI Model 58B SERIAL NO. _____ **Temperature Meter:** ☐ Beckman phi 21 ☐ Beckman phi 10 ☐ Orion SA250 ☒ Other HydAc SERIAL NO. _____ **Filtration Equipment:** ☐ Geotech Peristaltic Pump ☐ Geotech 0.45 micron filter ☐ Dispos. 0.45 micron filter **Water Level Meter:** ☐ Solinst SERIAL NO. _____	MRD/KS	1145	11/14/95

Casing Diameter	Casing Stickup	Total Well Depth (from TOC)	Static Water Level (from TOC)	Water Thickness	Casing Volume	Screened Interval (from GS)
2 in.	——— ft.	60.17 ft.	51.19 ft.	8.98 ft.	1.46 gal.	— ft.

Sample Equipment
☒ Other Disp. Poly
☐ 1.40" Bennett Pump (Teflon Tubing)
☐ 1.80" Bennett Pump (Teflon Tubing)
☐ Meyers Pump (PVC Tubing)
☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in.
☐ Stainless Bailer:
O.D. LENGTH
1.65" ☐ ☐ 2 ft.
1.85" ☐ ☐ 3 ft.
3.75" ☐ ☐ 4 ft.
___ ☐ ☐ ___ ft.
SERIAL NO. _____

Purge Containerized ?
☒ Yes ☐ No Destination: Drum Storage

Meter Calibration Time
pH _____ = _____ at _____ °C _____ Time
pH _____ = _____ at _____ °C _____
Conductance Standard: _____ µmhos/cm at 25°C Time
Measured Value: _____ µmhos/cm at 25°C _____
Dissolved Oxygen Time
Calibrated to _____ mg/l at _____ °C _____

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)
Start Point _____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) 51.5

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °F	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1155	INT	—	51.19	65.6	1604	6.7	NA			LT GREY, SANDY
1205	1 3/4	2.75	—	68.2	1674	6.6	NA			"
1214	2 1/4	5.5	—	64.1	1620	6.6	NA			"
1220	3	6.1	—	67.2	1615	6.6	NA			"
	Ferrous Iron - 1.7 mg/L									
	NO =	0.6 mg/L							TPH	
11/15	0815	collect full sample suite - BTEX only								

Analyses Requested (see COC) Full Suite Partial Suite (explain)
QC Samples: GC/MS Rinse Blank Field Blank Trip Blank
Additional Analyses:

Additional Comments:

☐ HNu ☐ OVA ☐ Microtip

Initial Readings:	Sample Readings:
TOC _____	TOC _____
BZ _____	BZ _____
Bkgnd _____	Bkgnd _____

Protective Level: B C D

SERIAL NO. _____
HSO Signature: Myra Dehnert

Condition of Well, Remarks:

Sampler's Signature: Myra Dehnert

Task Gw Sampling Log Book # _____

GROUNDWATER SAMPLING FIELD DATA SHEET

Job # 2832.10 Page ____ of ____

Well ID. No.: MW-7

Casing Diameter: 2" in.

Casing Stickup: – ft.

Total Well Depth (from TOC): 61.46 ft.

Static Water Level (from TOC): 51.48 ft.

Water Thickness: 9.98 ft.

Casing Volume: 1.63 gal.

Screened Interval (from GS): ft.

Purge Equipment
- [x] Other Disp. Poly
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.	LENGTH
1.65" [ ]	[ ] 2 ft.
1.85" [ ]	[ ] 3 ft.
3.75" [ ]	[ ] 4 ft.
___" [ ]	[ ] ___ ft.

SERIAL NO. _____

Sample Equipment
- [x] Other Disp. Poly.
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.	LENGTH
1.65" [ ]	[ ] 2 ft.
1.85" [ ]	[ ] 3 ft.
3.75" [ ]	[ ] 4 ft.
___" [ ]	[ ] ___ ft.

SERIAL NO. _____

Purge Containerized ? [x] Yes [ ] No Destination: Drum on-site

Analytical Equipment

pH Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Paper

SERIAL NO. _____

Conductivity Meter:
- [ ] YSI Model 33
- [ ] Orion 122
- [x] Other Hydac

SERIAL NO. _____

Dissolved Oxygen Meter:
- [ ] YSI Model 50B

SERIAL NO. _____

Temperature Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other Hydac

SERIAL NO. _____

Filtration Equipment:
- [ ] Geotech Peristaltic Pump
- [ ] Geotech 0.45 micron filter
- [ ] Dispos. 0.45 micron filter

Water Level Meter:
- [ ] Solinst

SERIAL NO. _____

Sampler's Initials	Time	Date
KS/MRD	0940	11/14/95

Meter Calibration
pH ____ at ____ °C Time ____
pH ____ at ____ °C Time ____
Conductance Standard: _____ µmhos/cm at 25°C Time ____
Measured Value: _____ µmhos/cm at 25°C Time ____
Dissolved Oxygen Calibrated to _____ mg/l at ____ °C ____

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)
Start Point _____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) 252'

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
0949	INIT	–	51.48	67.7°F	1572	6.5	NA			CLAY-Silty
1015	3 1/2	7.5	–	67.8	1528	6.5	NA			"
	Ferrous Iron = 0.1 mg/L									
	DO = 2.0 mg/L									
11/15	0740	collect full sample suite – BTEX only! + TPH								

Analyses Requested (see COC): Full Suite / Partial Suite (explain)
QC Samples: GC/MS Rinse Blank Field Blank Trip Blank
Additional Analyses:

Additional Comments:

- [ ] HNu
- [ ] OVA
- [ ] Microtip

Initial Readings: TOC ____ BZ ____ Bkgnd ____
Sample Readings: TOC ____ BZ ____ Bkgnd ____

Protective Level: B C D

SERIAL NO. _____
HSO Signature: Myra Dehnert

Condition of Well, Remarks:

Sampler's Signature: Myra Dehnert

Task GW SAMPLING Log Book # _____

Job # 2852.10 Page ____ of ____

GROUNDWATER SAMPLING FIELD DATA SHEET

Sampler's Initials: MKO / KS	Time: 0940	Date: 11/14/95

Well ID. No.: MW-5

Casing Diameter: 2" in.

Casing Stickup: ____ ft.

Total Well Depth (from TOC): 12.40 ft.

Static Water Level (from TOC): 7.34 ft.

Water Thickness: 11.06 ft.

Casing Volume: 1.8 gal.

Screened Interval (from GS): ____ ft.

Purge Equipment
- [x] Other: Bailer
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.	LENGTH
1.65" [ ]	[ ] 2 ft.
1.85" [ ]	[ ] 3 ft.
3.75" [ ]	[ ] 4 ft.
___" [ ]	[ ] ___ ft.

SERIAL NO. ____

Sample Equipment
- [x] Other: Disp Bailer
- [ ] 1.40" Bennett Pump (Teflon Tubing)
- [ ] 1.80" Bennett Pump (Teflon Tubing)
- [ ] Meyers Pump (PVC Tubing)
- [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.
- [ ] Stainless Bailer:

O.D.	LENGTH
1.65" [ ]	[ ] 2 ft.
1.85" [ ]	[ ] 3 ft.
3.75" [ ]	[ ] 4 ft.
___" [ ]	[ ] ___ ft.

SERIAL NO. ____

Analytical Equipment

pH Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other: Hydac

SERIAL NO. ____

Conductivity Meter:
- [ ] YSI Model 33
- [ ] Orion 122
- [x] Other: Hydac

SERIAL NO. ____

Dissolved Oxygen Meter:
- [ ] YSI Model 50B

SERIAL NO. ____

Temperature Meter:
- [ ] Beckman phi 21
- [ ] Beckman phi 10
- [ ] Orion SA250
- [x] Other: Hydac

SERIAL NO. ____

Filtration Equipment:
- [ ] Geotech Peristaltic Pump
- [ ] Geotech 0.45 micron filter
- [ ] Dispos. 0.45 micron filter

Water Level Meter:
- [ ] Solinst

SERIAL NO. ____

Meter Calibration

Time ____
pH ____ = ____ at ____ °C ____
Time ____
pH ____ = ____ at ____ °C ____
Conductance Standard: ____ µmhos/cm at 25°C
Time ____
Measured Value: ____ µmhos/cm at 25°C ____
Time ____
Dissolved Oxygen Calibrated to ____ mg/l at ____ °C ____

Alkalinity Titration Results (Acid Concentration: 0.16N / 1.6N)

Start Point ____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) (mid) Fe+3

Purge Containerized ?
- [x] Yes
- [ ] No

Destination: Drum on-site

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C/F	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
0845	INT.	—	51.34	59.2	~~12530~~ 1253	~~6.5~~ 7	NA			SLIGHTLY Cloudy
0940	1 1/2	2.75	—	66.9	1521	6.5	NA			"
0945	2 1/2	5.5	—	66.4	1469	6.5	NA			"
1000	3 1/2	7.0	—	66.8	1468	6.5	NA	0.1		"
	Ferrous Iron = 0.1 mg/L									
	DO = 4.0 mg/L									
11/15	0800	collect full sample suite - BTEX TPH only								

Analyses Requested (see COC)

QC Samples: GC/MS (Full Suite) Rinse Blank Partial Suite (explain) Field Blank Trip Blank

Additional Analyses:

Additional Comments:

	Initial Readings:	Sample Readings:
[ ] HNu	TOC ____	TOC ____
[ ] OVA	BZ ____	BZ ____
[ ] Microtip	Bkgnd ____	Bkgnd ____

Protective Level: B C (D)

SERIAL NO. ____

HSO Signature: [signature]

Condition of Well, Remarks:
NEED'S NEW WELL COVER.
MANHOLE IS CRACKED

Sampler's Signature: [signature]

Task 10 Log Book # _____

GROUNDWATER SAMPLING FIELD DATA SHEET

Job # 2832 Page ____ of ____

Well ID. No. MW-9	Purge Equipment: [x] Other Disp Poly; [ ] 1.40" Bennett Pump (Teflon Tubing); [ ] 1.80" Bennett Pump (Teflon Tubing); [ ] Meyers Pump (PVC Tubing); [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.; [ ] Stainless Bailer: O.D. 1.65" [ ] 1.85" [ ] 3.75" [ ] ___"; LENGTH [ ] 2 ft. [ ] 3 ft. [ ] 4 ft. [ ] ___ ft.; SERIAL NO. _____	Analytical Equipment: pH Meter: [ ] Beckman phi 21 [ ] Beckman phi 10 [ ] Orion SA250 [x] Other Paper SERIAL NO. _____; Conductivity Meter: [ ] YSI Model 33 [ ] Orion 122 [x] Other HyDac SERIAL NO. _____; Dissolved Oxygen Meter: [ ] YSI Model 58B SERIAL NO. _____; Temperature Meter: [ ] Beckman phi 21 [ ] Beckman phi 10 [ ] Orion SA250 [x] Other HyDac SERIAL NO. _____; Filtration Equipment: [ ] Geotech Peristaltic Pump [ ] Geotech 0.45 micron filter [ ] Dispos. 0.45 micron filter; Water Level Meter: [ ] Solinst SERIAL NO. _____
Casing Diameter 2 in.		
Casing Stickup ____ ft.		
Total Well Depth (from TOC) 60.27 ft.	Sample Equipment: [x] Other Disp Poly; [ ] 1.40" Bennett Pump (Teflon Tubing); [ ] 1.80" Bennett Pump (Teflon Tubing); [ ] Meyers Pump (PVC Tubing); [ ] Grundfos Pump (Neoprene Tubing) [ ] 2 in. [ ] 3 in.; [ ] Stainless Bailer: O.D. 1.65" [ ] 1.85" [ ] 3.75" [ ] ___"; LENGTH [ ] 2 ft. [ ] 3 ft. [ ] 4 ft. [ ] ___ ft.; SERIAL NO. _____	
Static Water Level (from TOC) 50.43 ft.		
Water Thickness 9.84 ft.		
Casing Volume 1.6 gal.		
Screened Interval (from GS) ____ ft.		
Purge Containerized ? [x] Yes [ ] No Destination: Drum On-Site		

Sampler's Initials	Time	Date
MRD/KS	1540	

Meter Calibration

pH ____ = ____ at ____ °C ____ Time

pH ____ = ____ at ____ °C ____ Time

Conductance Standard: ____ µmhos/cm at 25°C

Measured Value: ____ µmhos/cm at 25°C ____ Time

Dissolved Oxygen Calibrated to ____ mg/l at ____ °C ____ Time

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)

Start Point ____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) 51.0

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C/F	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1550	INT.	—	50.43	61.1	1121	6.6				
1555	1 1/2	2.5	—	61.2	1036	6.5				
1600	2	4.0	—	61.5	1039	6.5				
1612	3	6.2	—	61.5	1037	6.5				
	Ferrous Iron =			0.17 mg/L						
	DO=	1.2 mg/L								
9/15	0905	collect full sample suite BTEX + TPH								
	0915	collect duplicate 1115950 1								
	0920	collect field blank 1115950 2								

Analyses Requested (see COC) Full Suite Partial Suite (explain)

QC Samples: GC/MS Rinse Blank Field Blank Trip Blank

Additional Analyses: Duplicate - 1115950 1

Additional Comments: Also collected field blank 1115950 2

[ ] HNu [ ] OVA [ ] Microtip

Initial Readings: TOC ____ BZ ____ Bkgnd ____

Sample Readings: TOC ____ BZ ____ Bkgnd ____

Protective Level: B C D

SERIAL NO. ____

HSO Signature: Myra Dehnert

Condition of Well, Remarks:

Sampler's Signature: Myra Dehnert

Task 10 Log Book # _____

Job # 2832 Page ____ of ____

GROUNDWATER SAMPLING FIELD DATA SHEET

Well ID. No.: MW-10	Purge Equipment: ☒ Other Disp. Bailer; ☐ 1.40" Bennett Pump (Teflon Tubing); ☐ 1.80" Bennett Pump (Teflon Tubing); ☐ Meyers Pump (PVC Tubing); ☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in.; ☐ Stainless Bailer: O.D. 1.65" ☐ 1.85" ☐ 3.75" ☐ ___ ☐ ; LENGTH ☐ 2 ft. ☐ 3 ft. ☐ 4 ft. ☐ ___ ft.; SERIAL NO. _____	Analytical Equipment: pH Meter: ☐ Beckman phi 21 ☐ Beckman phi 10 ☐ Orion SA250 ☒ Other Paper; SERIAL NO. _____; Conductivity Meter: ☐ YSI Model 33 ☐ Orion 122 ☒ Other Hydac; SERIAL NO. _____; Dissolved Oxygen Meter: ☐ YSI Model 50B; SERIAL NO. _____; Temperature Meter: ☐ Beckman phi 21 ☐ Beckman phi 10 ☐ Orion SA250 ☒ Other Hydac; SERIAL NO. _____; Filtration Equipment: ☐ Geotech Peristaltic Pump ☐ Geotech 0.45 micron filter ☐ Dispos. 0.45 micron filter; Water Level Meter: ☐ Solinst SERIAL NO. _____	Sampler's Initials: MRD/KS; Time: 1035; Date: 11/14/95	
Casing Diameter: 2 in.	Sample Equipment: ☒ Other Disp. Bailer; ☐ 1.40" Bennett Pump (Teflon Tubing); ☐ 1.80" Bennett Pump (Teflon Tubing); ☐ Meyers Pump (PVC Tubing); ☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in.; ☐ Stainless Bailer: O.D. 1.65" ☐ 1.85" ☐ 3.75" ☐ ___ ☐ ; LENGTH ☐ 2 ft. ☐ 3 ft. ☐ 4 ft. ☐ ___ ft.; SERIAL NO. _____		Meter Calibration: pH ____ = ____ at ____ °C Time ____; pH ____ = ____ at ____ °C Time ____; Conductance Standard: _____ µmhos/cm at 25°C Time ____; Measured Value: _____ µmhos/cm at 25°C _____; Dissolved Oxygen Calibrated to _____ mg/l at _____ °C Time ____	
Casing Stickup: ____ ft.				
Total Well Depth (from TOC): 63.60 ft.				
Static Water Level (from TOC): 52.51 ft.				
Water Thickness: 11.09 ft.				
Casing Volume: 1.8 Cal gal.				
Screened Interval (from GS): ____ ft.				

Purge Containerized ? ☒ Yes ☐ No Destination: Drum On-Site

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)

Start Point _____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) ~53.0'

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C/°F	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1040	INT	—	52.51	651	7410	6.4	NA			LT Brown cloudy, silty
1055	1 1/2	2.7	—	633	7140	6.6	NA			
1105	2 1/2	5.5	—	632	6520	6.6	NA			
1120	3 1/2	7.5	—	633	5840	6.7	NA			
	Ferrous Iron = 30 mg/L									
	DO= 0.3 mg/L									
11/15	0720	- collect	full	sample	suite -	BTEX	only			

Analyses Requested (see COC): Full Suite; Partial Suite (explain)

QC Samples: GC/MS; Rinse Blank; Field Blank; Trip Blank

Additional Analyses:

Additional Comments:

☐ HNu ☐ OVA ☐ Microtip

Initial Readings: TOC _____ BZ _____ Bkgnd _____

Sample Readings: TOC _____ BZ _____ Bkgnd _____

Protective Level: B C (D)

SERIAL NO. _____

HSO Signature: Myra Dehmt

Condition of Well, Remarks:

Sampler's Signature: Myra Dehmt

Task 10 Log Book # _____

GROUNDWATER SAMPLING FIELD DATA SHEET

Job # 2882 Page ____ of ____

Well ID. No.	Purge Equipment	Analytical Equipment	Sampler's Initials	Time	Date
MW-11	☒ Other Disp Poly ☐ 1.40" Bennett Pump (Teflon Tubing) ☐ 1.80" Bennett Pump (Teflon Tubing) ☐ Meyers Pump (PVC Tubing) ☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in. ☐ Stainless Bailer: O.D. LENGTH 1.65" ☐ ☐ 2 ft. 1.85" ☐ ☐ 3 ft. 3.75" ☐ ☐ 4 ft. ____" ☐ ☐ ____ ft. SERIAL NO. _____	**pH Meter:** ☐ Beckman phi 21 ☐ Beckman phi 10 ☐ Orion SA250 ☒ Other Hydac SERIAL NO. _____ **Conductivity Meter:** ☐ YSI Model 33 ☐ Orion 122 ☒ Other Hydac SERIAL NO. _____ **Dissolved Oxygen Meter:** ☐ YSI Model 58 SERIAL NO. _____ **Temperature Meter:** ☐ Beckman phi 21 ☐ Beckman phi 10 ☐ Orion SA250 ☒ Other Hydac SERIAL NO. _____ **Filtration Equipment:** ☐ Geotech Peristaltic Pump ☐ Geotech 0.45 micron filter ☐ Dispos. 0.45 micron filter **Water Level Meter:** ☐ Solinst SERIAL NO. _____	MRD/KS	1105	11/14/95

Casing Diameter	Casing Stickup	Total Well Depth (from TOC)	Static Water Level (from TOC)	Water Thickness	Casing Volume	Screened Interval (from GS)
2" in.	— ft.	59.78 ft.	52.96 ft.	6.82 ft.	1.113 gallons gal.	ft.

Sample Equipment
☒ Other Disp Poly
☐ 1.40" Bennett Pump (Teflon Tubing)
☐ 1.80" Bennett Pump (Teflon Tubing)
☐ Meyers Pump (PVC Tubing)
☐ Grundfos Pump (Neoprene Tubing) ☐ 2 in. ☐ 3 in.
☐ Stainless Bailer:
O.D. LENGTH
1.65" ☐ ☐ 2 ft.
1.85" ☐ ☐ 3 ft.
3.75" ☐ ☐ 4 ft.
____" ☐ ☐ ____ ft.
SERIAL NO. _____

Purge Containerized ? ☒ Yes ☐ No Destination: On Site Drum

Meter Calibration
pH ____ = ____ at ____ °C Time ____
pH ____ = ____ at ____ °C Time ____
Conductance Standard: _____ µmhos/cm at 25°C Time ____
Measured Value: _____ µmhos/cm at 25°C Time ____
Dissolved Oxygen Calibrated to _____ mg/l at ____ °C

Alkalinity Titration Results (Acid Concentration: 0.16N, 1.6N)
Start Point _____

pH	8.3	5.1	4.8	4.5
#Clicks				
Color				

Sample Depth: (ft.) 53.5'

Time	Number of Casing Volumes	Gallons Removed	Water Level	Temp °C	E.C. µmhos/cm	pH	Dissolved O_2 mg/liter	Pump Rate GPM	Approx. Pump Depth ft.	Visual Description
1105	INT	—	52.96	63.6	9170	7.0	NA			Brown Sandy
1120	1 1/2	2.7	—	63.4	8790	7.0	NA			
1130	2 1/2	5.3	—	62.4	8700	7.2	NA			
1137	3 1/4	7.1	—	63.1	8720	6.8	NA			
	Ferrous Ion =			0.15 mg/L						
	DO =	3.0 mg/L								
11/15	0700	Collect full sample suite, BTEX + TPH								

Analyses Requested (see COC) Full Suite Partial Suite (explain)
QC Samples: GC/MS Rinse Blank Field Blank Trip Blank
Additional Analyses:

Additional Comments:

☐ HNu ☐ OVA ☐ Microtip
Initial Readings: TOC _____ BZ _____ Bkgnd _____
Sample Readings: TOC _____ BZ _____ Bkgnd _____
Protective Level: B C (D)
SERIAL NO. _____
HSO Signature: [signature]

Condition of Well, Remarks:

Sampler's Signature: [signature]

B

APPENDIX B

LABORATORY ANALYTICAL REPORTS
GROUNDWATER SAMPLES

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

November 29,1995

Brown and Caldwell Consultants
1415 Louisiana , Suite 2500
Houston, Tx 77002
Attn: Ms. Myna Dehnert

Dear Ms. Myna Dehnert,

Enclosed is the analytical report for chemical testing for samples taken on 11/15/95. It includes the following:

1) Analytical Report of results.

2) QC summary including LCS/LCSD, MS/MSD, duplicate samples, method blanks, and surrogates.

3) Cross reference sheet containing analyte, date analyzed, method, and batch number.

4) Case narrative explaining QC deficiencies and/or problems encountered in testing.

If you have any questions, please do not hesitate to call.

Very truly yours,

Brian Moore

Brian Moore
Program Specialist

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

Case Narrative

All quality objectives were met including holding times, LCS/LCSD, MS/MSD, Duplicate samples, and Method Blanks as applicable.

No analytical difficulties were encountered with any project samples.

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*1

Received: 11.16.95

Mailed: NOV 29. 19[illegible]

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 2832.10

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*1	MW-1	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	10
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	880
Toluene	8015M	11.25.95	ug/L	1800
Ethylbenzene	8015M	11.25.95	ug/L	300
Total Xylene Isomers	8015M	11.25.95	ug/L	970
TPH (Gasoline Range)	8015M	11.25.95	ug/L	6800
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	550
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	500

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*2

Received: 11.16.95

Mailed:

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 2832.10

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*2	MW-3	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	50
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	250
Toluene	8015M	11.25.95	ug/L	1000
Ethylbenzene	8015M	11.25.95	ug/L	180
Total Xylene Isomers	8015M	11.25.95	ug/L	440
TPH (Gasoline Range)	8015M	11.25.95	ug/L	2900
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	2550
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	2500

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*3

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*3	MW-4	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	100
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	490
Toluene	8015M	11.25.95	ug/L	1600
Ethylbenzene	8015M	11.25.95	ug/L	310
Total Xylene Isomers	8015M	11.25.95	ug/L	1100
TPH (Gasoline Range)	8015M	11.25.95	ug/L	5200
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	5440
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	5000

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*4

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*4	MW-5	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	1
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	<0.3
Toluene	8015M	11.25.95	ug/L	1.2
Ethylbenzene	8015M	11.25.95	ug/L	<0.3
Total Xylene Isomers	8015M	11.25.95	ug/L	1.5
TPH (Gasoline Range)	8015M	11.25.95	ug/L	<100
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	51.0
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	50.0

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*5

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*5	MW-6	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	100
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	8900
Toluene	8015M	11.25.95	ug/L	17000
Ethylbenzene	8015M	11.25.95	ug/L	2900
Total Xylene Isomers	8015M	11.25.95	ug/L	5500
TPH (Gasoline Range)	8015M	11.25.95	ug/L	57000
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	4900
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	5000

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*6

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*6	MW-7	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	1
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	8.4
Toluene	8015M	11.25.95	ug/L	0.77
Ethylbenzene	8015M	11.25.95	ug/L	<0.3
Total Xylene Isomers	8015M	11.25.95	ug/L	0.93
TPH (Gasoline Range)	8015M	11.25.95	ug/L	<100
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	47.5
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	50.0

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*7

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*7	MW-8	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	1
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	<0.3
Toluene	8015M	11.25.95	ug/L	0.52
Ethylbenzene	8015M	11.25.95	ug/L	<0.3
Total Xylene Isomers	8015M	11.25.95	ug/L	<0.6
TPH (Gasoline Range)	8015M	11.25.95	ug/L	<100
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	48.5
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	50.0

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*8

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*8	MW-9	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	10
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	240
Toluene	8015M	11.25.95	ug/L	24
Ethylbenzene	8015M	11.25.95	ug/L	11
Total Xylene Isomers	8015M	11.25.95	ug/L	140
TPH (Gasoline Range)	8015M	11.25.95	ug/L	1500
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	563
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	500

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*9

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE				DATE SAMPLED
9511318*9	MW-10			11.15.95
PARAMETER	**METHOD**	**ANALYZED**	**UNITS**	**RESULT**
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	10
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	1000
Toluene	8015M	11.25.95	ug/L	24
Ethylbenzene	8015M	11.25.95	ug/L	15
Total Xylene Isomers	8015M	11.25.95	ug/L	36
TPH (Gasoline Range)	8015M	11.25.95	ug/L	1700
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	535
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	500

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*10

Received: 11.16.95

Mailed:

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 2832.10

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE				DATE SAMPLED
9511318*10	MW-11			11.15.95
PARAMETER	**METHOD**	**ANALYZED**	**UNITS**	**RESULT**
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	1
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	190
Toluene	8015M	11.25.95	ug/L	2.8
Ethylbenzene	8015M	11.25.95	ug/L	6.2
Total Xylene Isomers	8015M	11.25.95	ug/L	11
TPH (Gasoline Range)	8015M	11.25.95	ug/L	400
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	47.9
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	50.0

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*11

Received: 11.16.95

Mailed:

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 2832.10

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*11	11159501	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	1
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	170
Toluene	8015M	11.25.95	ug/L	18
Ethylbenzene	8015M	11.25.95	ug/L	10
Total Xylene Isomers	8015M	11.25.95	ug/L	120
TPH (Gasoline Range)	8015M	11.25.95	ug/L	1900
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	51.2
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	50.0

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*12

Received: 11.16.95

Mailed:

Project: 2832.10

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*12	11159502	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	1
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	<0.3
Toluene	8015M	11.25.95	ug/L	0.42
Ethylbenzene	8015M	11.25.95	ug/L	<0.3
Total Xylene Isomers	8015M	11.25.95	ug/L	<0.6
TPH (Gasoline Range)	8015M	11.25.95	ug/L	<100
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	49.5
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	50.0

BCA

ANALYTICAL REPORT

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

SAMPLE NO: 9511318*13

Received: 11.16.95

Mailed:

Ms. Myna Dehnert
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 2832.10

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION, AQUEOUS SAMPLE		DATE SAMPLED
9511318*13	TB-1	11.15.95

PARAMETER	METHOD	ANALYZED	UNITS	RESULT
BTEX/GRO	8015M	11.25.95		
Date Analyzed	8015M	11.25.95	Date	11/25/95
Dilution Factor	8015M	11.25.95	Times	1
Carbon Range	8015M	11.25.95	.	C6-C12
Benzene	8015M	11.25.95	ug/L	<0.3
Toluene	8015M	11.25.95	ug/L	<0.3
Ethylbenzene	8015M	11.25.95	ug/L	<0.3
Total Xylene Isomers	8015M	11.25.95	ug/L	<0.6
TPH (Gasoline Range)	8015M	11.25.95	ug/L	<100
a,a,a-Trifluorotoluene Rep.	8015M	11.25.95	ug/L	49.4
a,a,a-Trifluorotoluene Th.	8015M	11.25.95	ug/L	50.0

Jane Freemyer, Laboratory Director

BCA

ORDER PLACED FOR CLIENT: Brown and Caldwell Consultants 9511318 :
BC ANALYTICAL : GLEN LAB : 17:13:48 28 NOV 1995 - P. 1 :

SAMPLES...	SAMPLE DESCRIPTION..	DETERM.....	DATE..... ANALYZED	METHOD.....	EQUIP.	BATCH..	ID.NO
9511318*1	MW-1	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*2	MW-3	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*3	MW-4	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*4	MW-5	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*5	MW-6	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*6	MW-7	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*7	MW-8	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*8	MW-9	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*9	MW-10	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*10	MW-11	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*11	11159501	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*12	11159502	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843
9511318*13	TB-1	GAS.TPH.BTEX	11.25.95	8015M	536-23	955165	6843

***

Notes: Equipment = BC Analytical identification number for a particular piece of analytical equipment.

ID.NO = BC Analytical employee identification number of analyst.

QC REPORT FOR 9511318

DATE PRINTED: 28 NOV 1995

AQUEOUS SAMPLES	------ METHOD BLANK ------				---------- LAB CONTROL ----------									---------- MATRIX QC ----------								
					LCS		LCSD					RPD	RPD	MS		MSD					RPD	RPD
	UNITS	RESULT	RDL	FLG	%REC	FLG	%REC	FLG	LCL	UCL	RPD	UCL	FLG	%REC	FLG	%REC	FLG	LCL	UCL	RPD	UCL	FLG
Batch: GAS*955165 Method: 8015M - Modified 8015																						
Benzene	ug/L	0	0.3	-	104	-	-	-	76	141	-	-	-	114	-	113	-	71	125	2	29	-
Toluene	ug/L	0	0.3	-	99	-	-	-	73	122	-	-	-	96	-	95	-	63	126	1	33	-
Ethylbenzene	ug/L	0	0.3	-	100	-	-	-	72	133	-	-	-	89	-	86	-	65	126	3	34	-
Total Xylene Isomers	ug/L	0	0.6	-	91	-	-	-	64	117	-	-	-	79	-	77	-	69	128	4	35	-
TPH (Gasoline Range)	ug/L	0	100	-	92	-	-	-	64	152	-	-	-	103	-	98	-	53	166	5	21	-
[a,a,a-Trifluorotoluene]	Percent	101	-	-	108	-	-	-	75	117	-	-	-	95	-	94	-	75	117	-	-	-

SURROGATE RECOVERIES :
BC ANALYTICAL : GLEN LAB : 17:14:01 28 NOV 1995 - P. 1 :

METHOD	ANALYTE	BATCH	ANALYZED	REPORTED	TRUE	%REC	FLAG	LCL	UCL
9511318*1									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	550	500	110		75	117
9511318*2									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	2550	2500	102		75	117
9511318*3									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	5440	5000	109		75	117
9511318*4									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	51.0	50.0	102		75	117
9511318*5									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	4900	5000	98		75	117
9511318*6									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	47.5	50.0	95		75	117
9511318*7									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	48.5	50.0	97		75	117
9511318*8									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	563	500	113		75	117
9511318*9									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	535	500	107		75	117
9511318*10									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	47.9	50.0	96		75	117
9511318*11									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	51.2	50.0	102		75	117
9511318*12									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	49.5	50.0	99		75	117
9511318*13									
8015M	a,a,a-Trifluorotoluene	Re955165	11/25/95	49.4	50.0	99		75	117

CHAIN OF CUSTODY RECORD

BCA Log Number 95-11-318

Client name: BROWN + CALDWELL / BJ Hobbs, NM	Project or PO#: 2832.10
Address: 1415 LOUISIANA, STE 2500	Phone #: (713) 646-1133
City, State, Zip: HOUSTON, TX 77002	Report attention: MYNA DEHNERT

Sampled by: MYNA DEHNERT

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	BTEX (8020)	Hazardous sample Special handling required	Remarks
MW-1	11/15/95	0950	GW		2(40ml)	✓		HEAVY SHEEN
~~MW-2~~				MRD				
MW-3		0840				✓		
MW-4		0930				✓		HEAVY SHEEN
MW-5		0850				✓		
MW-6		0815				✓		
MW-7		0740				✓		
MW-8		0800				✓		
MW-9		0905				✓		
MW-10		0720				✓		
MW-11		0700				✓		
11595 01	11/15	0915	GW			✓		

	Signature	Print Name	Company	Date	Time
Relinquished by	Myna Dehnert	MYNA DEHNERT	Brown + Caldwell	11/15/95	1530
Received by	FED-EX				
Relinquished by	FED-EX				
Received by	Brian Moore	Brian Moore	BCA	11/16/95	0930
Relinquished by					
Received by Laboratory					

B C ANALYTICAL

- ☐ 1085 Shary Circle, Concord, CA 94518 (510) 825-3894
- ☒ 801 Western Avenue, Glendale, CA 91201 (818) 247-5737
- ☐ 1200 Gene Autry Way, Anaheim, CA 92805 (714) 978-0113

Note: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client's expense.

Disposal arrangements: _____

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil PE—Petroleum WW—Wastewater

CHAIN OF CUSTODY RECORD

BCA Log Number [redacted]-1[redacted]18

Client name: Brown + Caldwell	Project or PO#: 2832.10
Address: 1415 LOUISIANA, STE 2500	Phone #: (713) 646-1133
City, State, Zip: HOUSTON, TX 77002	Report attention: MYNA DEHNERT
	Sampled by: MYNA Dehnert

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	BTEX 8020	Hazardous sample Special handling required	Remarks
1115A502	11/15		GW	WATER	(2)40ml	✓		
TB-1	11/15	—	↓	↓	(2)40ml	✓		

* BRIAN — Please put one sample result per page on report. Thanks, Myna

	Signature	Print Name	Company	Date	Time
Relinquished by	Myna Dehnert	MYNA Dehnert	Brown + Caldwell	11/15/95	1530
Received by	FED-EX				
Relinquished by	FED-EX				
Received by	Brian Moore	Brian Moore	BCA	11/16/95	0930
Relinquished by					
Received by Laboratory					

B C ANALYTICAL

☐ 1085 Shary Circle, Concord, CA 94518 (510) 825-3894
☐ 801 Western Avenue, Glendale, CA 91201 (818) 247-5737
☐ 1200 Gene Autry Way, Anaheim, CA 92805 (714) 978-0113

Note: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client's expense.

Disposal arrangements: _____

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil PE—Petroleum WW—Wastewater

C

APPENDIX C

REMEDIATION SYSTEM OPERATION DATA SHEETS

BJ Services

Hobbs, New Mexico
ph (505) 392-5556 fax (505) 392-7307

Date : 9-19-95

Recorded by : M. DEHNERT

Water drained from extraction unit:
AM Main N/A
Standby N/A
PM Main N/A
Standby N/A

Time : 1300
Weather conditions :
Temperature :
Humidity :
Barometric Press :

Time : 1300 **Blower Measurements**

Injection System NOT ON

Flow Rate	N/A	scfm
Pressure		psi
Temperature		F

Extraction System

Flow Rate	170	scfm
Vacuum	22	in. H_2O
Temperature	92°	F

CORRECTED FLOW RATE - 131.03

Time : 1300 **Differential Pressure Readings (ΔP)**

Injection System

Lat. #	ΔP (in. H_2O)	Ps (PSI)
1		
2	NOT	
3	OPERATING	
4		
5	N/A	N/A
6		
7		

Extraction System

Lat. #	ΔP (in. H_2O)	Ps (in. H_2O)
1	0.095	16
2	0.130	15
3	0.035	15
4	0.025	15
5	0.13	15
6	0.06	14
7	0.065	15

Time : _____ **Blower Measurements**

Injection System

Flow Rate	scfm
Pressure	psi
Temperature	F

Extraction System

Flow Rate	scfm
Vacuum	in. H_2O
Temperature	F

Fax daily to : Myna Dehnert @ (713) 759-0952
voice (713) 759-0999

BJ Services

Hobbs, New Mexico
ph (505) 392-5556 fax (505) 392-7307

Date : 9-20-95

Recorded by : M. DEHNERT

Water drained from extraction unit:
AM Main N/A
Standby N/A
PM Main N/A
Standby N/A

Time : 0825
Weather conditions :
Temperature :
Humidity :
Barometric Press :

Time : **Blower Measurements**

Injection System

Flow Rate	N/A	scfm
Pressure		psi
Temperature		F

Extraction System

Flow Rate	170	scfm
Vacuum	20.9	in. H_2O
Temperature	99°	F

CORRECTED FLOW RATE = 131.03.

Time : **Differential Pressure Readings (ΔP)**

Injection System

Lat. #	ΔP (in. H_2O)	Ps (PSI)
1		
2		
3		
4		
5	N/A	N/A
6		
7		

Extraction System

Lat. #	ΔP (in. H_2O)	Ps (in. H_2O)
1	0.13	14
2	0.125	14
3	0.09	14
4	0.02	14.5
5	0.11	13.5
6	0.05	13.5
7	0.065	13.9

Time : **Blower Measurements**

Injection System

Flow Rate	N/A	scfm
Pressure		psi
Temperature		F

Extraction System

Flow Rate	175	scfm
Vacuum	21	in. H_2O
Temperature	60°	F

CORRECTED FLOW RATE = 131.30

Fax daily to : Myna Dehnert @ (713) 759-0952
voice (713) 759-0999

BJ Services

Hobbs, New Mexico
ph (505) 392-5556 fax (505) 392-7307

Date : Sept. 28-95

Recorded by : Kenny Haverbuckle

Time : 07:00
Weather conditions : Clear, calm wind
Temperature : 65°
Humidity : _____
Barometric Press : _____

Time : 07:30 **Blower Measurements**

Injection System

Flow Rate	scfm
Pressure	psi
Temperature	F

Extraction System

Flow Rate	168 scfm
Vacuum	23 in. H_2O
Temperature	98° F

Time : _____ **Differential Pressure Readings (ΔP)**

Injection System

Lat. #	ΔP (in. H_2O)	Ps (PSI)
1		
2		
3		
4		
5	N/A	N/A
6		
7		

Extraction System

Lat. #	ΔP (in. H_2O)	Ps (in. H_2O)
1	0.090	16
2	0.105	16
3	0.070	16
4	0.010	16
5	0.130	15
6	0.050	15
7	0.050	15

Time : _____ **Blower Measurements**

Injection System

Flow Rate	scfm
Pressure	psi
Temperature	F

Extraction System

Flow Rate	165 scfm
Vacuum	23 in. H_2O
Temperature	101° F

Fax daily to : Myna Dehnert @ (713) 759-0952
voice (713) 759-0999

BJ Services

Hobbs, New Mexico
ph (505) 392-5556 fax (505) 392-7307

Date : 11/11/95

Recorded by : Stuart Todd

Time : 11:30 AM
Weather conditions : clear-windy
Temperature : 54°
Humidity : _____
Barometric Press : _____

Time : 11:30 AM **Blower Measurements**

Injection System

Flow Rate	scfm
Pressure	psi
Temperature	F

Extraction System

Flow Rate	170 scfm
Vacuum	23 in. H_2O
Temperature	68 F

Time : _____ **Differential Pressure Readings (ΔP)**

Injection System

Lat. #	ΔP (in. H_2O)	Ps (PSI)
1		
2		
3		
4		
5	N/A	N/A
6		
7		

Extraction System

Lat. #	ΔP (in. H_2O)	Ps (in. H_2O)
1	.11	15
2	.10	15
3	.05	15
4	.025	15
5	.15	15
6	.055	15
7	.045	15

Time : 5:00 PM **Blower Measurements**

Injection System

Flow Rate	scfm
Pressure	psi
Temperature	F

Extraction System

Flow Rate	170 scfm
Vacuum	24 in. H_2O
Temperature	84° F

Fax daily to : Myna Dehnert @ (713) 759-0952
voice (713) 759-0999

BJ Services

Hobbs, New Mexico
ph (505) 392-5556 fax (505) 392-7307

Date : 11/15/95

Recorded by : M. DEHNERT

Water drained from extraction unit:
AM Main 8.0 LITERS
Standby _____
PM Main NONE
Standby _____

Time : 0615
Weather conditions : CLEAR
Temperature : 37°
Humidity : 76%
Barometric Press : 30.11 R

Time : 0630 **Blower Measurements**

Injection System

Flow Rate	40	scfm
Pressure	5.2	psi
Temperature	1440	F

Extraction System

Flow Rate	170	scfm
Vacuum	26	in. H_2O
Temperature	81°	F

Time : 1400 **Differential Pressure Readings (ΔP)** TIME 1300

Injection System

Lat. #	ΔP (in. H_2O)	Ps (PSI)
1	0.26	4.4
2	0.06	4.4
3	0.075	4.4
4	0.015	4.4
5	N/A	N/A
6	0.265	4.4
7	0.15	4.4

Extraction System

Lat. #	ΔP (in. H_2O)	Ps (in. H_2O)
1	0.135	14.0
2	0.12	13.5
3	0.02	14.5
4	0.015	14
5	0.125	13
6	0.05	15
7	0.07	15

Time : _____ **Blower Measurements**

Injection System

Flow Rate	scfm
Pressure	psi
Temperature	F

Extraction System

Flow Rate	scfm
Vacuum	in. H_2O
Temperature	F

Fax daily to : Myna Dehnert @ (713) 759-0952
voice (713) 759-0999

D

APPENDIX D

AIR EMISSION CALCULATIONS

SVE SYSTEM EMISSION CALCULATIONS

BJ Services Company, U.S.A.
Hobb, New Mexico

Air Emission Concentration:*	Benzene	790 ppmv	**2,567.17**	mg/m^3
19-Sep-95	Ethylbenzene	340 ppmv	**1,501.43**	mg/m^3
	Toluene	1,100 ppmv	**4,215.60**	mg/m^3
	Xylene	920 ppmv	**4,062.70**	mg/m^3

Discharge Rate: **131.03** **scfm**

Emission Calculations

BENZENE

$$\frac{2{,}567.17\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{min} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{1.26\ lb/hr}$$

ETHYLBENZENE

$$\frac{1{,}501.43\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.74\ lb/hr}$$

TOLUENE

$$\frac{4{,}215.60\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{2.07\ lb/hr}$$

TOTAL XYLENE

$$\frac{4{,}062.70\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{1.99\ lb/hr}$$

TOTAL BETX = 6.05 lb/hr

NOTES: * Air Emission Concentrations based on sample collected on September 19, 1995.
** Discharge rate based on daily mesaurement obtained from blower.

SVE SYSTEM EMISSION CALCULATIONS
BJ Services Company, U.S.A.
Hobb, New Mexico

Air Emission Concentration:*	Benzene	990 ppmv	**3,217.09**	mg/m^3
20-Sep-95	Ethylbenzene	560 ppmv	**2,472.95**	mg/m^3
	Toluene	2,500 ppmv	**9,580.91**	mg/m^3
	Xylene	1,600 ppmv	**7,065.56**	mg/m^3

Discharge Rate: **131.03** **scfm**

Emission Calculations

BENZENE

$$\frac{3{,}794.04\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{min} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{1.58\ lb/hr}$$

ETHYLBENZENE

$$\frac{2{,}146.12\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{1.21\ lb/hr}$$

TOLUENE

$$\frac{9{,}580.91\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{4.70\ lb/hr}$$

TOTAL XYLENE

$$\frac{7{,}065.56\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.03\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{3.46\ lb/hr}$$

TOTAL BETX = 10.95 lb/hr

NOTES: * Air Emission Concentrations based on sample collected on September 20, 1995.
** Discharge rate based on daily mesaurement obtained from blower.

SVE SYSTEM EMISSION CALCULATIONS

BJ Services Company, U.S.A.
Hobb, New Mexico

Air Emission Concentration:*	Benzene	13 ppmv	**42.24**	mg/m^3
28-Sep-95	Ethylbenzene	6 ppmv	**26.50**	mg/m^3
	Toluene	28 ppmv	**107.31**	mg/m^3
	Xylene	18 ppmv	**79.49**	mg/m^3

Discharge Rate: **123.55** **scfm**

Emission Calculations

BENZENE

$$\frac{42.24\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{123.55\ ft^3}{min} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.02\ lb/hr}$$

ETHYLBENZENE

$$\frac{26.50\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{123.55\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.01\ lb/hr}$$

TOLUENE

$$\frac{107.31mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{123.55\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.05\ lb/hr}$$

TOTAL XYLENE

$$\frac{79.49\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{123.55\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.04\ lb/hr}$$

TOTAL BETX = 0.12 lb/hr

NOTES: * Air Emission Concentrations based on sample collected on September 28, 1995.
** Discharge rate based on daily mesaurement obtained from blower.

SVE SYSTEM EMISSION CALCULATIONS

BJ Services Company, U.S.A.
Hobb, New Mexico

Air Emission Concentration:*	Benzene	15 ppmv	**48.74**	mg/m^3
8-Nov-95	Ethylbenzene	12 ppmv	**52.99**	mg/m^3
	Toluene	58 ppmv	**222.28**	mg/m^3
	Xylene	36 ppmv	**158.98**	mg/m^3

Discharge Rate: **131.10** **scfm**

Emission Calculations

BENZENE

$$\frac{48.74\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.10\ ft^3}{min} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.02\ lb/hr}$$

ETHYLBENZENE

$$\frac{52.99\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.10\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.03\ lb/hr}$$

TOLUENE

$$\frac{222.28\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.10\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.11\ lb/hr}$$

TOTAL XYLENE

$$\frac{158.98\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{131.10\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.08\ lb/hr}$$

TOTAL BETX = 0.24 lb/hr

NOTES: * Air Emission Concentrations based on sample collected on November 8, 1995.
** Discharge rate based on daily mesaurement obtained from blower.

SVE SYSTEM EMISSION CALCULATIONS

BJ Services Company, U.S.A.
Hobb, New Mexico

Air Emission Concentration:*	Benzene	39 ppmv	**126.73**	mg/m^3
15-Nov-95	Ethylbenzene	42 ppmv	**185.47**	mg/m^3
	Toluene	180 ppmv	**689.83**	mg/m^3
	Xylene	130 ppmv	**574.08**	mg/m^3

Discharge Rate: **133.33** **scfm**

Emission Calculations

BENZENE

$$\frac{126.73\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{133.33\ ft^3}{min} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.06\ lb/hr}$$

ETHYLBENZENE

$$\frac{185.47\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{133.33\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.09\ lb/hr}$$

TOLUENE

$$\frac{689.83\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{133.33\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.34\ lb/hr}$$

TOTAL XYLENE

$$\frac{574.08\ mg}{m^3} \times \frac{1\ g}{1000\ mg} \times \frac{0.028317\ m^3}{ft^3} \times \frac{133.33\ ft^3}{hr} \times \frac{60\ min}{1\ hr} \times \frac{1\ lb}{454\ g} = \mathbf{0.29\ lb/hr}$$

TOTAL BETX = 0.79 lb/hr

NOTES: * Air Emission Concentrations based on sample collected on November 15, 1995.
** Discharge rate based on daily mesaurement obtained from blower.

SVE SYSTEM EMISSION CALCULATIONS FOR TPH

BJ Services Company, U.S.A.
Hobb, New Mexico

Air Emission Concentration:

19-Sep-95	TPH [1]	**9700** ppmv	**33,893.51** mg/m^3
20-Sep-95	TPH	**16000** ppmv	**55,906.82** mg/m^3
28-Sep-95	TPH	**2,533** ppmv	**8,850.75** mg/m^3
8-Nov-95	TPH	**1,500** ppmv	**5,241.26** mg/m^3
15-Nov-95	TPH	**1,870** ppmv	**6,534.11** mg/m^3

Emission Calculations

19-Sep-95 **Discharge Rate = 131.03 scfm**

$$\frac{33{,}893.51\,mg}{m^3} \times \frac{1\,g}{1000\,mg} \times \frac{0.028317\,m^3}{ft^3} \times \frac{131.03\,ft^3}{min} \times \frac{60\,min}{1\,hr} \times \frac{1\,lb}{454\,g} = \mathbf{16.62\ lb/hr}$$

20-Sep-95 **Discharge Rate = 131.03 scfm**

$$\frac{55{,}906.82\,mg}{m^3} \times \frac{1\,g}{1000\,mg} \times \frac{0.028317\,m^3}{ft^3} \times \frac{131.03\,ft^3}{hr} \times \frac{60\,min}{1\,hr} \times \frac{1\,lb}{454\,g} = \mathbf{27.41\ lb/hr}$$

28-Sep-95 **Discharge Rate = 123.55 scfm**

$$\frac{8{,}850.75\,mg}{m^3} \times \frac{1\,g}{1000\,mg} \times \frac{0.028317\,m^3}{ft^3} \times \frac{123.55\,ft^3}{hr} \times \frac{60\,min}{1\,hr} \times \frac{1\,lb}{454\,g} = \mathbf{4.09\ lb/hr}$$

8-Nov-95 **Discharge Rate = 131.10 scfm**

$$\frac{5{,}241.26\,mg}{m^3} \times \frac{1\,g}{1000\,mg} \times \frac{0.028317\,m^3}{ft^3} \times \frac{131.10\,ft^3}{hr} \times \frac{60\,min}{1\,hr} \times \frac{1\,lb}{454\,g} = \mathbf{2.57\ lb/hr}$$

15-Nov-95 **Discharge Rate = 133.33 scfm**

$$\frac{6{,}534.11\,mg}{m^3} \times \frac{1\,g}{1000\,mg} \times \frac{0.028317\,m^3}{ft^3} \times \frac{133.33\,ft^3}{hr} \times \frac{60\,min}{1\,hr} \times \frac{1\,lb}{454\,g} = \mathbf{3.26\ lb/hr}$$

Notes: (1) Total Petroleum Hydrocarbons (TPH) analyzed using U.S. EPA Method 8015 (Modified).

E

APPENDIX E

LABORATORY ANALYTICAL REPORTS
AIR SAMPLES

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

SPL, INC.

REPORT APPROVAL SHEET

WORK ORDER NUMBER: 95 - 11 - 676

Approved for release by:

M. Scott Sample Date: 11/30/95

M. Scott Sample, Laboratory Director

Date: 11/29/95

Siok Hong Chen, Project Manager

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9511676-01

Brown and Caldwell
1415 Louisianna
Houston, TX 77002
ATTN: Myna Dehnert

DATE: 11/29/95

PROJECT: Air Analysis
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: Effluent 11159501

PROJECT NO: 2832.31
MATRIX: AIR
DATE SAMPLED: 11/15/95 14:00:00
DATE RECEIVED: 11/16/95

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	39	1 P	ppm
TOLUENE	180	1 P	ppm
ETHYLBENZENE	42	1 P	ppm
TOTAL XYLENE	130	1 P	ppm
TOTAL VOLATILE AROMATIC HYDROCARBONS	391		ppm
METHOD 5030/8020 (Modified)***			
Analyzed by: AA			
Date: 11/18/95			
Total Petroleum Hydrocarbons	1870		ppm
METHOD 8015 (Modified)			
Analyzed by: AA			
Date: 11/18/95 21:33:00			

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

QUALITY CONTROL

DOCUMENTATION

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT **

METHOD 5030/8020 (Modified)

Matrix: Air

Batch Id: HP_P951118155600

Units: ppm

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike Result <1>	Blank Spike Recovery %	QC Limits(**) (Mandatory) % Recovery Range
Benzene	ND	20	18	90.0	20 - 150
Toluene	ND	20	15	75.0	20 - 150
EthylBenzene	ND	20	16	80.0	20 - 150
O Xylene	ND	20	15	75.0	20 - 150
M & P Xylene	ND	20	16	80.0	20 - 150

Analyst: AA

Sequence Date: 11/18/95

SPL ID of sample spiked: LCS_20

Sample File ID:

Method Blank File ID:

Blank Spike File ID: PP__444.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID: PP__444.TX0

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

LCS % Recovery = (<1> / <3>) x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary Limits

(***) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID): 9511507-01A 9511684-02A 9511574-01A 9511676-01A 9511731-01A 9511762-01A 9511506-01A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 5030/8020 (Modified)

Matrix: Air

Batch Id: HP_P951118155600

Units: ppm

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits (**) (Advisory) RPD Max.	QC Limits (**) (Advisory) Recovery Range
BENZENE	ND	20	18	90.0	18	90.0	0	30	20 - 150
TOLUENE	ND	20	15	75.0	16	80.0	6.45	30	20 - 150
ETHYLBENZENE	ND	20	15	75.0	16	80.0	6.45	30	20 - 150
O XYLENE	ND	20	14	70.0	15	75.0	6.90	30	20 - 150
M & P XYLENE	ND	20	16	80.0	16	80.0	0	30	20 - 150

Analyst: AA

Sequence Date: 11/18/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: PP__443.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID): 9511507-01A 9511684-02A 9511574-01A 9511676-01A 9511731-01A 9511762-01A 9511506-01A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE
METHOD 8015 (Modified)
®

Batch Id: HP_P951118144800

BLANK SPIKES

	Sample Results <2>	Spi Ad	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits(**) (Advisory) RPD Max.	QC Limits(**) (Advisory) Recovery Range
	ND		122	61.0	130	65.0	6.35	30	20 - 150

* = Values Outside QC Range
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = [(<1> - <2>) / <3>] x 100
Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100
(**) = Source: Temporary limits

ID): 9511711 \ 9511684-02A 9511676-01A 9511731-01A
9511762 A

QC Officer

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

95/1676

Page _____ of _____

Environmental Laboratory
8880 Interchange Drive
Houston, Texas 77054
713/660-0901

Analysis Request and Chain of Custody Record

Project No.	Client/Project Name	Project Location
2832.31	BJ Services / Bio-Sparging System	2708 West County Rd. Hobbs, NM

Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
EFFLUENT 11159501	11/15/95 1400	X		Tedlarbag	AIR	—	BTEX, TPH	

Samplers: (Signature)	Relinquished by: (Signature)	Date: 11/15/95 Time: 1600	Received by: (Signature)	Date: 11/15 Time:	Intact
Myna Dehnert	Myna Dehnert		FED-EX		
Affiliation	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact
Brown & Caldwell	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact 11/16/95 Ambient
SAMPLER REMARKS: SEND REPORT TO: MYNA DEHNERT BROWN & CALDWELL 1415 LOUISIANA, ST 2500 HOU, TX 77002			Received for laboratory: (Signature) S. West	Date: 11/16/95 Time: 1000	Laboratory No.
Seal #			Data Results to: Myna Dehnert		

SPL Houston Environmental Laboratory

Sample Login Checklist

Date:	Time:
11/16/95	1000

SPL Sample ID:

9511676

			Yes	No
1	Chain-of-Custody (COC) form is present.		✓	
2	COC is properly completed.		✓	
3	If no, Non-Conformance Worksheet has been completed.			
4	Custody seals are present on the shipping container.		✓	
5	If yes, custody seals are intact.		✓	
6	All samples are tagged or labeled.		✓	
7	If no, Non-Conformance Worksheet has been completed.			
8	Sample containers arrived intact		✓	
9	Temperature of samples upon arrival:		Ambient C	
10	Method of sample delivery to SPL:	SPL Delivery		
		Client Delivery		
		FedEx Delivery (airbill #)	7779152334	
		Other:		
11	Method of sample disposal:	SPL Disposal	✓	
		HOLD		
		Return to Client		

Name:	Date:
S. West	11/16/95

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

SPL, INC.

REPORT APPROVAL SHEET

WORK ORDER NUMBER: 95 - 11 - 321

Approved for release by:

M. Scott Sample

M. Scott Sample, Laboratory Director *Date:* 11/14/95

Siok Hong Chen

Siok Hong Chen, Project Manager *Date:* 11/13/95

Southern Petroleum Laboratories
****SUMMARY REPORT*****

11/13/95

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Company: Brown and Caldwell
Site: Hobbs, NM
Project No:
Project: Air Analysis

ANALYTICAL DATA
NOTE: ND - Not Detected

SPL ID MATRIX	CLIENT ID DATE SAMPLED	BENZENE PQL	TOLUENE PQL	ETHYLBENZ. PQL	XYLENE PQL	TPH-IR	TPH-GC	LEAD	MTBE
9511321-01 Air	Effluent 4 11/07/95 09:30:00	15 1ppm	58 1ppm	12 1ppm	36 1ppm		1500 5ppm		

BTEX - METHOD 5030/8020 (Modified)***
TPH-GC - METHOD 8015 (Modified)

SPL, Inc., - Project Manager

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9511321-01

Brown and Caldwell
1415 Louisianna
Houston, TX 77002
ATTN: Walt Agnew

DATE: 11/13/95

PROJECT: Air Analysis
SITE: Hobbs, NM
SAMPLED BY: B J Services
SAMPLE ID: Effluent 4

PROJECT NO:
MATRIX: AIR
DATE SAMPLED: 11/07/95 09:30:00
DATE RECEIVED: 11/08/95

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	15	1 P	ppm
TOLUENE	58	1 P	ppm
ETHYLBENZENE	12	1 P	ppm
TOTAL XYLENE	36	1 P	ppm
TOTAL VOLATILE AROMATIC HYDROCARBONS	121		ppm
METHOD 5030/8020 (Modified)***			
Analyzed by: KA			
Date: 11/08/95			
Total Petroleum Hydrocarbons	1500	5	ppm
METHOD 8015 (Modified)			
Analyzed by: KA			
Date: 11/08/95 23:36:00			

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

SPL, Inc., - Project Manager

QUALITY CONTROL

DOCUMENTATION

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 5030/8020 (Modified)

Matrix: Air

Batch Id: HP_P951108175900

Units: ppm

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits(**) (Advisory) RPD Max.	QC Limits(**) (Advisory) Recovery Range
BENZENE	ND	20	16	80.0	17	85.0	6.06	30	20 - 150
TOLUENE	ND	20	14	70.0	15	75.0	6.90	30	20 - 150
ETHYLBENZENE	ND	20	13	65.0	14	70.0	7.41	30	20 - 150
O XYLENE	ND	20	13	65.0	13	65.0	0	30	20 - 150
M & P XYLENE	ND	20	14	70.0	15	75.0	6.90	30	20 - 150

Analyst: KA

Sequence Date: 11/08/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: PP__402.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID): 9511323-02A 9511323-03A 9511321-01A 9511323-01A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE
METHOD 8015 (Modified)
®

Matrix: Air
Units: ppm

Batch Id: HP_P951108190600

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits(**) (Advisory) RPD Max.	QC Limits(**) (Advisory) Recovery Range
TPHAIR	ND	200	202	101	210	105	3.88	30	20 - 150

Analyst: KA
Sequence Date: 11/08/95
Method Blank File ID:
Sample File ID:
Blank Spike File ID: P___402.TX0
Matrix Spike File ID:
Matrix Spike Duplicate File ID:

* = Values Outside QC Range
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = [(<1> - <2>) / <3>] x 100
Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100
(**) = Source: Temporary limits

SAMPLES IN BATCH(SPL ID): 9511323-02A 9511323-03A 9511321-01A 9511323-01A

QC Officer

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

951132 [illegible]

Page _____ of _____

Environmental Laboratory
8880 Interchange Drive
Houston, Texas 77054
713/660-0901

Analysis Request and Chain of Custody Record

Project No.	Client/Project Name	Project Location
		Hobbs, N.M.

Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
Effluent-4	11-7-95 9:30 A			Bag	Air		BTEX	48HR Rush !
							TPH	[illegible]
								25% Surcharge

Samplers: (Signature)	Relinquished by: (Signature)	Date: 11-7-95 Time: 4:30 pm	Received by: (Signature)	Date: Time:	Intact
Kenny Hounshell	Kenny Hounshell				
Affiliation	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact
	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact Ambient
SAMPLER REMARKS:			Received for laboratory: (Signature)	Date: 11/8/95 Time: 10:00	Laboratory No. 951132 1-
Seal #			Data Results to: Nina Dehnert		

SPL Houston Environmental Laboratory

Sample Login Checklist

Date:	Time:
11/8/95	10:10

SPL Sample ID: 9511321

			Yes	No
1	Chain-of-Custody (COC) form is present.		✓	
2	COC is properly completed.		✓	
3	If no, Non-Conformance Worksheet has been completed.			
4	Custody seals are present on the shipping container.		✓	
5	If yes, custody seals are intact.		✓	
6	All samples are tagged or labeled.		✓	
7	If no, Non-Conformance Worksheet has been completed.			
8	Sample containers arrived intact		✓	
9	Temperature of samples upon arrival:		Ambient C	
10	Method of sample delivery to SPL:	SPL Delivery		
		Client Delivery		
		FedEx Delivery (airbill #)		
		Other:		
11	Method of sample disposal:	SPL Disposal		
		HOLD		
		Return to Client		

Name:	Date:
Elliott Brown	11/8/95

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

SPL, INC.

REPORT APPROVAL SHEET

WORK ORDER NUMBER: 95 - 09 - B89

Approved for release by:

M. Scott Sample — Date: 10/13/95

M. Scott Sample, Laboratory Director

Siok Hong Chen — Date: 10/12/95

Siok Hong Chen, Project Manager

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9509B89-01

Brown and Caldwell
1415 Louisianna
Houston, TX 77002
ATTN: K Saravanan

DATE: 10/12/95

PROJECT: BJ-Farmington/System Start-Up
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: Extraction-2

PROJECT NO: 2832.31
MATRIX: AIR
DATE SAMPLED: 09/28/95 10:30:00
DATE RECEIVED: 09/29/95

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	13	1 P	ppm
TOLUENE	28	1 P	ppm
ETHYLBENZENE	6	1 P	ppm
TOTAL XYLENE	18	1 P	ppm
TOTAL VOLATILE AROMATIC HYDROCARBONS	65		ppm
METHOD 5030/8020 (Modified)***			
Analyzed by: RR			
Date: 10/09/95			
Total Petroleum Hydrocarbons	2533	5	ppm
METHOD 8015 (Modified)			
Analyzed by: RR			
Date: 09/29/95 19:21:00			

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

QUALITY CONTROL

DOCUMENTATION

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 5030/8020 (Modified)

Matrix: Air

Batch Id: HP_P950926173700

Units: ppm

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits(**) (Advisory) RPD Max.	QC Limits(**) (Advisory) Recovery Range
BENZENE	ND	20	17	85.0	17	85.0	0	30	20 - 150
TOLUENE	ND	20	16	80.0	15	75.0	6.45	30	20 - 150
ETHYLBENZENE	ND	20	17	85.0	16	80.0	6.06	30	20 - 150
O XYLENE	ND	20	16	80.0	16	80.0	0	30	20 - 150
M & P XYLENE	ND	20	17	85.0	16	80.0	6.06	30	20 - 150

Analyst: RR

Sequence Date: 09/26/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: PP__157.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID):

9509A39-03A 9509A85-01A 9509B28-01A 9509B48-01A
9509B48-02A 9509B89-01A 9509C10-01A 9509C10-02A
9510076-01A 9509998-01A 9509998-02A 9509998-03A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT **
METHOD 5030/8020 (Modified)

Matrix: Air
Units: ppm

Batch Id: HP_P950926173700

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike Result <1>	Blank Spike Recovery %	QC Limits (**) (Mandatory) % Recovery Range
Benzene	ND	20	15	75.0	20 - 150
Toluene	ND	20	14	70.0	20 - 150
EthylBenzene	ND	20	15	75.0	20 - 150
O Xylene	ND	20	14	70.0	20 - 150
M & P Xylene	ND	20	15	75.0	20 - 150

Analyst: RR
Sequence Date: 09/26/95
SPL ID of sample spiked: STD_20
Sample File ID:
Method Blank File ID:
Blank Spike File ID: PP__155.TX0
Matrix Spike File ID:
Matrix Spike Duplicate File ID: PP__155.TX0

* = Values Outside QC Range
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = [(<1> - <2>) / <3>] x 100
LCS % Recovery = (<1> / <3>) x 100
Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100
(**) = Source: Temporary Limits
(***) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID): 9509A39-03A 9509A85-01A 9509B28-01A 9509B48-01A
9509B48-02A 9509B89-01A 9509C10-01A 9509C10-02A
9510076-01A 9509998-01A 9509998-02A 9509998-03A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 8015 (Modified)

Matrix: Air

Units: ppm

Batch Id: HP_P951005164400

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits(**) (Advisory) RPD Max.	QC Limits(**) (Advisory) Recovery Range
TPHAIR	ND	200	210	105	226	113	7.34	30	20 - 150

Analyst: RR

Sequence Date: 10/05/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: P___217.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary limits

SAMPLES IN BATCH(SPL ID):

9510171-05A 9510141-01A 9510141-02A 9510141-03A
9510240-01A 9510355-01A 9510356-01A 9510357-01A
9510093-01A 9510094-01A 9510171-04A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8015 (Modified)

Matrix: Air
Units: ppm

Batch Id: HP_P951005164400

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike Result <1>	Blank Spike Recovery %	QC Limits(**) (Mandatory) % Recovery Range
TPHAIR	0	200	201	100	20 - 150

Analyst: RR
Sequence Date: 10/05/95
SPL ID of sample spiked: LCS_20
Sample File ID:
Method Blank File ID:
Blank Spike File ID: P___215.TX0
Matrix Spike File ID:
Matrix Spike Duplicate File ID: P___215.TX0

* = Values Outside QC Range
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = [(<1> - <2>) / <3>] x 100
LCS % Recovery = (<1> / <3>) x 100
Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100
(**) = Source: Temporary Limits
(***) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID): 9510171-05A 9510141-01A 9510141-02A 9510141-03A 9510240-01A 9510355-01A 9510356-01A 9510357-01A 9510093-01A 9510094-01A 9510171-04A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 5030/8020 (Modified)

Matrix: Air

Batch Id: HP_P951005171800

Units: ppm

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits(**) (Advisory) RPD Max.	QC Limits(**) (Advisory) Recovery Range
BENZENE	ND	20	18	90.0	18	90.0	0	30	20 - 150
TOLUENE	ND	20	16	80.0	17	85.0	6.06	30	20 - 150
ETHYLBENZENE	ND	20	17	85.0	18	90.0	5.71	30	20 - 150
O XYLENE	ND	20	16	80.0	17	85.0	6.06	30	20 - 150
M & P XYLENE	ND	20	18	90.0	18	90.0	0	30	20 - 150

Analyst: RR

Sequence Date: 10/05/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: PP__217.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID): 9510171-05A 9510141-01A 9510141-02A 9510141-03A 9510076-01A 9509B89-01A 9510240-01A 9510355-01A 9510356-01A 9510357-01A 9510093-01A 9510094-01A 9510171-04A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT **
METHOD 5030/8020 (Modified)

PAGE

Matrix: Air
Units: ppm

Batch Id: HP_P951005171800

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike Result <1>	Blank Spike Recovery %	QC Limits(**) (Mandatory) % Recovery Range
Benzene	ND	20	18	90.0	20 - 150
Toluene	ND	20	16	80.0	20 - 150
EthylBenzene	ND	20	16	80.0	20 - 150
O Xylene	ND	20	16	80.0	20 - 150
M & P Xylene	ND	20	18	90.0	20 - 150

Analyst: RR
Sequence Date: 10/05/95
SPL ID of sample spiked: LCS_20
Sample File ID:
Method Blank File ID:
Blank Spike File ID: PP__215.TX0
Matrix Spike File ID:
Matrix Spike Duplicate File ID: PP__215.TX0

* = Values Outside QC Range
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = [(<1> - <2>) / <3>] x 100
LCS % Recovery = (<1> / <3>) x 100
Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100
(**) = Source: Temporary Limits
(***) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID):

9510171-05A 9510141-01A 9510141-02A 9510141-03A
9510076-01A 9509B89-01A 9510240-01A 9510355-01A
9510356-01A 9510357-01A 9510093-01A 9510094-01A
9510171-04A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 8015 (Modified)

Matrix: Air

Batch Id: HP_P950926181100

Units: ppm

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits (**) (Advisory) RPD Max.	QC Limits (**) (Advisory) Recovery Range
TPHAIR	ND	200	235	118	228	114	3.45	30	20 - 150

Analyst: RR

Sequence Date: 09/26/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: P___157.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary limits

SAMPLES IN BATCH(SPL ID):

9509A39-03A 9509A85-01A 9509B28-01A 9509B48-01A
9509B48-02A 9509B89-01A 9509C10-01A 9509C10-02A
9510076-01A 9509998-01A 9509998-02A 9509998-03A

QC Officer

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

9509B89

Page 1 of 1

Environmental Laboratory
8880 Interchange Drive
Houston, Texas 77054
713/660-0901

Analysis Request and Chain of Custody Record

Project No.	Client/Project Name	Project Location
2832.31	BJ SERVICES / SYSTEM START-UP	2708 W. County Road Hobbs, NM

Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
EXPEDITION-2	9/28/95	X		Tedlar bag	AIR	—	BETX; TPH (STANDARD TURNAROUND	

Samplers: (Signature)	Relinquished by: (Signature)	Date: 9-28-95 Time:	Received by: (Signature)	Date: Time:	Intact
Kenny Hounshell	Kenny Hounshell		FED-EX		
Affiliation	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact
BJ SERVICES	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	(Intact) Ambient
SAMPLER REMARKS:			Received for laboratory: (Signature) D. West	Date: 9/29/95 Time: 1000	Laboratory No. 9509B89
Seal #			Data Results to: MIKE DEHNERT		

BROWN + CALDWELL

SPL Houston Environmental Laboratory

Sample Login Checklist

Date:	Time:
9/29/95	1000

SPL Sample ID:
9509B89

			Yes	No
1	Chain-of-Custody (COC) form is present.		✓	
2	COC is properly completed.			✓
3	If no, Non-Conformance Worksheet has been completed.		✓	
4	Custody seals are present on the shipping container.		✓	
5	If yes, custody seals are intact.		✓	
6	All samples are tagged or labeled.		✓	
7	If no, Non-Conformance Worksheet has been completed.			
8	Sample containers arrived intact		✓	
9	Temperature of samples upon arrival:		Ambient C	
10	Method of sample delivery to SPL:	SPL Delivery		
		Client Delivery		
		FedEx Delivery (airbill #)	702801964 4	
		Other:		
11	Method of sample disposal:	SPL Disposal	✓	
		HOLD		
		Return to Client		

Name:	Date:
S. West	9/29/95

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

SPL, INC.

REPORT APPROVAL SHEET

WORK ORDER NUMBER: 95 - 09 - 781

Approved for release by:

M. Scott Sample Date: 9/25/95

M. Scott Sample, Laboratory Director

Siok Hong Chen Date: 9/25/95

Siok Hong Chen, Project Manager

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9509781-01

Brown and Caldwell
1415 Louisianna
Houston, TX 77002
ATTN: Suzanne Richard

DATE: 09/23/95

PROJECT: System Installation/BJ Serv.
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: Extraction-1

PROJECT NO: 2832.31
MATRIX: AIR
DATE SAMPLED: 09/19/95 07:30:00
DATE RECEIVED: 09/21/95

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	790	1 P	ppm
TOLUENE	1100	1 P	ppm
ETHYLBENZENE	340	1 P	ppm
TOTAL XYLENE	920	1 P	ppm
TOTAL VOLATILE AROMATIC HYDROCARBONS	3150		ppm
METHOD 5030/8020 (Modified)***			
Analyzed by: KA			
Date: 09/21/95			
Total Petroleum Hydrocarbons	9700	1	ppm
METHOD 8015 (Modified)			
Analyzed by: KA			
Date: 09/21/95 15:48:00			

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis No. H9-9509781-02

Brown and Caldwell
1415 Louisianna
Houston, TX 77002
ATTN: Suzanne Richard

DATE: 09/23/95

PROJECT: System Installation/BJ Serv.
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: Effluent-1

PROJECT NO: 2832.31
MATRIX: AIR
DATE SAMPLED: 09/20/95 09:35:00
DATE RECEIVED: 09/21/95

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	990	5 P	ppm
TOLUENE	2500	5 P	ppm
ETHYLBENZENE	560	5 P	ppm
TOTAL XYLENE	1600	5 P	ppm
TOTAL VOLATILE AROMATIC HYDROCARBONS	5650		ppm
METHOD 5030/8020 (Modified)***			
Analyzed by: KA			
Date: 09/21/95			
Total Petroleum Hydrocarbons	16000	5	ppm
METHOD 8015 (Modified)			
Analyzed by: KA			
Date: 09/21/95 19:08:00			

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.
***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

QUALITY CONTROL

DOCUMENTATION

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 5030/8020 (Modified)

Matrix: Air

Batch Id: HP_P950920140700

Units: ppm

BLANK SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits(**) (Advisory) RPD Max.	QC Limits(**) (Advisory) Recovery Range
BENZENE	ND	20	17	85.0	16	80.0	6.06	30	20 - 150
TOLUENE	ND	20	15	75.0	15	75.0	0	30	20 - 150
ETHYLBENZENE	ND	20	15	75.0	15	75.0	0	30	20 - 150
O XYLENE	ND	20	16	80.0	15	75.0	6.45	30	20 - 150
M & P XYLENE	ND	20	17	85.0	16	80.0	6.06	30	20 - 150

Analyst: KA

Sequence Date: 09/21/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: PP__115.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID): 9509781-01A 9509711-01A 9509711-02A 9509781-02A

QC Officer

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

** SPL BATCH QUALITY CONTROL REPORT ** PAGE

METHOD 8015 (Modified)

Matrix: Air

Batch Id: HP_P950920151400

Units: ppm

B L A N K S P I K E S

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike Result <1>	Matrix Spike Recovery <4>	Matrix Spike Duplicate Result <1>	Matrix Spike Duplicate Recovery <5>	MS/MSD Relative % Difference	QC Limits (**) (Advisory) RPD Max.	QC Limits (**) (Advisory) Recovery Range
TPHAIR	ND	200	204	102	190	95.0	7.11	30	20 - 150

Analyst: KA

Sequence Date: 09/18/95

Method Blank File ID:

Sample File ID:

Blank Spike File ID: P___115.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range

NC = Not Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

% Recovery = [(<1> - <2>) / <3>] x 100

Relative Percent Difference = |(<4> - <5> | / [(<4> + <5>) x 0.5] x 100

(**) = Source: Temporary limits

SAMPLES IN BATCH(SPL ID): 9509781-01A 9509711-01A 9509711-02A 9509781-02A

QC Officer

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

AIR BILL # 6539142654 9509781 Page 1 of 1

Environmental Laboratory
8880 Interchange Drive
Houston, Texas 77054
713/660-0901

Analysis Request and Chain of Custody Record

SEND FINAL RESULTS TO: BROWN AND CALDWELL
1415 LOUISIANA STE 2500
HOUSTON, TX 77002

Project No.	Client/Project Name	Project Location
28732.31	SYSTEM INSTALLATION / BJ SERVICES	Hobbs, NM

Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
EXTRACTION-1	9/19/95 0730	X		Tedlar bag	AIR	—	BETX, TPH STANDARD TURN	#85
EFFLUENT-1	9/20/95 0935	X		Tedlar bag	AIR	—	BETX, TPH 24Hr TURN	@ 85 x 1.5

Samplers: (Signature)	Relinquished by: (Signature)	Date: 9/20/95 Time: 1245	Received by: (Signature) FED-EX	Date: Time:	Intact
Myna Dehnert	Myna Dehnert				
Affiliation	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact
BC	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	Intact Ambient
SAMPLER REMARKS: PLEASE FAX 24hr TURN RESULTS TO: MYNA DEHNERT (505) 392-7307			Received for laboratory: (Signature) B. West	Date: 9/21/95 Time: 1030	Laboratory No. 9509781
Seal #			Data Results to: MYNA DEHNERT		

SPL Houston Environmental Laboratory

Sample Login Checklist

Date:	Time:
9/21/95	1030

SPL Sample ID:
9509781

			Yes	No
1	Chain-of-Custody (COC) form is present.		✓	
2	COC is properly completed.		✓	
3	If no, Non-Conformance Worksheet has been completed.			
4	Custody seals are present on the shipping container.		✓	
5	If yes, custody seals are intact.		✓	
6	All samples are tagged or labeled.		✓	
7	If no, Non-Conformance Worksheet has been completed.			
8	Sample containers arrived intact		✓	
9	Temperature of samples upon arrival:		Ambient C	
10	Method of sample delivery to SPL:	SPL Delivery		
		Client Delivery		
		FedEx Delivery (airbill #)	653914265 4	
		Other:		
11	Method of sample disposal:	SPL Disposal	✓	
		HOLD		
		Return to Client		

Name:	Date:
S. West	9/21/95