

GW - 72

**MONITORING
REPORTS**

DATE:

1997

B R O W N A N D C A L D W E L L

FINAL

**SEPTEMBER 1997 GROUNDWATER
SAMPLING REPORT
HOBBS, NEW MEXICO FACILITY**

BJ SERVICES COMPANY, U.S.A.

JANUARY 8, 1998

**FINAL
SEPTEMBER 1997 GROUNDWATER SAMPLING REPORT
HOBBS, NEW MEXICO FACILITY
BJ SERVICES COMPANY, U.S.A.**

Prepared for

BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas

BC Project Number: 2832.12



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January 5, 1998

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"This is a draft report and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report."

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1.0 INTRODUCTION

Brown and Caldwell conducted field activities associated with the September 1997 quarterly groundwater sampling event at BJ Services Company, U.S.A. (BJ Services) facility located at 2708 West County Road, in Hobbs, New Mexico. The facility layout is shown in Figure 1.

The facility formerly operated an above-grade on-site fueling system. Subsurface impact near the fueling system from a diesel fuel release was first detected by the New Mexico Oil Conservation Division (OCD) during an on-site inspection on February 7, 1991. The fueling system was taken out of operation in July 1995. As the result of the diesel fuel release, the New Mexico OCD has required a quarterly groundwater monitoring program to assess the hydrocarbon constituents in the groundwater.

A biosparging system was fully activated in November 1995 to remediate soil and groundwater at the facility. A site chronology detailing the history of the fueling system, the groundwater recovery system, and the previous sampling events is presented on Table 1.

During the September 1997 sampling event, groundwater samples were collected and analyzed for gasoline and diesel range total petroleum hydrocarbons (TPH), and for benzene, toluene, ethylbenzene, and total xylenes (BTEX). This report presents the results of the groundwater sampling event, a description of the field activities, and a summary of the analytical results. Also included is a groundwater potentiometric surface map, a benzene concentration map, and a hydrocarbon distribution map.



2.0 GROUNDWATER SAMPLING AND ANALYSES

Brown and Caldwell purged and sampled the groundwater monitoring wells at the facility on September 11-12, 1997 to determine concentrations of dissolved-phase hydrocarbons in groundwater.

The following subsections describe the activities conducted during this sampling event and present the results of the groundwater analyses.

2.1 Groundwater Measurements and Sampling

Ten monitoring wells were sampled during the September 1997 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 the 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 2. The groundwater elevation data indicates that the general groundwater flow direction is toward the east and northeast with a hydraulic gradient of 0.01 ft/ft. A potentiometric surface map is presented in Figure 2. Measurable thickness of phase-separated hydrocarbons was detected in monitoring wells MW-1 (0.51 ft) and MW-4 (0.15 ft) during this sampling event.

Groundwater samples were collected after purging the wells with a submersible pump to remove at least three well volumes of groundwater. 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 during the purging and sampling activities to assess the potential for natural attenuation. These parameters were dissolved oxygen (DO), dissolved ferrous iron, and reduction-oxidation potential (redox). The field parameter readings were recorded in the field log book and are listed on the groundwater sampling forms included in Appendix A. The field screening results for groundwater samples are presented on Table 3.

Following recovery, 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 or plastic containers sealed with Teflon[®]-lined lids, labeled, and placed on ice in an insulated cooler for shipment via overnight courier to the analytical laboratory. Each cooler was accompanied by completed chain-of-custody documentation.

The field measurement equipment was decontaminated prior to and after each use. Decontamination procedures consisted of washing with fresh water and a non-phosphate detergent and rinsing with deionized (DI) water. Purged water and excess water generated by equipment cleaning operations were 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 BTEX by EPA Method 5030/8020 and for TPH by EPA Method 8015 Modified for gasoline and diesel. Current and cumulative analytical results for BTEX and TPH gasoline and diesel are presented in Table 4.

BTEX constituent concentrations in excess of applicable laboratory detection limits were reported in 7 of the 10 groundwater samples obtained during this sampling event. Benzene concentrations were below the New Mexico Water Quality Control Commission Standard of 0.01 milligrams per liter (mg/L) in monitor wells MW-5, MW-7, MW-8, and MW-9. Figure 3 presents a benzene isoconcentration and total BTEX distribution map for the September 1997 sampling event. A total

petroleum hydrocarbons distribution map for the September 1997 sampling event is presented in Figure 4. The laboratory analytical report and chain of custody record for the groundwater samples are included in Appendix B.

It appears that natural attenuation of dissolved phase BTEX is occurring in the vicinity of monitor wells MW-10 and MW-11. The primary evidence of natural attenuation is plume behavior; concentrations of dissolved phase BTEX have stabilized subsequent to removal of a field waste tank (see Figure 1) in March 1997. Furthermore the following lines of geochemical evidence suggest that intrinsic bioremediation, an important natural attenuation mechanism, is occurring:

1. DO concentrations measured in monitor wells MW-10 and MW-11 are depressed relative to background. The respective DO concentrations of 0.65 mg/L and 1.80 mg/L measured in monitor wells MW-10 and MW-11 are less than the measured DO concentrations of 5.44 mg/L and 2.62 mg/L in monitor wells MW-5 and MW-8, respectively, which are upgradient or cross-gradient wells believed to exhibit background conditions.
2. Ferrous iron concentrations of 9.4 mg/L and 3.2 mg/L were recorded in monitor wells MW-10 and MW-11, respectively. Ferrous iron was not detected in any of the other monitor wells. When DO becomes depleted, anaerobic microbes which utilize other electron acceptors become active. Ferrous iron is the reduction product of ferric iron, a common electron acceptor.
3. Oxidation-reduction potential (E_h) measurements of -108.9 millivolts (mV) and -73.8 mV were observed in monitor wells MW-10 and MW-11, respectively. These values are slightly below the theoretical E_h of -50 mV for ferric iron reduction, which indicates that iron reduction is occurring.

It is recommended that monitoring continue in this area, and that other geochemical analyses be performed in subsequent sampling events. Specifically, nitrate, sulfate, dissolved methane, and alkalinity should be measured, in addition to the current suite of geochemical parameters.



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 of 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 adsorbed directly to the soil (i.e., residual) as well as contaminants present in soil moisture (i.e., dissolved phase) within the capillary fringe and vadose zone. Additionally, the biosparging system removes volatile contaminants from the saturated zone. 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 in soil moisture present in the capillary fringe and vadose zone. The elevated dissolved oxygen content facilitates the activities of indigenous microorganisms to accelerate biodegradation of the contaminants. The flushing of the air also strips the volatile and semivolatile contaminants.

The New Mexico OCD approved the RAP on August 11, 1994. The installation of the biosparging system was conducted between August 2 through 24, 1995. Nineteen combined injection/extraction wells, three vacuum extraction wells, associated piping, and one extraction blower and one injection blower were installed. An additional vapor extraction well, VE-4, was installed and connected to the vapor extraction system in April 1997. The vapors recovered during the extraction process are discharged to the atmosphere in accordance with the State of New Mexico Air Quality Regulations.

During the system startup operations, effluent air samples were collected on a monthly basis from the recovered vapors to monitor the bioremediation process and emission rate. Upon receiving a determination from the State of New Mexico that an air permit is not required, effluent air samples have been collected voluntarily on a quarterly basis. The air samples were analyzed for TPH using EPA Method Modified 8015A (Air) and for total volatile aromatic hydrocarbons (BTEX) using EPA Method 5030/8020 (modified). The analytical results demonstrate a significant reduction in hydrocarbon vapor concentrations and emissions rates since November 1995. Total BTEX concentrations have decreased from 391 parts per million by volume (ppmv) in November 1995 to

17.3 ppmv in July 1997. The corresponding BTEX emissions have decreased from 0.77 lb/hour to 0.03 lb/hour. TPH concentrations have decreased from 1,870 ppmv in November 1995 to 65 ppmv in July 1997. The corresponding TPH - Volatile Organic Compound (VOC) emissions rates have decreased from 3.21 lb/hour to 0.08 lb/hour. These emission rates are well below the regulatory limit of 10 lb/hour for VOCs. Therefore, a field monitoring instrument utilizing a flame ionization detector (FID) was used during the September 1997 monitoring event to measure the VOC concentration in the vapors. The VOC measurements are equivalent to TPH concentrations previously determined in the analytical laboratory. The VOC concentration measured using the FID was 340 ppmv. A cumulative summary of analytical results for air emissions monitoring is included in Table 5. These results are based on both laboratory and field analyses.

Adjustments were made in air injection and extraction rates within the biosparging system following the March 1997 groundwater sampling event in order to direct air flow into recalcitrant areas of the subsurface. Specifically, vapor extraction well VE-4 was added, and flow rates were increased in the upgradient and central portions of the plume, in the area of monitor wells MW-4, MW-1, and MW-3. The vapor extraction system is currently operating at an average flow of 150 cubic feet per minute (cfm) at 120°F. The air injection system is operating at an average flow of 32 cfm at 5 pounds per square inch (psi) at 176°F. Total VOC emissions of 0.39 lb/hr were calculated for the September 1997 monitoring event.

Review of data presented in Table 4 indicates that concentrations of benzene and total BTEX have decreased in monitor wells MW-7, MW-8 and MW-10, located in the downgradient portion of the plume, during the time period from the start-up of the biosparging system in November 1995 to the present. Reductions in benzene, total BTEX, and TPH concentrations have occurred between June 1997 and September 1997 in monitor wells MW-1 and MW-3, which are located in the central portion of the plume. The increase in hydrocarbon concentrations observed in monitor well MW-4 during the period from June 1997 to September 1997 may be attributed to modifications to air injection and extraction rates made in March 1997 and to the addition of vapor extraction well VE-4, which was installed in April 1997. Such increases are anticipated during operation of the biosparging system, as

air flow is redirected into areas of the subsurface that were only minimally affected previously by the operation of the remedial system. Samples collected from monitor wells MW-9 and MW-11 exhibited increases in BTEX concentrations relative to the previous sampling event. Fluctuations in concentrations have been previously observed in site monitor wells over the course of remediation. These fluctuations may be attributed to the presence of PSH, which acts as a continuing source of dissolved phase BTEX. These fluctuations are likely to continue until the PSH is removed through a combination of passive recovery and volatilization by sparging and soil vapor extraction.



4.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on information obtained during the September 1997 quarterly groundwater sampling event.

4.1 Conclusions

- Groundwater flow was to the east and northeast at an average hydraulic gradient of 0.01 ft/ft.
- Dissolved benzene concentrations monitor wells MW-1 and MW-3, which are located in the central portion of the plume, have not decreased since the biosparging system was activated in September 1995.
- Dissolved benzene concentrations have generally decreased in all remaining monitor wells since the biosparging system was activated in September 1995.
- Benzene concentrations in monitor wells MW-5, MW-7, MW-8, and MW-9 are below the New Mexico Water Quality Control Commission standard of 0.01 mg/L.
- Modifications to air injection and extraction rates were made in March 1997 to apply increased air flow to the central portion of the plume, and vapor extraction well VE-4 was installed upgradient of monitor well MW-4 in April 1997.
- Substantial reductions in hydrocarbon air emissions have been made during the period from November 1995 to September 1997. The current emissions rate is 0.39 lb/hr TPH.
- Phase separated hydrocarbons continue to be present in monitor wells MW-1 and MW-4. The thickness of phase separated hydrocarbons increased in monitor well MW-1 and decreased in monitor well MW-4 during the time period from June 1997 to September 1997.

4.2 Recommendations

- Continue the quarterly groundwater sampling program and the operation and maintenance of the biosparging system.
- Continue monitoring hydrocarbon emissions on a quarterly basis using a field FID and discontinue analysis of air emissions samples in an analytical laboratory.

- Nitrate, sulfate, dissolved methane, and alkalinity should be added to the current suite of geochemical parameters.
- Recommence free product recovery as needed in monitor wells MW-1 and MW-4.

DISTRIBUTION

Final September 1997 Groundwater Sampling Report
BJ Services Company, U.S.A.
Hobbs, New Mexico

January 5, 1998

1 copy to: State of New Mexico
Energy, Minerals, and Natural Resources Dept.
Oil Conservation Division
Post Office Box 2088, State Land Office Building
Santa Fe, New Mexico 87504

Attention: Mr. Mark Ashley

1 copy to: State of New Mexico
Oil Conservation Division, Hobbs District Office
Post Office Box 1980
Hobbs, New Mexico 88240

Attention: Mr. Wayne Price

1 copy to: BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas 77381

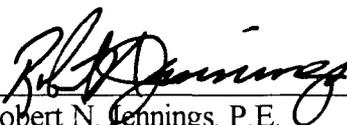
Attention: Ms. Jo Ann Cobb

1 copy to: BJ Services Company, U.S.A.
2708 West County Road
Hobbs, New Mexico 88240

Attention: Mr. Clint Chamberlain

1 copy to: Brown and Caldwell, Project File

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Robert N. Jennings, P.E.
Vice President

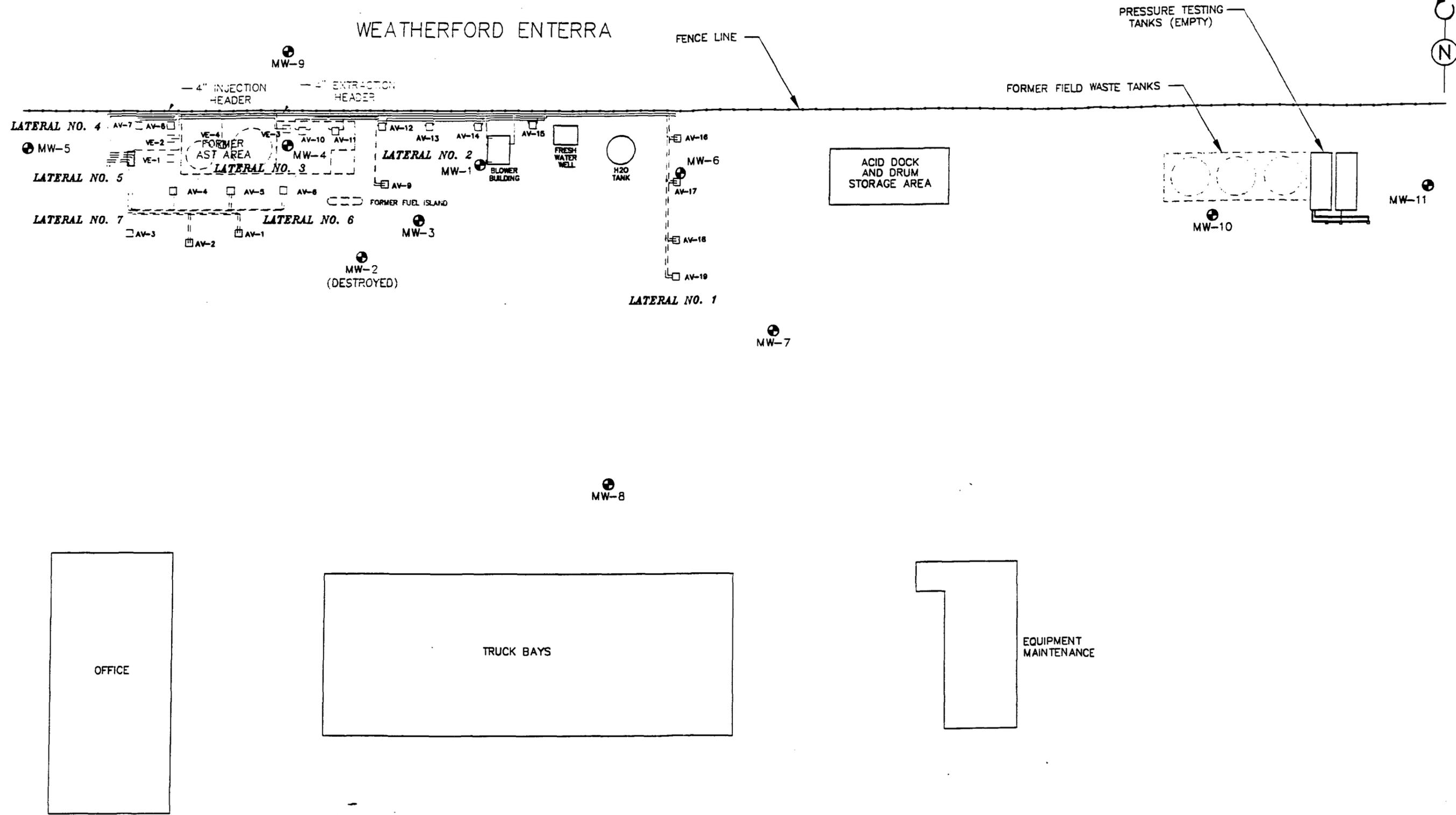
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FIGURES

WEATHERFORD ENTERRA



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BROWN AND CALDWELL
HOUSTON, TEXAS

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BROWN AND CALDWELL

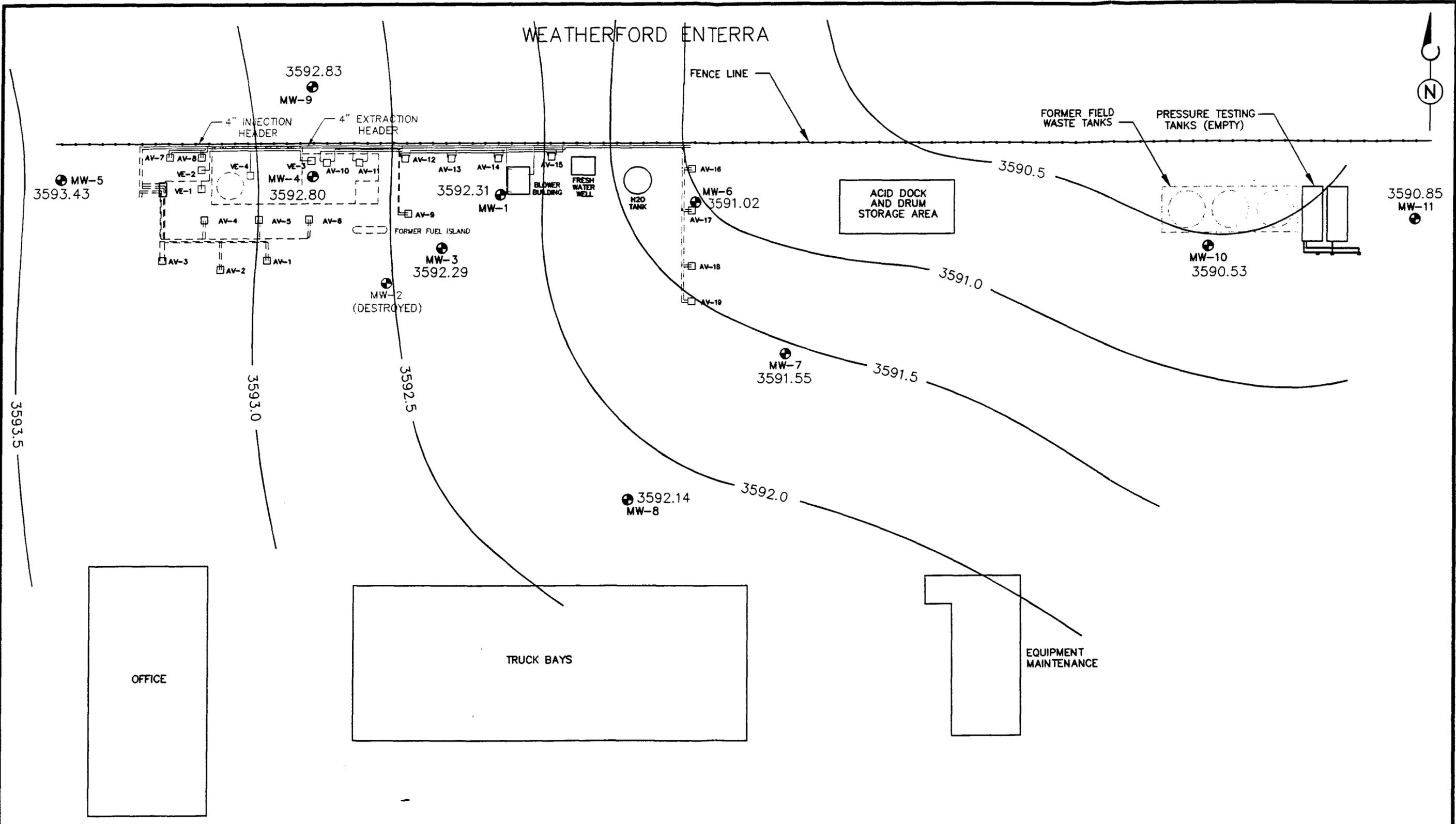
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APPROVED: _____ DATE: _____

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	SITE MAP	DATE	05/07/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-12
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	1

WEATHERFORD ENTERRA



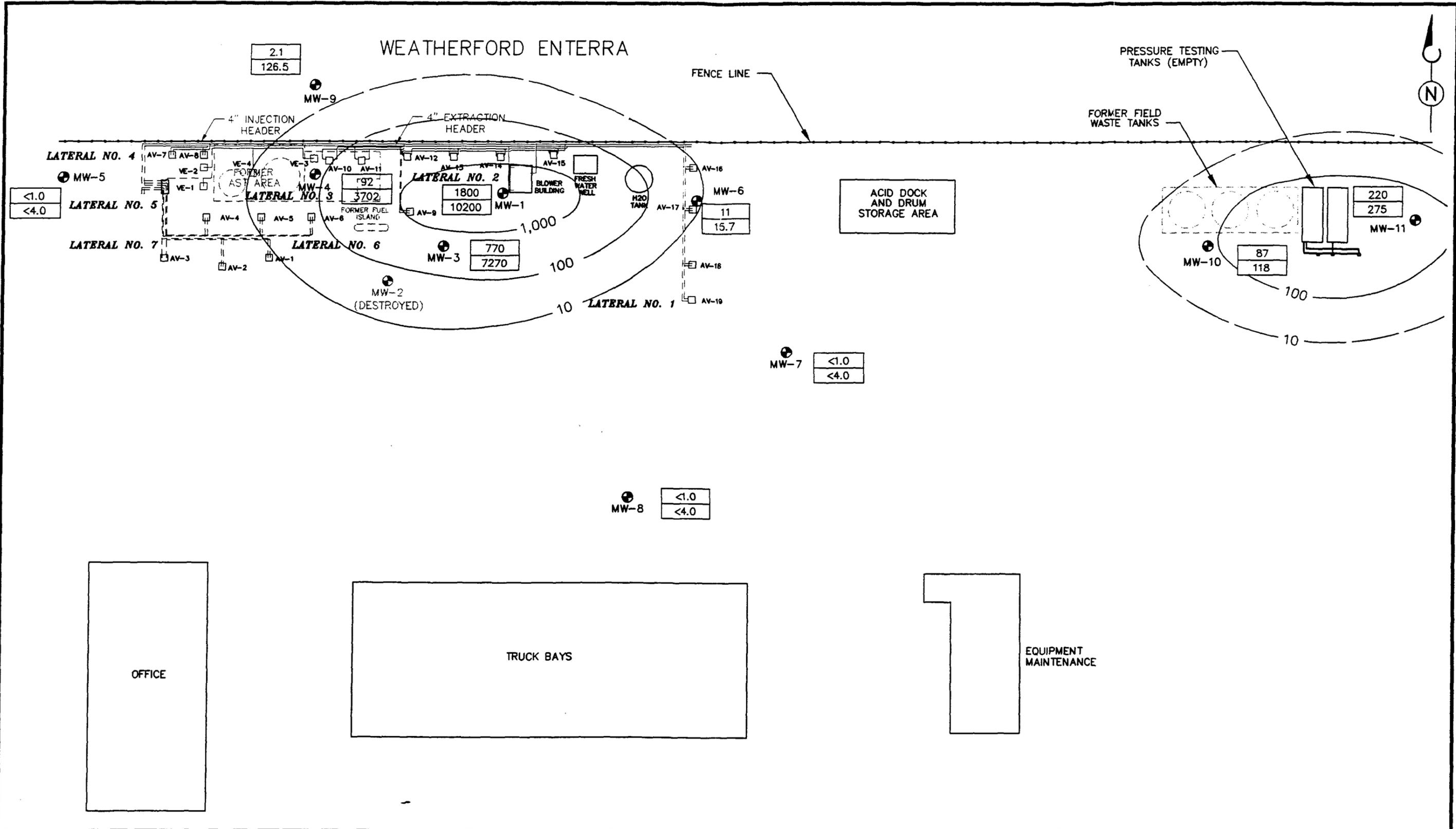
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APPROVED: _____ DATE: _____
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LEGEND
 MW-8 MONITORING WELL LOCATION AND IDENTIFICATION
 3592.14 POTENTIOMETRIC SURFACE ELEVATION, FT.
 3592.5 POTENTIOMETRIC SURFACE CONTOUR, FT.

TITLE	POTENTIOMETRIC SURFACE MAP FOR SEPTEMBER 11-12, 1997	DATE	10/09/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-12
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	2



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HOUSTON, TEXAS

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PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL

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APPROVED: _____ DATE _____

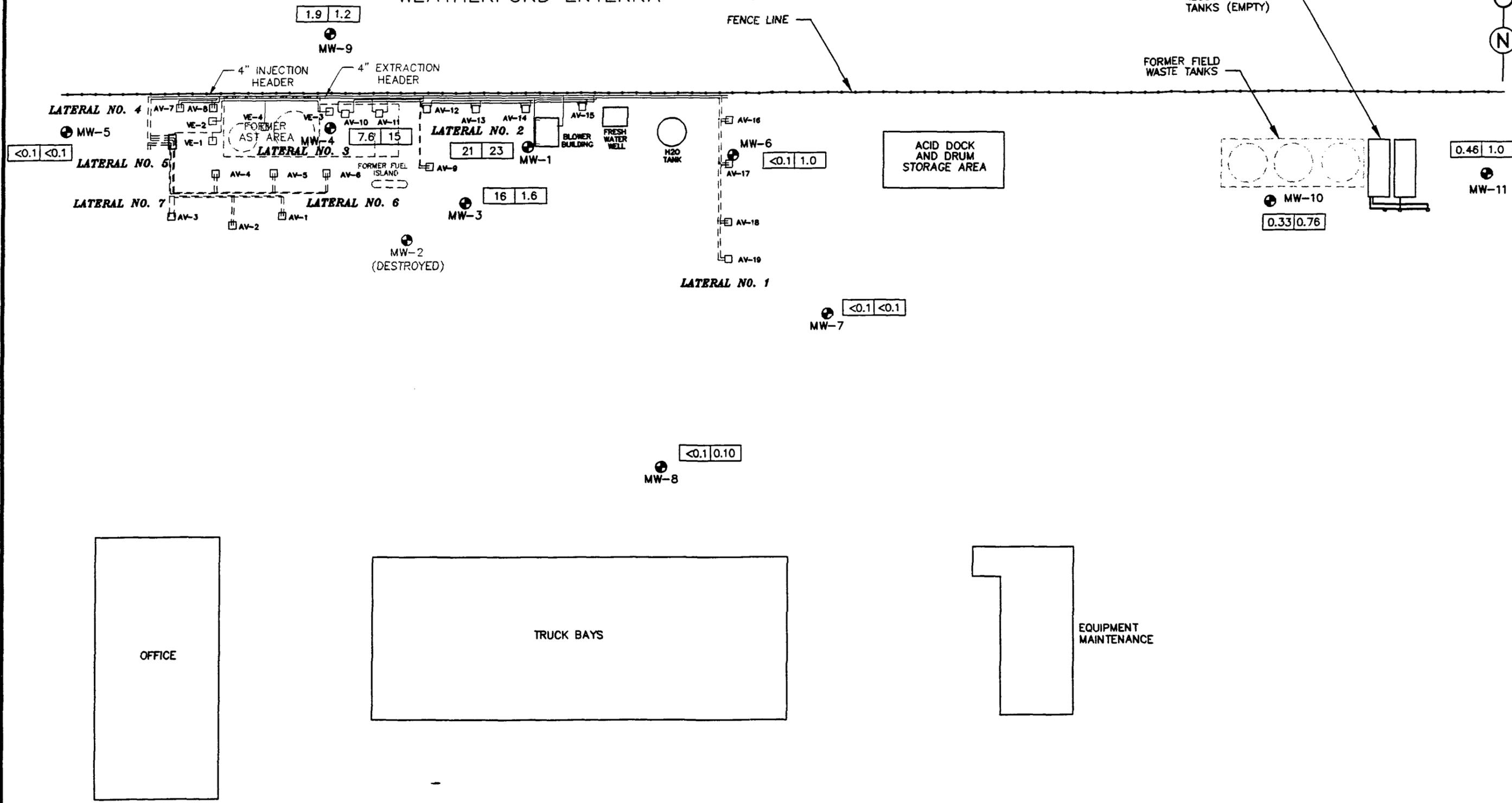
LEGEND

MW-8
92
3720

MONITORING WELL LOCATION AND IDENTIFICATION
BENZENE CONCENTRATION (ug/L)
TOTAL BTEX CONCENTRATION (ug/L)
BENZENE CONCENTRATION CONTOUR (ug/L) - SEPTEMBER 1997
CONTOUR INTERVAL = LOGARITHMIC

TITLE	BENZENE ISOCONCENTRATION AND TOTAL BTEX DISTRIBUTION MAP FOR SEPTEMBER 11-12, 1997	DATE	10/15/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-12
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	3

WEATHERFORD ENTERRA



T: 2832 HYC0997 (1-40) 10-09-97 JEB

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL

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SCALE: 1" = 40'
DRAWN BY: JEB DATE 10/97
CHK'D BY: _____ DATE _____
APPROVED: _____ DATE _____

LEGEND
● MW-8 MONITORING WELL LOCATION AND IDENTIFICATION
[7.6 | 15] TPH-G | TPH-D (mg/L)

TITLE	TOTAL PETROLEUM HYDROCARBONS DISTRIBUTION MAP FOR SEPTEMBER 11-12, 1997	DATE	10/09/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-12
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	4

Tables

TABLES

Table 1
Site Chronolgy
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
February 7, 1991	The State of New Mexico Oil Conservation Division (OCD) conducted an on-site inspection, including sampling of the on-site fresh water well.
August 6, 1991	OCD requested submittal of an investigation work plan.
September 5, 1991	Roberts/Schornick and Associates, Inc. (RSA) submitted Technical Work Plan for soil and groundwater investigation to the OCD.
November 15, 1991	The OCD approved Technical Work Plan submitted by RSA.
December 16, 1991	RSA sampled the fresh water well. Analytical results were submitted to the OCD.
February 21, 1992	Western sampled the fresh water well. Analytical results were submitted to the OCD.
July 29 - August 10, 1992	Brown and Caldwell conducted a soil and groundwater investigation according to the approved Technical Work Plan. Investigation included drilling and sampling 9 soil borings, sampling 6 hand-augured soil borings, the installation and sampling of 5 monitoring wells, and the sampling of the fresh water well.
October 12, 1992	Brown and Caldwell submitted Soil and Groundwater Investigation Report to the OCD.
December 2, 1992	The OCD requested the installation and sampling of 4 additional monitoring wells, including a monitoring well on an adjacent property.
April 13, 1993	Brown and Caldwell conducted a vapor extraction pilot test on existing groundwater monitoring wells.
April 15, 1993	Brown and Caldwell installed off-site monitoring well.
April 22, 1993	Brown and Caldwell sampled off-site monitoring well.
May 27, 1993	Brown and Caldwell submitted a letter report documenting the installation and sampling of the off-site monitoring well to the OCD.
June 2, 1993	Brown and Caldwell conducted a short-term aquifer test using the fresh water well at the facility.
June 8, 1993	USTank Management, Inc. conducted a non-volumetric tank system tightness test on the diesel and unleaded gasoline aboveground storage tanks at the facility.
June 21, 1993	ENSR Consulting and Engineering (ENSR), the environmental consultant of the adjacent property owner on which the off-site well is located, submitted a request to sample the off-site monitoring well.

Table 1 (Continued)
Site Chronolgy
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
July 15, 1993	ENSR split one groundwater sample, collected from the off-site monitoring well, with Brown and Caldwell.
July 30, 1993	USTank Management, Inc. submitted the tank tightness test report to Brown and Caldwell. The report indicated that both tanks and their associated piping passed.
August 16-19, 1993	Brown and Caldwell installed two additional downgradient monitoring wells. Brown and Caldwell sampled each of the existing monitoring and the newly installed monitoring wells.
January 26, 1994	Brown and Caldwell performed groundwater monitoring event; existing monitoring wells and the fresh water well were purged and sampled. Groundwater samples were analyzed for BTEX.
May 6, 1994	Remedial Action Plan (RAP) submitted to the OCD.
August 11, 1994	RAP approved by the OCD.
May 3, 1995	Brown and Caldwell conducted the May 1995 groundwater sampling event.
July 31, 1995	Brown and Caldwell conducted the July 1995 groundwater sampling event.
August 2-9, 1995	Installation of biosparging system was initiated. Nineteen combined injection/extraction wells and three vacuum extraction wells were installed.
August 14-26, 1995	Remedial Construction Services, Inc. (RCS) began construction of the biosparging system.
September 19, 1995	Began operation of the extraction portion of the biosparging system.
November 13, 1995	Began operation of the injection portion of the biosparging system.
November 14, 1995	Brown and Caldwell conducted the November 1995 groundwater sampling event.
February 23, 1996	Brown and Caldwell conducted the February 1996 groundwater sampling event.
May 31, 1996	Brown and Caldwell conducted the May 1996 groundwater sampling event.
August 23, 1996	Brown and Caldwell conducted the August 1996 groundwater sampling event.

Table 1 (Continued)
Site Chronolgy
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
December 2, 1996	Brown and Caldwell conducted the December 1996 groundwater sampling event.
March 12, 1997	Brown and Caldwell conducted the March 1997 groundwater sampling event.
March 14, 1997	Vapor extraction well VE-4 installed.
April 1997	Vapor extraction well VE-4 connected to the vapor extraction system.
June 12, 1997	Brown and Caldwell conducted the June 1997 groundwater sampling event.
September 11-12, 1997	Brown and Caldwell conducted the September 1997 groundwater sampling event.

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-1	3,647.53	8/10/92	53.22	0.00	3,594.31	(1)
	3,647.53	2/9/93	53.03	0.00	3,594.50	
	3,647.53	8/18/93	53.10	0.00	3,594.43	
	3,647.53	1/26/94	53.31	0.00	3,594.22	
	3,647.53	5/3/95	54.64	0.20	3,593.05	(2)
	3,647.53	7/31/95	54.14	0.00	3,593.39	
	3,647.53	11/14/95	53.69	0.00	3,593.84	
	3,647.53	2/23/96	54.32	0.00	3,593.21	
	3,647.53	5/31/96	54.14	0.00	3,593.39	
	3,647.53	8/23/96	56.17	0.00	3,591.36	
	3,647.53	12/2/96	55.27	0.00	3,592.26	
	3,647.53	3/12/97	55.70	0.27	3,592.05	(3)
	3,647.53	6/12/97	55.08	0.02	3,592.47	
	3,647.53	9/12/97	55.64	0.51	3,592.31	
MW-2	3,647.59	8/10/92	52.82	0.00	3,594.77	(1)
	3,644.84	2/9/93	49.60	0.00	3,595.24	
	3,644.84	8/18/93	49.71	0.00	3,595.13	
	3,644.84	1/26/94	49.97	0.00	3,594.87	
		5/3/95				(4)
MW-3	3,647.68	8/10/92	52.99	0.00	3,594.69	(1)
	3,647.68	2/9/93	52.72	0.00	3,594.96	
	3,647.68	8/18/93	52.82	0.00	3,594.86	
	3,647.68	1/26/94	53.05	0.00	3,594.63	
	3,647.68	5/3/95	54.31	0.00	3,593.37	
	3,645.00	7/31/95	51.24	0.00	3,593.76	
	3,645.00	11/14/95	51.10	0.00	3,593.90	
	3,645.00	2/23/96	51.68	0.00	3,593.32	
	3,645.00	5/31/96	51.45	0.00	3,593.55	
	3,645.00	8/23/96	51.55	0.00	3,593.45	
	3,645.00	12/2/96	52.23	0.00	3,592.77	
	3,645.00	3/12/97	52.67	0.00	3,592.33	(3)
	3,645.00	6/12/97	52.68	0.00	3,592.32	
3,645.00	9/11/97	52.71	0.00	3,592.29		

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-4						
	3,645.28	8/10/92	50.55	0.00	3,594.73	(1)
	3,645.28	2/9/93	50.26	0.00	3,595.02	
	3,645.28	8/18/93	50.38	0.00	3,594.90	
	3,645.28	1/26/94	50.90	0.30	3,594.63	
	3,645.28	5/3/95	51.51	0.45	3,594.14	
	3,645.28	7/31/95	51.74	0.26	3,593.75	
	3,645.28	11/14/95	51.03	0.00	3,594.25	
	3,645.28	2/23/96	51.65	0.01	3,593.64	
	3,645.28	5/31/96	51.48	0.00	3,593.80	
	3,645.28	8/23/96	53.49	0.00	3,591.79	
	3,645.28	12/2/96	52.32	0.00	3,592.96	
	3,645.28	3/12/97	52.74	0.05	3,592.58	(3)
	3,645.28	6/12/97	53.08	0.44	3,592.56	
	3,645.28	9/12/97	52.60	0.15	3,592.80	
MW-5						
	3,647.72	8/10/92	52.38	0.00	3,595.34	(1)
	3,647.72	2/9/93	52.06	0.00	3,595.66	
	3,647.72	8/18/93	52.16	0.00	3,595.56	
	3,647.72	1/26/94	52.50	0.00	3,595.22	
	3,647.72	5/3/95	53.57	0.00	3,594.15	
	3,647.72	7/31/95	53.27	0.00	3,594.45	
	3,647.72	11/14/95	52.83	0.00	3,594.89	
	3,647.72	2/23/96	53.57	0.00	3,594.15	
	3,647.72	5/31/96	53.16	0.00	3,594.56	
	3,647.72	8/23/96	53.41	0.00	3,594.31	
	3,647.72	12/2/96	53.98	0.00	3,593.74	
	3,647.72	3/12/97	54.44	0.00	3,593.28	(3)
	3,647.72	6/12/97	54.48	0.00	3,593.24	
	3,647.72	9/12/97	54.29	0.00	3,593.43	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-6	3,644.74	2/9/93	50.58	0.00	3,594.16	(1)
	3,644.74	8/18/93	50.78	0.00	3,593.96	
	3,644.74	1/26/94	51.00	0.00	3,593.74	
	3,644.74	5/3/95	52.63	0.00	3,592.11	
	3,644.74	7/31/95	51.90	0.00	3,592.84	
	3,644.74	11/14/95	51.19	0.00	3,593.55	
	3,644.74	2/23/96	52.10	0.00	3,592.64	
	3,644.74	5/31/96	51.76	0.00	3,592.98	
	3,644.74	8/23/96	51.63	0.00	3,593.11	
	3,644.74	12/2/96	52.85	0.00	3,591.89	
	3,644.74	3/12/97	53.55	0.00	3,591.19	(3)
	3,644.74	6/12/97	52.08	0.00	3,592.66	
	3,644.74	9/11/97	53.72	0.00	3,591.02	
MW-7	3,644.55	2/9/93	50.53	0.00	3,594.02	(1)
	3,644.55	8/18/93	50.74	0.00	3,593.81	
	3,644.55	1/26/94	51.01	0.00	3,593.54	
	3,644.55	5/3/95	52.25	0.00	3,592.30	
	3,644.55	7/31/95	51.92	0.00	3,592.63	
	3,644.55	11/14/95	51.48	0.00	3,593.07	
	3,644.55	2/23/96	52.15	0.00	3,592.40	
	3,644.55	5/31/96	51.78	0.00	3,592.77	
	3,644.55	8/23/96	52.02	0.00	3,592.53	
	3,644.55	12/2/96	52.52	0.00	3,592.03	
	3,644.55	3/12/97	52.99	0.00	3,591.56	(3)
	3,644.55	6/12/97	53.08	0.00	3,591.47	
	3,644.55	9/11/97	53.00	0.00	3,591.55	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-8	3,644.87	2/9/93	50.48	0.00	3,594.39	(1)
	3,644.87	8/18/93	50.67	0.00	3,594.20	
	3,644.87	1/26/94	50.96	0.00	3,593.91	
	3,644.87	5/3/95	52.15	0.00	3,592.72	
	3,644.87	7/31/95	51.77	0.00	3,593.10	
	3,644.87	11/14/95	51.37	0.00	3,593.50	
	3,644.87	2/23/96	52.17	0.00	3,592.70	
	3,644.87	5/31/96	51.55	0.00	3,593.32	
	3,644.87	8/23/96	51.92	0.00	3,592.95	
	3,644.87	12/2/96	52.43	0.00	3,592.44	
	3,644.87	3/12/97	52.93	0.00	3,591.94	(3)
	3,644.87	6/12/97	53.96	0.00	3,590.91	
	3,644.87	9/11/97	52.73	0.00	3,592.14	
MW-9	3,644.78	4/22/93	49.73	0.00	3,595.05	(1)
	3,644.78	7/15/93	49.65	0.00	3,595.13	
	3,644.78	8/18/93	49.85	0.00	3,594.93	
	3,644.78	1/26/94	50.02	0.00	3,594.76	
	3,644.78	5/3/95	51.35	0.00	3,593.43	
	3,644.78	7/31/95	50.97	0.00	3,593.81	
	3,644.78	11/14/95	50.43	0.00	3,594.35	
	3,644.78	2/23/96	51.12	0.00	3,593.66	
	3,644.78	5/31/96	50.89	0.00	3,593.89	
	3,644.78	8/23/96	50.98	0.00	3,593.80	
	3,644.78	12/2/96	51.58	0.00	3,593.20	
	3,644.78	3/12/97	52.21	0.05	3,592.61	(3)
	3,644.78	6/12/97	52.10	0.00	3,592.68	PSH sheen
3,644.78	9/12/97	51.95	0.00	3,592.83	PSH Sheen	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-10						
	3,644.47	8/18/93	51.54	0.00	3,592.93	(1)
	3,644.47	1/26/94	51.90	0.00	3,592.57	
	3,644.47	5/3/95	52.97	0.00	3,591.50	
	3,644.47	7/31/95	52.87	0.00	3,591.60	
	3,644.47	11/14/95	52.51	0.00	3,591.96	
	3,644.47	2/23/96	53.05	0.00	3,591.42	
	3,644.47	5/31/96	52.79	0.00	3,591.68	
	3,644.47	8/23/96	53.03	0.00	3,591.44	
	3,644.47	12/2/96	53.41	0.00	3,591.06	
	3,644.47	3/12/97	54.21	0.00	3,590.26	(3)
	3,644.47	6/12/97	53.99	0.00	3,590.48	
	3,644.47	9/12/97	53.94	0.00	3,590.53	
MW-11						
	3,643.78	8/18/93	51.92	0.00	3,591.86	(1)
	3,643.78	1/26/94	52.32	0.00	3,591.46	
	3,643.78	5/3/95	53.38	0.00	3,590.40	
	3,643.78	7/31/95	53.35	0.00	3,590.43	
	3,643.78	11/14/95	52.96	0.00	3,590.82	
	3,643.78	2/23/96	53.50	0.00	3,590.28	
	3,643.78	5/31/96	53.25	0.00	3,590.53	
	3,643.78	8/23/96	53.49	0.00	3,590.29	
	3,643.78	12/2/96	53.79	0.00	3,589.99	
	3,643.78	3/12/97	53.81	0.00	3,589.97	(3)
	3,643.78	6/12/97	53.96	0.00	3,589.82	
	3,643.78	9/12/97	52.93	0.00	3,590.85	

(1) Top of casing elevations and groundwater elevations of all monitor wells were relative to an arbitrary datum of 100.00 feet prior to March 1997 and have been converted to Mean Sea Level (MSL).

(2) For wells with a hydrocarbon layer the groundwater elevation was calculated as follows:

$$\text{Groundwater Elevation} = (\text{TOC elevation}) - (\text{Depth to groundwater}) + \{(\text{Free product thickness}) \times (\text{SG of free product})\}$$

Note: The specific gravity (SG) for the free product was 0.82.

(3) Top of casing elevations and groundwater elevations relative to MSL after March 1997.

(4) MW-2 could not be located and is assumed destroyed after January, 1994.

Table 3
 Field Screening Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	Date Measured	Well Volume	pH	Conductivity (µmhos)	Temperature (°C)	Redox (mV)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)
MW-3	9/11/97	0	7.18	1,208	19.3	11	5.37	
		1	7.16	1,216	19.1	-50.4	5.00	
		2	7.17	1,221	19.1	-83	4.85	
		2	7.20	1,220	19.1	-89.9	5.70	
		3	7.17	1,223	19.2	-90.8	4.97	
		3	7.17	1,223	19.2	-91.7	4.96	0.0
MW-5	9/12/97	1	7.52	1,127	18.8	35.2	6.42	
		2	7.22	1,105	18.8	43.2	5.75	
		2	7.21	1,107	18.8	49.8	5.50	
		3	7.20	1,109	18.8	54.1	5.44	0.0
MW-6	9/11/97	1	8.14	1,653	20.0	51	7.85	
		2	8.03	1,375	19.9	61.1	7.51	
		2	8.04	1,317	20.9	55.1	7.50	
		2	7.99	1,286	22.1	65.7	6.91	
		3	7.97	1,183	20.5	72.8	7.54	0.0
MW-7	9/11/97	1	6.68	1,664	20.4	57.9	3.49	
		1	6.69	1,661	20.1	67.5	3.03	
		2	6.69	1,601	20.1	74	2.96	
		3	6.70	1,574	19.9	80.6	3.03	
		3	6.70	1,574	20.1	83.2	3.06	0.0

Table 3
Field Screening Results for Groundwater Samples
Hobbs, New Mexico Facility
BJ Services Company, U.S.A.

Monitoring Well	Date Measured	Well Volume	pH	Conductivity (µmhos)	Temperature (°C)	Redox (mV)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)
MW-8	9/11/97	1	6.82	1,747	19.4	30.9	3.22	0.0
		1	6.81	1,732	19.4	36.6	3.02	
		2	6.81	1,724	19.4	39.7	2.79	
		2	6.81	1,715	19.3	45.9	2.52	
		3	6.81	1,716	19.3	48.3	2.62	
MW-10	9/12/97	1	6.77	7,450	19.5	-99.5	1.16	9.4
		1	6.78	7,680	19.5	-104.2	0.91	
		2	6.79	7,651	19.6	-102.4	1.98	
		2	6.80	7,542	19.6	-105.6	0.85	
		3	6.81	7,548	19.7	-108.9	0.65	
MW-11	9/12/97	1	6.99	7,513	19.8	-65.5	5.40	3.2
		2	6.95	7,444	19.8	-76.8	2.26	
		3	6.94	7,351	19.6	-71.7	2.40	
		3	6.93	7,352	19.6	-73.8	1.80	

MW-2 could not be located and assumed destroyed after January, 1994.

NR = No Reading

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-1	8/10/92	Regular	5550	12090	2160	7370	NA	NA
	2/9/93	Regular	2100	6500	1300	7400	NA	NA
	8/19/93	Regular	3200	7300	1200	3700	NA	NA
	1/27/94	Regular	1930	4580	672	2390	NA	NA
	5/3/95	Regular	NSP	NSP	NSP	NSP	NA	NSP
	8/1/95	Regular	390	1300	230	800	NA	5.7
	11/15/95	Regular	880	1800	300	970	NA	6.8
	2/23/96	Regular	1500	3700	620	2200	NA	21
	5/31/96	Regular	1100	1700	380	990	NA	7.5
	8/23/96	Regular	1800	3300	570	2100	NA	17
	12/2/96	Regular	5600	9600	2100	9600	100	64
	3/12/97	Regular	5500	9700	2600	8200	22	62
	6/12/97	Regular	5300	34000	7500	27000	180	160
9/12/97	Regular	1800	4400	1000	3000	23	21	
MW-2	8/10/92	Regular	14.9	< 4	< 4	< 4	NA	NA
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	100	12	3	13	NA	NA
	1/27/94	Regular	< 1	1.2	2	2.5	NA	NA
MW-3	8/10/92	Regular	304.9	2099	6760	1586	NA	NA
	2/9/93	Regular	130	< 10	< 10	190	NA	NA
	8/19/93	Regular	560	3100	630	1900	NA	NA
	1/27/94	Regular	1070	5380	510	3120	NA	NA
	5/4/95	Regular	770	3300	470	1800	NA	NA
	8/1/95	Regular	490	2900	890	1600	NA	14
	11/15/95	Regular	250	1000	180	440	NA	2.9
	2/23/96	Regular	120	810	170	560	NA	4
	5/31/96	Regular	670	3900	1200	2300	NA	15
	8/23/96	Regular	330	2200	590	1500	NA	12
	12/2/96	Regular	220	1800	670	1000	0.89	7.4
	3/12/97	Regular	370	2000	960	1400	1.8	11
	6/12/97	Regular	860	4800	1700	2600	1.9	20
9/11/97	Regular	770	3000	1600	1900	1.6	16	

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-4	8/10/92	Regular	2594	10360	2160	6740	NA	NA
	2/9/93	Regular	5200	15000	2200	10000	NA	NA
	8/19/93	Regular	3000	12000	< 2000	7000	NA	NA
	1/27/94	Regular	NSP	NSP	NSP	NSP	NA	NSP
	5/3/95	Regular	NSP	NSP	NSP	NSP	NA	NSP
	8/1/95	Regular	5700	17000	3500	13000	NA	120
	11/15/95	Regular	490	1600	310	1100	NA	5.2
	2/23/96	Regular	360	2800	560	2500	NA	18
	5/31/96	Regular	84	830	280	1100	NA	6.2
	8/23/96	Regular	110	1400	430	1800	NA	9.8
	12/2/96	Regular	190	2000	1800	7200	56	43
	3/12/97	Regular	220	1500	1500	4400	27	27
	6/12/97	Regular	47	270	360	950	2.5	6.2
	9/12/97	Regular	92	840	670	2100	15	7.6
MW-5	8/10/92	Regular	< 4	< 4	< 4	< 4	NA	NA
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/10/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	1/27/94	Regular	8.7	29.9	4	11.3	NA	NA
	5/3/95	Regular	3.7	5.3	0.92	4.6	NA	NA
	8/1/95	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	11/15/95	Regular	< 0.3	1.2	< 0.3	1.5	NA	NA
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	5/31/96	Regular	31	86	10	20	NA	NA
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	9/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-6	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	7000	19000	3100	7200	NA	NA
	8/19/93	Regular	8100	19000	3500	6400	NA	NA
	1/27/94	Regular	7960	20200	3830	6150	NA	NA
	5/4/95	Regular	11000	17000	2900	6000	NA	NA
	8/1/95	Regular	8300	12000	2500	5100	NA	60
	11/15/95	Regular	8900	17000	2900	5500	NA	57
	2/23/96	Regular	8100	10000	2300	4000	NA	58
	5/31/96	Regular	83	150	15	51	NA	0.57
	5/31/96	Duplicate	87	160	13	47	NA	0.52
	8/23/96	Regular	31	28	9.4	7.9	NA	0.46
	12/2/96	Regular	< 1	< 1	< 1	1.7	5.6	< 0.1
	3/12/97	Regular	12	< 5	6.8	18	12	< 0.5
	6/12/97	Regular	1900	1400	410	310	7.8	7.4
	9/11/97	Regular	11	1.3	3.4	< 1	1	< 0.1
MW-7	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	< 2	3	< 2	< 2	NA	NA
	1/27/94	Regular	1.1	< 1	< 1	< 1	NA	NA
	5/3/95	Regular	52	3.4	0.67	2.8	NA	NA
	8/1/95	Regular	22	2.2	0.85	2.8	NA	< 0.1
	11/15/95	Regular	8.4	0.77	< 0.3	0.93	NA	< 0.1
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	2/23/96	Duplicate	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	5/31/96	Regular	29	83	10	21	NA	0.25
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	9/11/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-8	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA	NA
	1/27/94	Regular	< 1	< 1	< 1	< 1	NA	NA
	5/3/95	Regular	3	4.9	0.75	3.7	NA	NA
	8/1/95	Regular	3.1	1.2	0.47	1.6	NA	< 0.001
	8/1/95	Duplicate	3.6	1.5	0.51	1.5	NA	< 0.1
	11/15/95	Regular	< 0.3	0.52	< 0.3	< 0.6	NA	< 0.1
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	5/31/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	1.8	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	9/11/97	Regular	< 1	< 1	< 1	< 1	0.1	< 0.1
MW-9	4/22/93	Regular	570	380	< 50	870	NA	NA
	7/15/93	Regular	121	7.3	3	458	NA	NA
	8/19/93	Regular	390	290	40	250	NA	NA
	1/27/94	Regular	327	357	51.1	293	NA	NA
	5/3/95	Regular	380	110	19	120	NA	NA
	8/1/95	Regular	660	410	91	310	NA	6.2
	11/15/95	Regular	240	24	11	140	NA	1.5
	11/15/95	Duplicate	170	18	10	120	NA	1.9
	2/23/96	Regular	170	18	2.3	160	NA	4.3
	5/31/96	Regular	120	16	3	200	NA	NA
	8/23/96	Regular	82	13	6	270	NA	4
	8/23/96	Duplicate	76	14	4.8	250	NA	4.4
	12/2/96	Regular	61	< 25	< 25	210	2.6	2.8
	12/2/96	Duplicate	86	13	2.4	270	3.7	2.9
	3/12/97	Regular	30	48	420	880	8.2	19
	6/12/97	Regular	4.7	2.1	11	97	2.6	2.2
6/12/97	Duplicate	< 5	< 5	6.6	69	5.2	1.9	
9/12/97	Regular	2.1	2.3	2.1	120	1.2	1.9	

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-10								
	8/19/93	Regular	190	460	< 200	240	NA	NA
	1/27/94	Regular	13.4	4	5.5	33.6	NA	NA
	5/4/95	Regular	980	15	11	84	NA	NA
	8/1/95	Regular	1300	32	32	100	NA	3.6
	11/15/95	Regular	1000	24	15	36	NA	1.7
	2/23/96	Regular	810	23	27	44	NA	2.4
	5/31/96	Regular	700	24	34	28	NA	2
	8/23/96	Regular	290	3.4	6.4	13	NA	1.4
	12/2/96	Regular	280	1.3	17	8	0.94	0.97
	3/12/97	Regular	110	< 5	17	< 5	0.61	0.57
	6/12/97	Regular	150	12	30	< 5	0.68	< 0.5
	9/12/97	Regular	87	2.3	26	2.7	0.76	0.33
	9/12/97	Duplicate	87	2.4	26	2.8	0.79	0.33
MW-11								
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA	NA
	1/27/94	Regular	< 1	< 1	< 1	< 1	NA	NA
	5/4/95	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	8/1/95	Regular	44	29	5.5	13	NA	0.2
	11/15/95	Regular	190	2.8	6.2	11	NA	0.4
	2/23/96	Regular	49	1.2	0.51	4	NA	0.25
	5/31/96	Regular	300	83	12	28	NA	0.8
	8/23/96	Regular	100	1.2	0.3	4.7	NA	0.26
	12/2/96	Regular	970	< 5	6	8.1	2	1.3
	3/12/97	Regular	130	< 5	13	5.8	0.42	< 0.5
	3/12/97	Duplicate	100	< 5	10	5.1	0.43	< 0.5
	6/12/97	Regular	150	23	19	< 5	1.1	0.55
	9/12/97	Regular	220	15	27	13	1	0.46

MW-2 destroyed after January, 1994 NA = Not Analysed NS = Not Sampled
 NSP = Not Sampled due to Phase Separated Hydrocarbons

Table 5
Summary of Analytical Results for Air Emissions
Hobbs, New Mexico Facility
BJ Services Company, U.S.A.

Sample Number	Sample Date	parts per million by volume, ppmv						TPH	Discharge Rate, scfm	Benzene Emission Rate, lb/hr	Total BTEX Emission Rate, lb/hr	TPH Emission Rate, lb/hr
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH	Discharge Rate, scfm					
Extraction-1	9/19/95	790	1100	340	920	9700	132.47	1.24	5.94	16.31		
Effluent-1	9/20/95	990	2500	560	1600	16000	135.76	1.58	10.94	27.37		
Effluent-2	9/28/95	13	28	6	18	2533	123.56	0.02	0.11	3.89		
Effluent-4	11/7/95	15	58	12	36	1500	131.10	0.02	0.24	2.59		
Effluent111595-01	11/15/95	39	180	42	130	1870	133.33	0.06	0.77	3.21		
Effluent121995-01	12/19/95	10	45	11	33	530	129.64	0.02	0.19	0.89		
Effluent012996-01	1/29/96	12	61	17	53	1200	128.45	0.02	0.27	1.95		
Effluent032296-01	3/22/96	6	44	12	40	990	124.68	0.01	0.19	1.56		
Effluent042496-01	4/25/96	4	37	10	36	900	118.34	0.01	0.15	1.29		
Effluent053196-01	5/31/96	3.7	40	10	33	670	124.11	0.01	0.16	1.04		
Effluent082396-01	8/23/96	< 5	12	< 5	< 5	200	126.18	0.01	0.05	0.31		
Effluent120296-01	12/2/96	< 1	< 1	< 1	< 1	< 5	129.04	0.00	0.01	0.01		
Eff-31297-1	3/12/97	2.1	15	4.6	15	250	110.56	0.00	0.06	0.33		
Effluent070297-01	7/2/97	< 1	6.3	2.4	8.6	65	109.90	0.00	0.03	0.08		
Monitor970912	9/12/97	NA	NA	NA	NA	340	105.40	NA	NA	0.39		

Emission rates reported for 12/02/96 sampling event were calculated using the detection limits. The actual emissions are Benzene <0.001 lb/hr, BTEX: <0.01 lb/hr and TPH: <0.01 lb/hr.
 Table printed: 10/15/97
 Page 1 of 1

Appendices



APPENDIX A

Groundwater Sampling Forms

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 9/12/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Disposable Bailer</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>64.42</u> feet		pH = _____ at _____ °C	<u>NA</u>
Static Water from TOC <u>55.64</u> feet	Sample Equipment <u>Poly Ethylene Disposable Bailer</u>	pH = _____ at _____ °C	
Product Level from TOC <u>55.13</u> feet		Conductivity Conductance Standard: _____ μmhos/cm at 25° C	<u>NA</u>
Length of Water Column <u>8.78</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>None</u>	Measured Value: _____ μmhos/cm at 25° C	
Well Volume <u>1.45</u> gal		Dissolved Oxygen	<u>NA</u>
Screened Interval (from GS) <u>45</u> feet		DO Meter Calibrated to: _____ mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
<u>NA HC on Water</u>								

Geochemical Parameters		Comments:
Ferrous Iron:	<u>NA</u> mg/L	<u>Little HC from filter</u>
Dissolved Oxygen:	<u>NA</u> mg/L	
Nitrate:	<u>NA</u> mg/L	
Sulfate:	<u>NA</u> mg/L	

PPE Worn: <u>Level D Nitrile Surgical Gloves</u>	Sampler's Signature: <u>Thomas A. Wager</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 09/11/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Electric Submersible Pump</u>	Equipment Calibration - Time <u>Factory</u>
Total Depth of Well from TOC <u>64.31</u> feet		pH = _____ at _____ °C
Static Water from TOC <u>52.71</u> feet	Sample Equipment <u>Disposable Bailers</u>	pH = _____ at _____ °C
Product Level from TOC <u>N/A</u> feet		Conductivity Conductance Standard: <u>Factory</u> $\mu\text{mhos/cm}$ at 25° C
Length of Water Column <u>11.6'</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>6820</u>	Measured Value: _____ $\mu\text{mhos/cm}$ at 25° C
Well Volume <u>1.91</u> gal	<u>Multi parameter</u>	Dissolved Oxygen <u>760 $\mu\text{mhos/cm}$</u>
Screened interval (from GS) <u>—45</u> feet	<u>pH, DO, Redox, TRB,</u>	DO Meter Calibrated to: _____ mg/L

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
2002	1 gal	12.5	minutes					TRB
2007	0.52	1	7.18	19.31	1208	11.0	5.37	140.6
2010	1.05	2	7.16	19.08	1216	-50.4	5.0	230.8
2012	1.57	3	7.17	19.07	1221	-83.0	4.85	428.2
2014	2.09	4	7.20	19.10	1220	-89.9	5.70	28.0
2016	2.62	5	7.17	19.17	1223	-90.8	4.97	27.6
2018	3.14	6	7.19 7.17	19.17	1223	-91.7	4.96	27.5

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	<u>Water purged is Black but Clear Quickly.</u>
Dissolved Oxygen: <u>4.6</u> mg/L	
Nitrate: <u>NA</u> mg/L	
Sulfate: <u>NA</u> mg/L	

PPE Worn: <u>Level D</u>	Sampler's Signature: <u>Thomas A. Waj</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 9/12/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Polyethylene Disposable Bailer</u>	Equipment Calibration - Time	
Total Depth of Well from TOC 52 <u>61.43</u> feet		pH = <u>NA</u> at _____ °C	
Static Water from TOC <u>52.6</u> feet	Sample Equipment <u>Polyethylene Disposable Bailer</u>	pH = _____ at _____ °C	
Product Level from TOC <u>52.45</u> feet		Conductivity Conductance Standard: <u>NA</u> $\mu\text{mhos/cm}$ at 25° C	
Length of Water Column <u>8.83</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>NA</u>	Measured Value: _____ $\mu\text{mhos/cm}$ at 25° C	
Well Volume <u>1.45</u> gal		Measured Value: _____ $\mu\text{mhos/cm}$ at 25° C	
Screened Interval (from GS) <u>45</u> → <u>60</u> feet		Dissolved Oxygen DO Meter Calibrated to: _____ mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
NA HC on Water								

Geochemical Parameters	Comments:
Ferrous Iron: <u>NA</u> mg/L	<u>Hydrocarbon on Water surface</u>
Dissolved Oxygen: <u>NA</u> mg/L	
Nitrate: <u>NA</u> mg/L	
Sulfate: <u>NA</u> mg/L	

PPE Worn: <u>level D</u>	Sampler's Signature: <u>Thomas A. Wajda</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 09/12/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Electric Submersible Pump</u>	Equipment Calibration - Time <u>Factory</u>	
Total Depth of Well from TOC <u>64.60</u> feet		pH = _____ at _____ °C	
Static Water from TOC <u>54.25</u> feet	Sample Equipment <u>Polyethylene Disposable Bailer</u>	pH = _____ at _____ °C	
Product Level from TOC <u>NA</u> feet		Conductivity Conductance Standard: _____ μmhos/cm at 25° C	<u>Factory</u>
Length of Water Column <u>10.31</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>6820 Multi Parameter</u>	Measured Value: _____ μmhos/cm at 25° C	
Well Volume <u>1.7</u> gal		Dissolved Oxygen DO Meter Calibrated to: _____ mg/L	
Screened Interval (from GS) <u>45' to 60'</u> feet		<u>760 mmHg</u>	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0808	Start	≈ 1.5 gallon				avg 2 minutes	0.75 gal/min	TRB
0810	0.59	1	7.52	18.82	1127	35.2	6.42	52
0812	1.47	2.5	7.22	18.83	1105	43.2	5.75	40
0814	2.35	4.0	7.21	18.83	1107	49.8	5.50	35.4
0816	3.24	5.5 1.5 PAW	7.20	18.83	1109	54.1	5.44	32.8
—	—	—	—	—	—	—	—	—

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	<u>None</u>
Dissolved Oxygen: <u>3.6</u> mg/L	
Nitrate: <u>NA</u> mg/L	
Sulfate: <u>NA</u> mg/L	

PPE Worn: <u>Nitrile Surgical Gloves</u>	Sampler's Signature: <u>Thomas A. Wagoner</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 09/11/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Electric Submersible Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>60.17</u> feet		pH = _____ at _____ °C	<u>Factory</u>
Static Water from TOC <u>53.72</u> feet	Sample Equipment <u>Disposable Bailer</u> <u>Polyethylene</u>	pH = _____ at _____ °C	
Product Level from TOC <u>N/A</u> feet		Conductivity Conductance Standard: _____ $\mu\text{mhos/cm}$ at 25° C	<u>Factory</u>
Length of Water Column <u>6.45</u> feet	Analytical Equipment (SH, DO, Redox, filtration, etc.) <u>6820</u> <u>MultiParameter</u>	Measured Value: _____ $\mu\text{mhos/cm}$ at 25° C	
Well Volume <u>1.06</u> gal		Dissolved Oxygen <u>760 mm Hg</u>	
Screened Interval (from GS) <u>45 → 60</u> feet		DO Meter Calibrated to: _____ mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
<u>1825</u>								<u>TRB</u>
<u>1830</u>	<u>0.94</u>	<u>1</u>	<u>8.14</u>	<u>20.02</u>	<u>1653</u>	<u>57.0</u>	<u>7.85</u>	<u>316.4</u>
<u>1838</u>	<u>1.42</u>	<u>1.5</u>	<u>8.03</u>	<u>19.94</u>	<u>1375</u>	<u>61.1</u>	<u>7.51</u>	<u>756.2</u>
<u>1855</u>	<u>1.89</u>	<u>2</u>	<u>8.04</u>	<u>20.90</u>	<u>1317</u>	<u>55.1</u>	<u>7.50</u>	<u>322.1</u>
<u>1859</u>								
<u>1859</u>	<u>2.35</u>	<u>2.5</u>	<u>7.99</u>	<u>22.14</u>	<u>1286</u>	<u>65.7</u>	<u>6.91</u>	<u>139.9</u>
<u>1907</u>	<u>3.0</u>	<u>3.2</u>	<u>7.97</u>	<u>20.53</u>	<u>1183</u>	<u>72.8</u>	<u>7.54</u>	<u>437.3</u>

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	
Dissolved Oxygen: <u>6.8</u> mg/L	
Nitrate: <u>—</u> mg/L	
Sulfate: <u>—</u> mg/L	

PPE Worn: <u>Level D</u>	Sampler's Signature: <u>Thomas A. Wagner</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 09/11/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Electric Submersible Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>61.46</u> feet		pH = _____ at _____ °C	<u>Factory</u>
Static Water from TOC <u>53.00</u> feet	Sample Equipment <u>Disposable Bailer</u>	pH = _____ at _____ °C	
Product Level from TOC <u>N/A</u> feet		Conductivity Standard: _____ μmhos/cm at 25° C	<u>Factory</u>
Length of Water Column <u>8.46</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>6820 Multi Parameter</u>	Measured Value: _____ μmhos/cm at 25° C	
Well Volume <u>1.40</u> gal		DO Meter Calibrated to: _____ mg/L	<u>760 mmHg</u>
Screened Interval (from GS) <u>45-60</u> feet			

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
16:56	1708	Start pump		20.45			3.49	TRB
17:11	071	1	6.68	16.6	1664	57.9	3.49	33.8
17:14	1.43	2	6.69	20.15	1661	67.5	3.03	31.2
17:17	2.14	3	6.69	20.15	1601	74.0	2.96 2.97	32.3
17:21	2.86	4	6.70	19.89	1574	80.6	3.03	33.2
17:23	3.21	4.5	6.70	20.05	1574	83.2	3.06	33.4

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	
Dissolved Oxygen: <u>2.6</u> mg/L	
Nitrate: <u>NA</u> mg/L	
Sulfate: <u>NA</u> mg/L	

PPE Worn: <u>Level D</u>	Sampler's Signature: <u>Thomas A. Wager</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 9/11/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Purge Submersible Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>62.37</u> feet		pH = <u>Factory</u> at _____ °C	
Static Water from TOC <u>52.73</u> feet	Sample Equipment <u>Baden - Desirable</u>	pH = _____ at _____ °C	
Product Level from TOC <u>N/A</u> feet		Conductivity Standard: <u>Factory</u> µmhos/cm at 25° C	
Length of Water Column <u>9.64</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>6820 Multiparameter</u>	Measured Value: _____ µmhos/cm at 25° C	
Well Volume <u>1.59</u> gal		Dissolved Oxygen <u>760 mmHg.</u>	
Screened Interval (from GS) <u>45 → 60</u> feet		DO Meter Calibrated to: _____ mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1559	Start Pumping	≈ 1 gal every 2 minutes						TRB
1604	0.63	1	6.82	19.45	1747	30.9	3.22	17.7
1606	1.26	2	6.81	19.35	1732	36.6	3.02	6.9
1608	1.89	3	6.81	19.35	1724 1724	39.7	2.79	2.7
1610	2.52	4	6.81	19.30	1715	45.9	2.52	1.1
1612	3.14	5	6.81	19.32	1716	48.3	2.62	1.4

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	
Dissolved Oxygen: <u>3</u> mg/L	
Nitrate: <u>NA</u> mg/L	
Sulfate: <u>NA</u> mg/L	

PPE Worn: <u>level D</u>	Sampler's Signature: <u>Thomas A. Wagner</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 09/12/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Electric Submersible Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>63.60</u> feet		pH = _____ at _____ °C	Factory
Static Water from TOC <u>53.94</u> feet	Sample Equipment <u>Polyethylene Disposable Bailer</u>	pH = _____ at _____ °C	
Product Level from TOC <u>N/A</u> feet		Conductivity Conductance Standard: _____ µmhos/cm at 25° C	Factory
Length of Water Column <u>9.66</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>6820 Multiparameter from YSI</u>	Measured Value: _____ µmhos/cm at 25° C	
Well Volume <u>1.59</u> gal		DO Meter Calibrated to: _____ mg/L	<u>760mm Hg.</u>
Screened Interval (from GS) <u>46-62</u> feet			

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1029		1	6.77	19.52	7450	-99.5	1.16	TRB 196.4
1032		2	6.78	19.52	7680	-104.2	0.91	251.0
1034		3	6.79	19.60	7651	-102.4	1.98	34.7
1036		4	6.80	19.63	7542	-105.6	0.85	33.0
1038		5	6.81	19.66	7548	-108.9	0.65	33.7

Geochemical Parameters	Comments:
Ferrous Iron: <u>9.4</u> mg/L	<u>light brown on purged TAW</u>
Dissolved Oxygen: <u>0</u> mg/L	
Nitrate: <u>NA</u> mg/L	
Sulfate: <u>NA</u> mg/L	

PPE Worn: <u>level D</u>	Sampler's Signature: <u>Thomas A. Wagon</u>
Disposition of Purge Water: <u>Drummed</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 09/12/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Electric Submersible Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>59.78</u> feet		pH = _____ at _____ °C	<u>Factory</u>
Static Water from TOC <u>52.93</u> feet	Sample Equipment <u>Disposable Bailer</u>	pH = _____ at _____ °C	
Product Level from TOC <u>N/A</u> feet		Conductivity Conductance Standard: _____ μ mhos/cm at 25° C	
Length of Water Column <u>6.85</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>6820 Multiparameter from YSI</u>	Measured Value: _____ μ mhos/cm at 25° C	
Well Volume <u>1.13</u> gal		Dissolved Oxygen <u>760 μm Hg</u>	
Screened Interval (from GS) _____ feet		DO Meter Calibrated to: _____ mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
<u>0906</u>								<u>TRB</u>
<u>0911</u>	<u>0.89</u>	<u>1</u>	<u>6.99</u>	<u>19.75</u>	<u>7513</u> 7513	<u>-65.5</u>	<u>5.4</u>	<u>663.5</u>
<u>0917</u>	<u>1.77</u>	<u>2</u>	<u>6.95</u>	<u>19.79</u>	<u>7444</u>	<u>-76.8</u>	<u>2.26</u>	<u>82.1</u>
<u>0922</u>	<u>2.65</u>	<u>3</u>	<u>6.94</u>	<u>19.56</u>	<u>7351</u>	<u>-71.7</u>	<u>2.40</u>	<u>35.4</u>
<u>0924</u>	<u>3.10</u>	<u>3.5</u>	<u>6.93</u>	<u>19.64</u>	<u>7352</u>	<u>-73.8</u>	<u>1.8</u>	<u>33.5</u>

Geochemical Parameters	Comments:
Ferrous Iron: <u>3.2</u> mg/L	
Dissolved Oxygen: <u>0.6</u> mg/L	
Nitrate: <u>NA</u> mg/L	
Sulfate: <u>NA</u> mg/L	

PPE Worn: <u>level D</u>	Sampler's Signature: <u>Thomas A. Wagner</u>
Disposition of Purge Water: <u>Drummed</u>	

—

B



APPENDIX B

Laboratory Analytical Report for Groundwater Samples



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

September 25, 1997

Mr. Rick Rexroad
BROWN and CALDWELL
1415 Louisiana
Houston, TX 77002

The following report contains analytical results for samples received at Southern Petroleum Laboratories (SPL) on September 13, 1997. The samples were assigned to Certificate of Analysis No.(s) 9709645 and analyzed for all parameters as listed on the chain of custody.

There were no analytical problems encountered with this group of samples and all quality control data was within acceptance limits.

If you have any questions or comments pertaining to this data report, please do not hesitate to contact me. Please reference the above Certificate of Analysis No. during any inquiries.

Again, SPL is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

Southern Petroleum Laboratories

A handwritten signature in black ink, appearing to read "Bernadette A. Fini", is written over a horizontal line.

Bernadette A. Fini
Project Manager



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

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate of Analysis Number: 97-09-645

Approved for Release by:


Bernadette A. Fini, Project Manager

9-26-97
Date:

Greg Grandits
Laboratory Director

Idelis Williams
Quality Assurance Officer

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

Certificate of Analysis No. H9-9709645-01

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-8

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/11/97 15:42:00
 DATE RECEIVED: 09/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00		09/18/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c15
 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-02

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-7

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/11/97 16:30:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 93
 4-Bromofluorobenzene 87
 Method 8020A ***
 Analyzed by: VHZ
 Date: 09/18/97

Petroleum Hydrocarbons - Gasoline ND 0.1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 103
 4-Bromofluorobenzene 73
 Modified 8015A - Gasoline***
 Analyzed by: VHZ
 Date: 09/18/97

Total Petroleum Hydrocarbons-Diesel ND 0.1 P mg/L

Surrogate % Recovery
 n-Pentacosane 96
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 09/19/97 01:51:00

ND - Not detected. (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. H9-9709645-02

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-7

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/11/97 16:30:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA				
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction		09/18/97		
Method 3510B ***				
Analyzed by: PC				
Date: 09/18/97 08:00:00				

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. H9-9709645-03

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-5

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 07:25:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 93
 4-Bromofluorobenzene 87
 Method 8020A ***
 Analyzed by: VHZ
 Date: 09/18/97

Petroleum Hydrocarbons - Gasoline ND 0.1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 113
 4-Bromofluorobenzene 73
 Modified 8015A - Gasoline***
 Analyzed by: VHZ
 Date: 09/18/97

Total Petroleum Hydrocarbons-Diesel ND 0.1 P mg/L

Surrogate % Recovery
 n-Pentacosane 90
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 09/19/97 02:29:00

ND - Not detected.

(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. H9-9709645-03

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-5

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 07:25:00
 DATE RECEIVED: 09/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00		09/18/97		

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. H9-9709645-04

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-6

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 09/11/97 18:15:00
DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00	09/18/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24
that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-05

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-3

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/11/97 19:30:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	770	10 P	µg/L
TOLUENE	3000	10 P	µg/L
ETHYLBENZENE	1600	10 P	µg/L
TOTAL XYLENE	1900	10 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	7270		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 113
 4-Bromofluorobenzene 113
 Method 8020A ***
 Analyzed by: TB
 Date: 09/21/97

Petroleum Hydrocarbons - Gasoline 16 1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 137
 4-Bromofluorobenzene 120
 Modified 8015A - Gasoline***
 Analyzed by: TB
 Date: 09/21/97

Total Petroleum Hydrocarbons-Diesel 1.6 0.5 P mg/L

Surrogate % Recovery
 n-Pentacosane 70
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 09/19/97 02:46:00

(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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c18 that do not resemble a diesel pattern. (C10-C24) RR

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. H9-9709645-05

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-3

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 09/11/97 19:30:00
DATE RECEIVED: 09/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00		09/18/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c18
that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-06

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-11

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 09:35:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00	09/18/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24
 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-07

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-D

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	87	1.0 P	µg/L
TOLUENE	2.4	1.0 P	µg/L
ETHYLBENZENE	26	1.0 P	µg/L
TOTAL XYLENE	2.8	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	118.2		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 110
 4-Bromofluorobenzene 110
 Method 8020A ***
 Analyzed by: VHZ
 Date: 09/18/97

Petroleum Hydrocarbons - Gasoline 0.33 0.1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 127
 4-Bromofluorobenzene 110
 Modified 8015A - Gasoline***
 Analyzed by: VHZ
 Date: 09/18/97

Total Petroleum Hydrocarbons-Diesel 0.79 0.1 P mg/L

Surrogate % Recovery
 n-Pentacosane 90
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 09/19/97 04:03:00

(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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24 that do not resemble a diesel pattern. (C10-C24) RR
 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. H9-9709645-07

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-D

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00	09/18/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-08

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-10

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 09:35:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	87	1.0 P	µg/L
TOLUENE	2.3	1.0 P	µg/L
ETHYLBENZENE	26	1.0 P	µg/L
TOTAL XYLENE	2.7	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	118.0		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 110
 4-Bromofluorobenzene 110
 Method 8020A ***
 Analyzed by: VHZ
 Date: 09/18/97

Petroleum Hydrocarbons - Gasoline 0.33 0.1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 123
 4-Bromofluorobenzene 113
 Modified 8015A - Gasoline***
 Analyzed by: VHZ
 Date: 09/18/97

Total Petroleum Hydrocarbons-Diesel 0.76 0.1 P mg/L

Surrogate % Recovery
 n-Pentacosane 78
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 09/19/97 04:41:00

(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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24 that do not resemble a diesel pattern. (C10-C24) RR
 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. H9-9709645-08

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-10

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 09:35:00
 DATE RECEIVED: 09/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00		09/18/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24
 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-09

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-9

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 13:00:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	2.1	1.0 P	µg/L
TOLUENE	2.3	1.0 P	µg/L
ETHYLBENZENE	2.1	1.0 P	µg/L
TOTAL XYLENE	120	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	126.5		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 93
 4-Bromofluorobenzene 170MI
 Method 8020A ***
 Analyzed by: MF
 Date: 09/19/97

Petroleum Hydrocarbons - Gasoline 1.9 0.1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 130
 4-Bromofluorobenzene 220MI
 Modified 8015A - Gasoline***
 Analyzed by: TB
 Date: 09/20/97

Total Petroleum Hydrocarbons-Diesel 1.2 0.5 P mg/L

Surrogate % Recovery
 n-Pentacosane 86
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 09/19/97 05:20:00

(P) - Practical Quantitation Limit MI - Matrix interference.

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c17 that do not resemble a diesel pattern.(C10-C24) RR
 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. H9-9709645-09

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-9

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 13:00:00
 DATE RECEIVED: 09/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00		09/18/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c17
 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-10

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-1

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 13:30:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	1800	25 P	µg/L
TOLUENE	4400	25 P	µg/L
ETHYLBENZENE	1000	25 P	µg/L
TOTAL XYLENE	3000	25 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	10200		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 100
 4-Bromofluorobenzene 112

Method 8020A ***
 Analyzed by: TB
 Date: 09/21/97

Petroleum Hydrocarbons - Gasoline 21 2 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 112
 4-Bromofluorobenzene 104

Modified 8015A - Gasoline***
 Analyzed by: TB
 Date: 09/21/97

Total Petroleum Hydrocarbons-Diesel 23 10 P mg/L

Surrogate % Recovery

(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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c17 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-10

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-1

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 13:30:00
 DATE RECEIVED: 09/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
n-Pentacosane Modified 8015A - Diesel *** Analyzed by: RR Date: 09/22/97 03:35:00		D		
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/18/97 08:00:00		09/18/97		

D - Diluted, limits not applicable.

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c17
 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-11

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-4

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 13:15:00
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	92	5.0 P	µg/L
TOLUENE	840	5.0 P	µg/L
ETHYLBENZENE	670	5.0 P	µg/L
TOTAL XYLENE	2100	5.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	3702		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 93
 4-Bromofluorobenzene 140MI
 Method 8020A ***
 Analyzed by: MF
 Date: 09/20/97

Petroleum Hydrocarbons - Gasoline 7.6 0.5 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 107
 4-Bromofluorobenzene 147
 Modified 8015A - Gasoline***
 Analyzed by: fab
 Date: 09/23/97

Total Petroleum Hydrocarbons-Diesel 15 0.5 P mg/L

Surrogate % Recovery
 n-Pentacosane 90
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 09/23/97 01:58:00

(P) - Practical Quantitation Limit MI - Matrix interference.

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24 that do resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-11

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-4

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/12/97 13:15:00
 DATE RECEIVED: 09/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: PC Date: 09/21/97 10:00:00		09/19/97		

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.

COMMENTS: Sample contains petroleum hydrocarbons from c10-c24
 that do resemble a diesel pattern.(C10-C24) RR

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. H9-9709645-12

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 09/26/97

PROJECT: Hobbs-BJ Services
 SITE: Hobbs, NM
 SAMPLED BY: Provided By SPL
 SAMPLE ID: Trip Blank

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 09/11/97
 DATE RECEIVED: 09/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate

% Recovery

1,4-Difluorobenzene

93

4-Bromofluorobenzene

77

Method 8020A ***

Analyzed by: MF

Date: 09/20/97

Petroleum Hydrocarbons - Gasoline

ND

0.1 P

mg/L

Surrogate

% Recovery

1,4-Difluorobenzene

110

4-Bromofluorobenzene

67

Modified 8015A - Gasoline***

Analyzed by: TB

Date: 09/20/97

ND - Not detected.

(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



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_U970918052900

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	50	43	86.0	62 - 121
Toluene	ND	50	45	90.0	66 - 136
EthylBenzene	ND	50	45	90.0	70 - 136
O Xylene	ND	50	45	90.0	74 - 134
M & P Xylene	ND	100	89	89.0	77 - 140

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	87	20	110	NC	110	NC	NC	25	39 - 150
TOLUENE	2.4	20	21	93.0	21	93.0	0	26	56 - 134
ETHYLBENZENE	26	20	46	100	48	110	9.52	38	61 - 128
O XYLENE	ND	20	19	95.0	20	100	5.13	29	40 - 130
M & P XYLENE	2.8	40	40	93.0	41	95.5	2.65	20	43 - 152

Analyst: VHZ

Sequence Date: 09/18/97

SPL ID of sample spiked: 9709645-07A

Sample File ID: U_17525.TX0

Method Blank File ID:

Blank Spike File ID: U_17515.TX0

Matrix Spike File ID: U_17520.TX0

Matrix Spike Duplicate File ID: U_17521.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: SPL-Houston Historical Data (3rd Q '95)

(***) = Source: SPL-Houston Historical Data (4th Q '94)

SAMPLES IN BATCH(SPL ID):

9709604-03A 9709645-01A 9709645-02A 9709645-03A
 9709645-04A 9709645-05A 9709809-01A 9709809-04A
 9709809-06A 9709604-04A 9709809-08A 9709809-10A
 9709809-07A 9709809-09A 9709645-08A 9709604-05A
 9709645-07A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_U970921091200

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	50	50	100	62 - 121
Toluene	ND	50	50	100	66 - 136
EthylBenzene	ND	50	44	88.0	70 - 136
O Xylene	ND	50	41	82.0	74 - 134
M & P Xylene	ND	100	83	83.0	77 - 140

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	11	20	27	80.0	27	80.0	0	25	39 - 150
TOLUENE	ND	20	18	90.0	17	85.0	5.71	26	56 - 134
ETHYLBENZENE	ND	20	18	90.0	15	75.0	18.2	38	61 - 128
O XYLENE	ND	20	17	85.0	15	75.0	12.5	29	40 - 130
M & P XYLENE	ND	40	33	82.5	29	72.5	12.9	20	43 - 152

Analyst: TB
Sequence Date: 09/21/97
SPL ID of sample spiked: 9709643-02A
Sample File ID: U_17645.TX0
Method Blank File ID:
Blank Spike File ID: U_17641.TX0
Matrix Spike File ID: U_I7638.TX0
Matrix Spike Duplicate File ID: U_I7639.TX0

* = Values Outside QC Range. « = Data outside Method Specification Limits.
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: SPL-Houston Historical Data (3rd Q '95)
(***) = Source: SPL-Houston Historical Data (4th Q '94)

SAMPLES IN BATCH(SPL ID): 9709856-08A 9709856-07A 9709643-05A 9709645-05A
9709645-10A 9709643-03A 9709643-02A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_U970919101800

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	50	42	84.0	62 - 121
Toluene	ND	50	45	90.0	66 - 136
EthylBenzene	ND	50	45	90.0	70 - 136
O Xylene	ND	50	45	90.0	74 - 134
M & P Xylene	ND	100	91	91.0	77 - 140

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	ND	20.0	18	90.0	18	90.0	0	25	39 - 150
TOLUENE	ND	20.0	18	90.0	19	95.0	5.41	26	56 - 134
ETHYLBENZENE	ND	20.0	18	90.0	18	90.0	0	38	61 - 128
O XYLENE	ND	20.0	17	85.0	19	95.0	11.1	29	40 - 130
M & P XYLENE	ND	40.0	35	87.5	37	92.5	5.56	20	43 - 152

Analyst: MF

Sequence Date: 09/19/97

SPL ID of sample spiked: 9709809-11A

Sample File ID: U_17561.TX0

Method Blank File ID:

Blank Spike File ID: U_17559.TX0

Matrix Spike File ID: U_17567.TX0

Matrix Spike Duplicate File ID: U_17568.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: SPL-Houston Historical Data (3rd Q '95)

(***) = Source: SPL-Houston Historical Data (4th Q '94)

SAMPLES IN BATCH(SPL ID):

9709928-01A 9709929-01A 9709930-01A 9709862-01B
 9709862-03B 9709862-04B 9709862-05B 9709645-09A
 9709645-11A 9709645-10A 9709856-01A 9709856-02A
 9709856-03A 9709856-04A 9709862-02B 9709809-03A
 9709809-11A 9709809-07A 9709809-02A 9709645-06A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_U970920030200

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	50	38	76.0	62 - 121
Toluene	ND	50	41	82.0	66 - 136
EthylBenzene	ND	50	40	80.0	70 - 136
O Xylene	ND	50	40	80.0	74 - 134
M & P Xylene	ND	100	80	80.0	77 - 140

M A T R I X 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		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	4.7	20	20	76.5	22	86.5	12.3	25	39 - 150
TOLUENE	1.4	20	18	83.0	19	88.0	5.85	26	56 - 134
ETHYLBENZENE	ND	20	16	80.0	17	85.0	6.06	38	61 - 128
O XYLENE	ND	20	17	85.0	19	95.0	11.1	29	40 - 130
M & P XYLENE	ND	40	33	82.5	36	90.0	8.70	20	43 - 152

Analyst: TB
Sequence Date: 09/20/97
SPL ID of sample spiked: 9709856-06A
Sample File ID: U_17609.TX0
Method Blank File ID:
Blank Spike File ID: U_17599.TX0
Matrix Spike File ID: U_17603.TX0
Matrix Spike Duplicate File ID: U_17604.TX0

* = Values Outside QC Range. « = Data outside Method Specification Limits.
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: SPL-Houston Historical Data (3rd Q '95)
(***) = Source: SPL-Houston Historical Data (4th Q '94)

SAMPLES IN BATCH(SPL ID): 9709645-12A 9709856-05A 9709643-04A 9709856-06A



** SPL BATCH QUALITY CONTROL REPORT **
Modified 8015 - Gasoline

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

Matrix: Aqueous
Units: mg/L

Batch Id: HP_U970921093500

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Gasoline Petr. Hydrocarbon	ND	1.0	0.68	68.0	56 - 130

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
GASOLINE PETR. HYDROCARBON	ND	0.9	0.92	102	0.94	104	1.94	22	37 - 169

Analyst: TB
Sequence Date: 09/21/97
SPL ID of sample spiked: 9709643-03A
Sample File ID: UUI7644.TX0
Method Blank File ID:
Blank Spike File ID: UUI7640.TX0
Matrix Spike File ID: UUI7636.TX0
Matrix Spike Duplicate File ID: UUI7637.TX0

* = Values Outside QC Range. « = Data outside Method Specification Limits.
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = $[(<1> - <2>) / <3>] \times 100$
LCS % Recovery = $(<1> / <3>) \times 100$
Relative Percent Difference = $| (<4> - <5>) | / [(<4> + <5>) \times 0.5] \times 100$
(**) = Source: SPL-Houston Historical data (3rd Q '95)
(***) = Source: SPL-Houston Historical Data (3rd Q '95)

SAMPLES IN BATCH(SPL ID):

9709862-01B 9709643-05A 9709645-05A 9709645-10A
9709818-01A 9709820-04A 9709818-04A 9709818-05A
9709820-03A 9709818-06A 9709820-02A 9709818-07A
9709643-03A 9709643-02A 9709862-02B 9709862-03B



** SPL BATCH QUALITY CONTROL REPORT **
Modified 8015 - Gasoline

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

Matrix: Aqueous
Units: mg/L

Batch Id: HP_U970923110800

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Gasoline Petr. Hydrocarbon	ND	1.0	0.73	73.0	56 - 130

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
GASOLINE PETR. HYDROCARBON	ND	0.9	0.78	86.7	0.83	92.2	6.15	22	37 - 169

Analyst: fab
Sequence Date: 09/23/97
SPL ID of sample spiked: 9709643-01A
Sample File ID: UUI7709.TX0
Method Blank File ID:
Blank Spike File ID: UUI7703.TX0
Matrix Spike File ID: UUI7706.TX0
Matrix Spike Duplicate File ID: UUI7707.TX0

* = Values Outside QC Range. « = Data outside Method Specification Limits.
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = $[(<1> - <2>) / <3>] \times 100$
LCS % Recovery = $(<1> / <3>) \times 100$
Relative Percent Difference = $| (<4> - <5>) / [(<4> + <5>) \times 0.5] \times 100$
(**) = Source: SPL-Houston Historical data (3rd Q '95)
(***) = Source: SPL-Houston Historical Data (3rd Q '95)

SAMPLES IN BATCH(SPL ID):
9709916-02A 9709916-03A 9709645-11A 9709643-01A
9709645-06A 9709914-01A



** SPL BATCH QUALITY CONTROL REPORT **
Modified 8015 - Gasoline

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

Matrix: Aqueous
Units: mg/L

Batch Id: HP_U970920130800

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Gasoline Petr. Hydrocarbon	ND	1.0	0.77	77.0	56 - 130

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
GASOLINE PETR. HYDROCARBON	ND	0.9	0.67	74.4	0.61	67.8	9.28	22	37 - 169

Analyst: TB

Sequence Date: 09/20/97

SPL ID of sample spiked: 9709643-04A

Sample File ID: UUI7608.TX0

Method Blank File ID:

Blank Spike File ID: UUI7593.TX0

Matrix Spike File ID: UUI7605.TX0

Matrix Spike Duplicate File ID: UUI7606.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: SPL-Houston Historical data (3rd Q '95)

(***) = Source: SPL-Houston Historical Data (3rd Q '95)

SAMPLES IN BATCH(SPL ID):

9709645-12A 9709643-04A 9709862-05B 9709645-09A
9709862-04B



** SPL BATCH QUALITY CONTROL REPORT **
Modified 8015A - Diesel ***

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

Matrix: Aqueous
Units: mg/L

Batch Id: HP_T970918045900

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Diesel	ND	5.0	4.76	95.2	60 - 139

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
DIESEL	0.25	5.0	5.4	103	5.1	97.0	6.00	43	20 - 177

Analyst: RR
Sequence Date: 09/18/97
SPL ID of sample spiked: 9709582-02B
Sample File ID: T_I7168.TX0
Method Blank File ID:
Blank Spike File ID: T_I7165.TX0
Matrix Spike File ID: T_I7185.TX0
Matrix Spike Duplicate File ID: T_I7186.TX0

* = Values Outside QC Range. « = Data outside Method Specification Limits.
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: SPL-Houston Historical Data (1st Q '96)
(***) = Source: SPL-Houston Historical Data (2nd Q '94)

SAMPLES IN BATCH(SPL ID):

9709582-01B	9709624-01B	9709624-02B	9709624-03B
9709624-04B	9709624-05B	9709624-06B	9709624-08B
9709645-05B	9709645-06B	9709645-07B	9709645-08B
9709645-09B	9709645-10B	9709582-02B	9709624-07B
9709645-01B	9709645-02B	9709645-03B	9709645-04B

CHAIN OF CUSTODY
AND
SAMPLE RECEIPT CHECKLIST

SPL Houston Environmental Laboratory

Sample Login Checklist

Date: 9/13/97	Time: 1515
---------------	------------

SPL Sample ID: 9709645

		<u>Yes</u>	<u>No</u>
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:		4 C
10	Method of sample delivery to SPL:	SPL Delivery	
		Client Delivery	
		FedEx Delivery (airbill #)	969 8098 864
		Other:	
11	Method of sample disposal:	SPL Disposal	✓
		HOLD	
		Return to Client	

Name: <i>Arden Esteb</i>	Date: 9/13/97
--------------------------	---------------



SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No:

9709645

15440

page of

Client Name: *Brown and Caldwell*
 Address/Phone: *1915 Louisiana St #2500 357-0881*
 Client Contact: *Rick Rexroad*
 Project Name: *Hobbs - BJ Services*
 Project Number: *28.32.12*
 Project Location: *Hobbs, NM*
 Invoice To:

Requested Analysis

SAMPLE ID	DATE	TIME	comp	grab	matrix	bottle	size	pres.	Number of Containers
MW-D	9/12/97			X	W	G	1 = 1 liter 4 = 4oz 40 = vial 8 = 8oz 16 = 16oz	1 = HCl 2 = HNO3 3 = H2SO4 0 = other:	4
MW-10*	9/12/97	0935		X	W	G			3
MW-9	9/12/97	1300		X	W	G			3
MW-1	9/12/97	1330		X	W	G			3
MW-4	9/12/97	1315		X	W	G			3

BETX 8020
 TPH GRO 8015
 TPH DRO 8015

Client/Consultant Remarks: *Extra Volume for QA/QC*

Requested TAT

- 24hr
- 72hr
- Standard
- Other

Special Reporting Requirements

Standard QC

Raw Data

Special Detection Limits (specify):

1. Relinquished by Sampler: *Thomas A. Weber*
 3. Relinquished by: *Thomas A. Weber*
 5. Relinquished by:

date *9/12/97*
 date
 date

Level 3 QC
 Level 4 QC

2. Received by: *Federal Express*
 4. Received by: *Mullen*
 6. Received by Laboratory:

time *1700*
 time
 time

9995763975
 9/13/97

Laboratory remarks:

Ice Chest 1 of 2

Intact? Y N

Temp: *4C*

PM review (initial):

- 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901
- 459 Hughes Drive, Traverse City, MI 49684 (616) 947-5777

- 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775
- 1511 E. Orangethorpe Avenue, Fullerton, CA 92631 (714) 447-6868



SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 0709645 page 15439 of

Client Name: *Brown and Caldwell*
 Address/Phone: *1415 Louisiana Str. # 2500*
 Client Contact: *Rick Rexroad*
 Project Name: *Hobbs - 65 Services*
 Project Number: *2832.12*
 Project Location: *Hobbs, NM*

SAMPLE ID	DATE	TIME	comp	grab	matrix	bottle	size	pres.	Number of Containers	Requested Analysis
MW-8	9/11/97	1542		X	W	G	8oz	1	4	TPH DRO 8015
MW-7	9/11/97	1630		X	W	G	8oz	1	4	TPH DRO 8015
MW-5	9/12/97	0725		X	W	G	8oz	1	4	BETX 8020
MW-6	9/11/97	1815		X	W	G	8oz	1	4	TPH DRO 8015
MW-3	9/11/97	1930		X	W	G	8oz	1	4	TPH DRO 8015
MW-11	9/12/97	0935		X	W	G	8oz	1	4	TPH DRO 8015
AWW - TAW Trip Bank				X	W	G	Vial		2	

1 = 1 liter 4 = 4oz 40 = vial
 8 = 8oz 16 = 16oz
 W = water S = soil
 SL = sludge O = other
 P = plastic A = amber glass
 G = glass V = vial

1 = HCl 2 = HNO3
 3 = H2SO4 O = other

Client/Consultant Remarks: *Free chest 2 of 2*

Requested TAT: 24hr 72hr Standard Other

Special Reporting Requirements: Standard QC Level 3 QC Level 4 QC Raw Data

1. Relinquished by Sampler: *Thomas A. C. C. C. C.*

3. Relinquished by: _____

5. Relinquished by: _____

Laboratory remarks: *FedEx 969 8098 864*

Intact? Y N
 Temp: *4C*

2. Received by: *Federal Express 4995 76 3975*
 time: *1700*

4. Received by: *WLM Esth*
 time: _____

6. Received by Laboratory: _____
 time: _____

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SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No:

9709645

15440

page of

Client Name: Brown and Caldwell
 Address/Phone: 1415 Louisiana St #2500 337-2277
 Client Contact: Rick Rexroad
 Project Name: Hobbs - BJ Services
 Project Number: 2832.12
 Project Location: Hobbs, NM

Requested Analysis

SAMPLE ID	DATE	TIME	comp	grab	matrix		bottle	size	pres.	Number of Containers	Requested Analysis
					W=water S=soil SL=sludge O=other:	P=plastic A=amber glass G=glass V=vial					
MW-D	9/12/97				X	W	G	1 = 1 liter 4=4oz 40=vial 8=8oz 16=16oz	1=HCl 2=HNO3 3=H2SO4 O=other:	4	BETA 8020 TPH GRO 8015 TPH DRO 8015
MW-10*	9/12/97	0935			X	W	G		1	6	
MW-9	9/12/97	1300			X	W	G		1	3	
MW-1	9/12/97	1330			X	W	G		1	4	
MW-4	9/12/97	1315			X	W	G		1	4	

Laboratory remarks:

Client/Consultant Remarks: Extra Volume for PAC
Ice Chest 1 of 2

Intact? Y N

Temp: 4c

Requested TAT

24hr

48hr

Other

Standard QC

Level 3 QC

Raw Data

Level 4 QC

Special Detection Limits (specify):

1. Relinquished by Sampler: Thomas A. Wagon

3. Relinquished by:

5. Relinquished by:

time

time

time

2. Received by: Federal Express

4. Received by: William Stuk

6. Received by Laboratory:

4995763975

9/18/97

9/18/97

8880 Interchange Drive, Houston, TX 77054 (713) 660-0901

459 Hughes Drive, Traverse City, MI 49684 (616) 947-5777

500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

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SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No:

9709645

15439

page of

Client Name: Brown and Caldwell
 Address/Phone: 1415 Louisiana St. #2500
 Client Contact: Rick Rexford
 Project Name: Hobbs - BS Services
 Project Number: 2832.12
 Project Location: Hobbs, NM
 Invoice To:

Requested Analysis

BETA 8020
TPH GRO 8015
TPH DRO 8015

matrix bottle size pres.

W = water S = soil SL = sludge O = other
 P = plastic A = amber glass G = glass V = vial
 1 = 1 liter 4 = 4oz 40 = vial 8 = 8oz 16 = 16oz
 1 = HCl 2 = HNO3 3 = H2SO4 O = other

Number of Containers

SAMPLE ID DATE TIME comp grab

SAMPLE ID	DATE	TIME	comp	grab
MW-8	9/11/97	1542		X
MW-7	9/11/97	1630		X
MW-5	9/12/97	0725		X
MW-6	9/11/97	1815		X
MW-3	9/11/97	1930		X
MW-11	9/12/97	0935		X
AAH-TAN Trip Bank				X

1 = 1 liter 4 = 4oz 40 = vial 8 = 8oz 16 = 16oz

1 = HCl 2 = HNO3 3 = H2SO4 O = other

Number of Containers

BETA 8020
TPH GRO 8015
TPH DRO 8015

Requested Analysis

Client/Consultant Remarks:

Ice chest 2052

Laboratory remarks:

FedEx 969 8098 864

Intact? Y N

Temp: 4C

PM review (initial):

CUSTOMER PACKAGE TRACKING NUMBER - PULL UP PURPLE TAG
Special Detection Limits (specify):

Special Reporting Requirements Fax Results Raw Data
 Standard QC Level 3 QC Level 4 QC

Requested TAT

24hr 72hr
 48hr Standard
 Other

1. Relinquished by Sampler:

Thana AlCulaf

3. Relinquished by:

5. Relinquished by:

time

1700

time

time

2. Received by:

Federal Express

4995 76 3975

3. Received by:

Wen Esteban

9/13/97 1000

6. Received by Laboratory:

8880 Interchange Drive, Houston, TX 77054 (713) 660-0901

459 Hughes Drive, Traverse City, MI 49684 (616) 947-5777

500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

1511 E. Orangethorpe Avenue, Fullerton, CA 92631 (714) 447-6868

SPL Houston Environmental Laboratory

Sample Login Checklist

Date: 9/13/97	Time: 1515
---------------	------------

SPL Sample ID: 9709645

		<u>Yes</u>	<u>No</u>
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:		4 C
10	Method of sample delivery to SPL:	SPL Delivery	
		Client Delivery	
		FedEx Delivery (airbill #)	969 8098 864
		Other:	
11	Method of sample disposal:	SPL Disposal	✓
		HOLD	
		Return to Client	

Name: <i>Arden Esteb</i>	Date: 9/13/97
--------------------------	---------------



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MAR 27 1998

Environmental
Conservation Division

B R O W N A N D C A L D W E L L

FINAL

**DECEMBER 1997 GROUNDWATER
SAMPLING REPORT
HOBBS, NEW MEXICO FACILITY**

BJ SERVICES COMPANY, U.S.A.

MARCH 23, 1998

**FINAL
DECEMBER 1997 GROUNDWATER SAMPLING REPORT
HOBBS, NEW MEXICO FACILITY
BJ SERVICES COMPANY, U.S.A.**

Prepared for

BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas

BC Project Number: 2832.13



Richard L. Rexroad
Senior Geologist

March 23, 1998

Brown and Caldwell
1415 Louisiana, Suite 2500
Houston, Texas 77002 - (713) 759-0999

"This is a draft report and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report."

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DISTRIBUTION AND QA/QC REVIEWER'S SIGNATURE

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3	Benzene Isoconcentration and Total BTEX Distribution Map for December 10, 1997
4	Total Petroleum Hydrocarbons Distribution Map for December 10, 1997

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2	Cumulative Groundwater Elevation Data
3	Field Screening Results for Groundwater Samples
4	Cumulative Analytical Results for Groundwater Samples
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B	Laboratory Analytical Report for Groundwater Samples



1.0 INTRODUCTION

Brown and Caldwell conducted field activities associated with the December 1997 quarterly groundwater sampling event at BJ Services Company, U.S.A. (BJ Services) facility located at 2708 West County Road, in Hobbs, New Mexico. The facility layout is shown in Figure 1.

The facility formerly operated an above-grade on-site fueling system. Subsurface impact near the fueling system from a diesel fuel release was first detected by the New Mexico Oil Conservation Division (OCD) during an on-site inspection on February 7, 1991. The fueling system was taken out of operation in July 1995. As the result of the diesel fuel release, the New Mexico OCD has required a quarterly groundwater monitoring program to assess the hydrocarbon constituents in the groundwater. A biosparging system was fully activated in November 1995 to remediate soil and groundwater at the facility. A site chronology detailing the history of the fueling system, the groundwater recovery system, and the previous sampling events is presented on Table 1.

During the December 1997 sampling event, groundwater samples were collected and analyzed for gasoline and diesel range total petroleum hydrocarbons (TPH), and for benzene, toluene, ethylbenzene, and total xylenes (BTEX). This report presents the results of the groundwater sampling event, a description of the field activities, and a summary of the analytical results. Also included is a groundwater potentiometric surface map, a benzene concentration map, and a hydrocarbon distribution map.



2.0 GROUNDWATER SAMPLING AND ANALYSES

Brown and Caldwell purged and sampled the groundwater monitoring wells at the facility on December 10, 1997 to determine concentrations of dissolved-phase hydrocarbons in groundwater. The following subsections describe the activities conducted during this sampling event and present the results of the groundwater analyses.

2.1 Groundwater Measurements and Sampling

Nine monitoring wells were sampled during the December 1997 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. Monitoring well MW-11 could not be located during the December 1997 sampling event and is believed to have been destroyed during the course of construction activities at the site between September 12, 1997 and December 10, 1997.

Groundwater level measurements were obtained from the 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 2. The groundwater elevation data indicates that the general groundwater flow direction is toward the east northeast at a typical hydraulic gradient of 0.005 ft/ft. A potentiometric surface map is presented in Figure 2. No measurable thicknesses of phase-separated hydrocarbons were detected in any monitoring wells at the site during this sampling event; hydrocarbon sheens were observed in MW-1, MW-4, and MW-9, however.

Groundwater samples were collected after purging the wells with a submersible pump to remove at least three well volumes of groundwater. 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 during the purging and sampling activities to assess the potential for natural attenuation. These parameters were dissolved oxygen, dissolved ferrous iron, and reduction-oxidation potential (redox). The field parameter readings were recorded in the field log book and are listed on the groundwater sampling forms included in Appendix A. The field screening results for groundwater samples are presented on Table 3. To further assess the potential for natural attenuation at the site, the concentrations of nitrate and sulfate in monitoring well MW-10, which is located downgradient of the biosparging system, were determined at the analytical laboratory.

Following recovery, 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 or plastic containers sealed with Teflon[®]-lined lids, labeled, and placed on ice in an insulated cooler for shipment via overnight courier to the analytical laboratory. Each cooler was accompanied by completed chain-of-custody documentation.

The field measurement equipment was decontaminated prior to and after each use. Decontamination procedures consisted of washing with fresh water and a non-phosphate detergent and rinsing with deionized (DI) water. Purged water and excess water generated by equipment cleaning operations were 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 BTEX by EPA Method 5030/8020 and for TPH by EPA Method 8015 Modified for gasoline and diesel. The sample from monitoring well MW-10 was also analyzed for nitrate by EPA Method 353.3 and for

sulfate by Method 375.4. Current and cumulative analytical results for BTEX and TPH gasoline and diesel are presented in Table 4.

BTEX constituent concentrations in excess of applicable laboratory detection limits were reported in six of the nine groundwater samples obtained during this sampling event. Benzene concentrations were below the New Mexico Water Quality Control Commission Standard of 0.01 milligrams per liter (mg/L) in monitor wells MW-5, MW-6, MW-7, MW-8, and MW-9. Figure 3 presents a benzene isoconcentration and total BTEX distribution map for the December 1997 sampling event. A total petroleum hydrocarbons distribution map for the December 1997 sampling event is presented in Figure 4. The laboratory analytical report and chain of custody record for the groundwater samples are included in Appendix B.

It appears that natural attenuation of dissolved phase BTEX is occurring in the vicinity of monitor well MW-10. The primary evidence of natural attenuation is plume behavior; concentrations of dissolved phase BTEX have stabilized subsequent to removal of a field waste tank (see Figure 1) in March 1997. Furthermore, the following lines of geochemical evidence suggest that intrinsic bioremediation, an important natural attenuation mechanism, is occurring:

1. The DO concentration measured in monitor well MW-10 is depressed relative to background. The DO concentration of 0.33 mg/L measured in monitor well MW-10 is less than the measured DO concentrations of 4.73 mg/L, 2.89 mg/L, and 2.33 mg/L in monitor wells MW-5, MW-7, and MW-8, respectively, which are upgradient or cross-gradient wells believed to exhibit background conditions.
2. Ferrous iron was detected at a concentration of 9.4 mg/L in monitor well MW-10. Ferrous iron was not detected in any of the other monitor wells. When DO becomes depleted, anaerobic microbes which utilize other electron acceptors become active. Ferrous iron is the reduction product of ferric iron, a common electron acceptor.
3. An oxidation-reduction potential (E_h) measurement of -115.2 millivolts (mV) was observed in monitor well MW-10. This value is slightly below the theoretical E_h of -50 mV for ferric iron reduction, which indicates that iron reduction is occurring.

It is recommended that monitoring continue in this area, and that other geochemical analyses be performed in subsequent sampling events. Specifically, nitrate, sulfate, dissolved methane, and alkalinity should be measured, in addition to the current suite of geochemical parameters, for wells in the vicinity of monitoring well MW-10.

—



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 of 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 adsorbed directly to the soil (i.e., residual) as well as contaminants present in soil moisture (i.e., dissolved phase) within the capillary fringe and vadose zone. Additionally, the biosparging system removes volatile contaminants from the saturated zone. 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 in soil moisture present in the capillary fringe and vadose zone. The elevated dissolved oxygen content facilitates the activities of indigenous microorganisms to accelerate biodegradation of the contaminants. The flushing of the air also strips the volatile and semivolatile contaminants.

The New Mexico OCD approved the RAP on August 11, 1994. The installation of the biosparging system was conducted between August 2 through 24, 1995. Nineteen combined injection/extraction wells, three vacuum extraction wells, associated piping, and one extraction blower and one injection blower were installed. An additional vapor extraction well, VE-4, was installed and connected to the vapor extraction system in April 1997. The vapors recovered during the extraction process are discharged to the atmosphere in accordance with the State of New Mexico Air Quality Regulations.

During the system startup operations, effluent air samples were collected on a monthly basis from the recovered vapors to monitor the bioremediation process and emission rate. Upon receiving a determination from the State of New Mexico that an air permit is not required, effluent air samples have been collected voluntarily on a quarterly basis. The air samples were analyzed for TPH using EPA Method Modified 8015A (Air) and for total volatile aromatic hydrocarbons (BTEX) using EPA Method 5030/8020 (modified).

The analytical results demonstrate a significant reduction in hydrocarbon vapor concentrations and emissions rates since November 1995. Total BTEX concentrations have decreased from 391 parts per million by volume (ppmv) in November 1995 to 17.3 ppmv in July 1997. The corresponding BTEX emissions have decreased from 0.77 lb/hour to 0.03 lb/hour. TPH concentrations have decreased from 1,870 ppmv in November 1995 to 65 ppmv in July 1997. The corresponding TPH - Volatile Organic Compound (VOC) emissions rates have decreased from 3.21 lb/hour to 0.08 lb/hour. These emission rates were well below the regulatory limit of 10 lb/hour for VOCs. Therefore, a field monitoring instrument utilizing a flame ionization detector (FID) was used during the September 1997 monitoring event to measure the VOC concentration in the vapors. The VOC measurements collected during the September 1997 sampling event correspond to TPH concentrations previously determined in the analytical laboratory. The VOC concentration measured using the FID during the September 1997 sampling event was 340 ppmv.

An effluent air sample was collected during the December 1997 sampling event because the FID used during the sampling event could not be properly calibrated within the range of the effluent air to be sampled. The air sample collected during the November 1997 sampling event was analyzed for TPH using EPA Method Modified 8015A (Air) and for total volatile aromatic hydrocarbons (BTEX) using EPA Method 5030/8020 (modified). The total BTEX concentration decreased to 0.503 parts per million by volume (ppmv) in the December 1997 sampling event. The corresponding BTEX emissions rate was less than 0.01 lb/hour. The TPH concentration of 210 ppmv measured during the December 1997 sampling event is comparable to TPH concentrations measured during the time period from August 1996 through September 1997. The TPH - Volatile Organic Compound (VOC) emissions rate calculated for the December 1997 sampling event was 0.28 lb/hour. These emission rates were well below the regulatory limit of 10 lb/hour for VOCs. A cumulative summary of analytical results for air emissions monitoring is included in Table 5. These results are based on both laboratory and field analyses.

Adjustments were made in air injection and extraction rates within the biosparging system following the March 1997 groundwater sampling event in order to direct air flow into recalcitrant areas of the subsurface. Specifically, vapor extraction well VE-4 was added, and flow rates were increased in the upgradient and central portions of the plume, in the area of monitor wells MW-4, MW-1, and MW-3. During the December 1997 sampling event, the biosparging system was temporarily shut down in order to effect repair of a cracked fitting. The system was brought back on-line after the repairs were completed. The system was gauged after it was adjusted to optimal flow rates and stabilization occurred. The vapor extraction system was operating at 32 inches H₂O vacuum with an average flow of 140 cubic feet per minute (cfm) at 85°F during the December 1997 sampling event. The air injection system was operating at an average flow of 40 cfm at 10 pounds per square inch (psi) at 145°F during the December 1997 sampling event. Total VOC emissions of 0.28 lb/hr were calculated for the December 1997 monitoring event.

Review of data presented in Table 4 indicates that concentrations of benzene and total BTEX have decreased in monitor wells MW-7, MW-8 and MW-10, located in the downgradient portion of the plume, during the time period from the start-up of the biosparging system in November 1995 to the present. Reduction in benzene and total BTEX concentrations in monitor well MW-4, which is located in the upgradient portion of the plume, has occurred during the period in which the biosparging system has been operational. The recent increase in hydrocarbon concentrations observed in monitor well MW-4 during the period from June 1997 to December 1997 may be attributed to modifications to air injection and extraction rates made in March 1997 and to the addition of vapor extraction well VE-4, which was installed in April 1997. Such increases may occur during operation of the biosparging system, as air flow is redirected into areas of the subsurface that were less directly affected during previous operation of the remedial system. Benzene and total BTEX concentrations in samples collected from monitor wells MW-1 and MW-3 have not decreased since startup of the biosparging system, however. A modification to the biosparging system that would result in increased air flow to this portion of the plume is recommended.



4.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on information obtained during the December 1997 quarterly groundwater sampling event.

4.1 Conclusions

- Groundwater flow was to the east northeast at an average hydraulic gradient of 0.005 ft/ft.
- Dissolved benzene concentrations have not decreased in monitor wells MW-1 and MW-3, which are located in the central portion of the plume, since activation of the biosparging system in September 1995.
- Dissolved benzene concentrations have generally decreased in the remaining monitor wells during operation of the biosparging system.
- Benzene concentrations in monitor wells MW-5, MW-6, MW-7, MW-8, and MW-9 are below the New Mexico Water Quality Control Commission standard of 0.01 mg/L.
- Hydrocarbon air emissions have decreased substantially during the period from November 1995 to December 1997. The current emissions rate is 0.28 lb/hr TPH.
- No measurable thickness of phase separated hydrocarbons was observed in any of the monitor wells at the site during the December 1997 sampling event.

4.2 Recommendations

- Perform modifications to the biosparging system to increase air flow in the central portion of the plume.
- Replace monitor well MW-11, which was destroyed between September 1997 and December 1997, with a monitor well located approximately 100 to 150 feet downgradient of the former field waste tank.
- Continue the quarterly groundwater sampling program and the operation and maintenance of the biosparging system.
- Continue monitoring hydrocarbon emissions on a quarterly basis using a calibrated field FID and discontinue analysis of air emissions samples in an analytical laboratory.
- Continue free product recovery, if needed, in monitor wells MW-1 and MW-4.

DISTRIBUTION

Final December 1997 Groundwater Sampling Report
BJ Services Company, U.S.A.
Hobbs, New Mexico

March 23, 1998

1 copy to: State of New Mexico
Energy, Minerals, and Natural Resources Dept.
Oil Conservation Division
2040 South Pacheco Street, State Land Office Building
Santa Fe, New Mexico 87505

Attention: Mr. Mark Ashley

1 copy to: State of New Mexico
Oil Conservation Division, Hobbs District Office
Post Office Box 1980
Hobbs, New Mexico 88240

Attention: Mr. Wayne Price

1 copy to: BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas 77381

Attention: Ms. Jo Ann Cobb

1 copy to: BJ Services Company, U.S.A.
2708 West County Road
Hobbs, New Mexico 88240

Attention: Mr. Clint Chamberlain

1 copy to: Brown and Caldwell, Project File

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Robert N. Jennings, P.E.
Vice President

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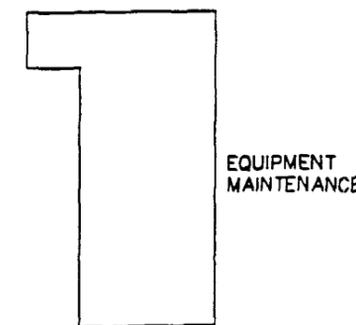
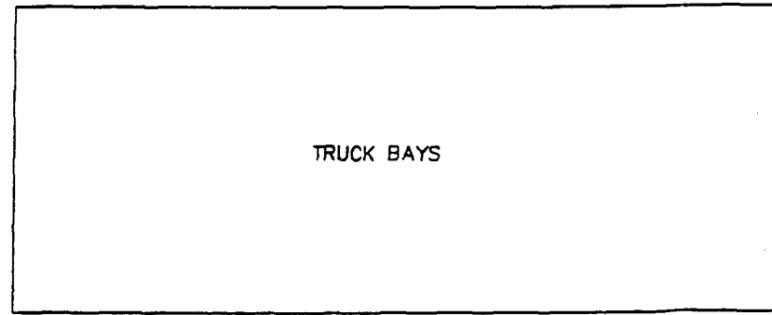
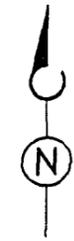
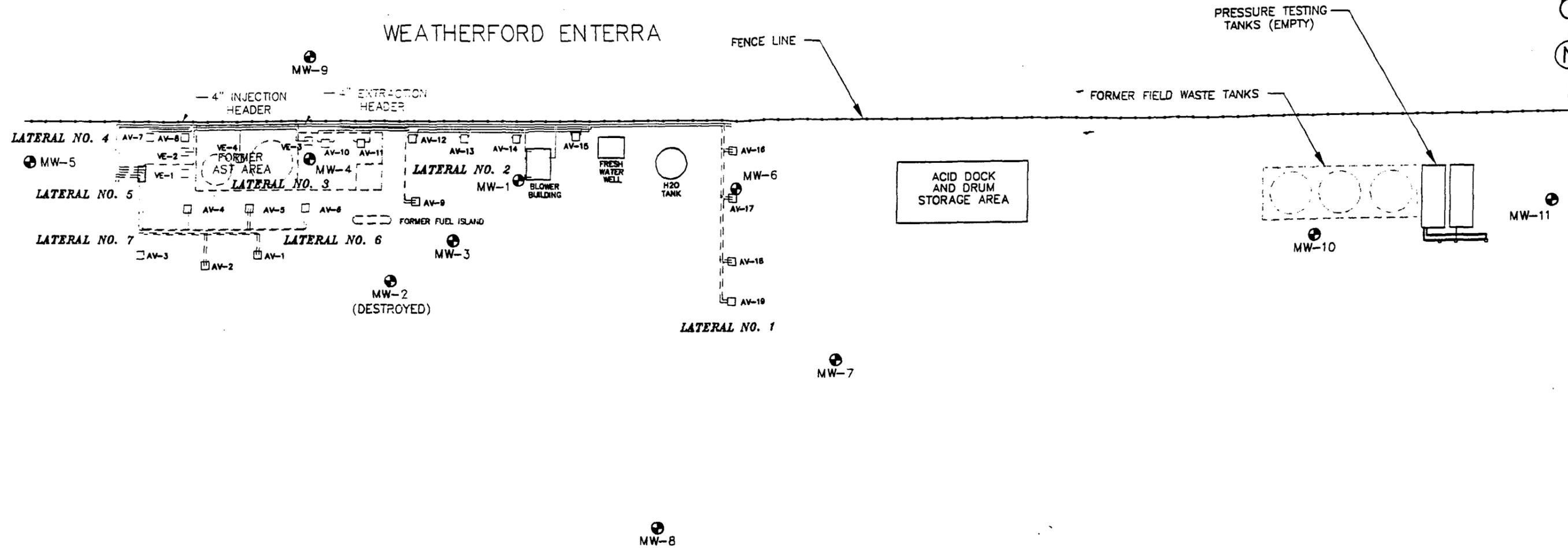
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"Use or disclosure of data contained on this sheet is subject to the restriction specified at the beginning of this document."

Figures

FIGURES

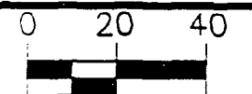
WEATHERFORD ENTERRA



T:\2832\NEWSURVY (1-30) 05-07-97 JEB

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL

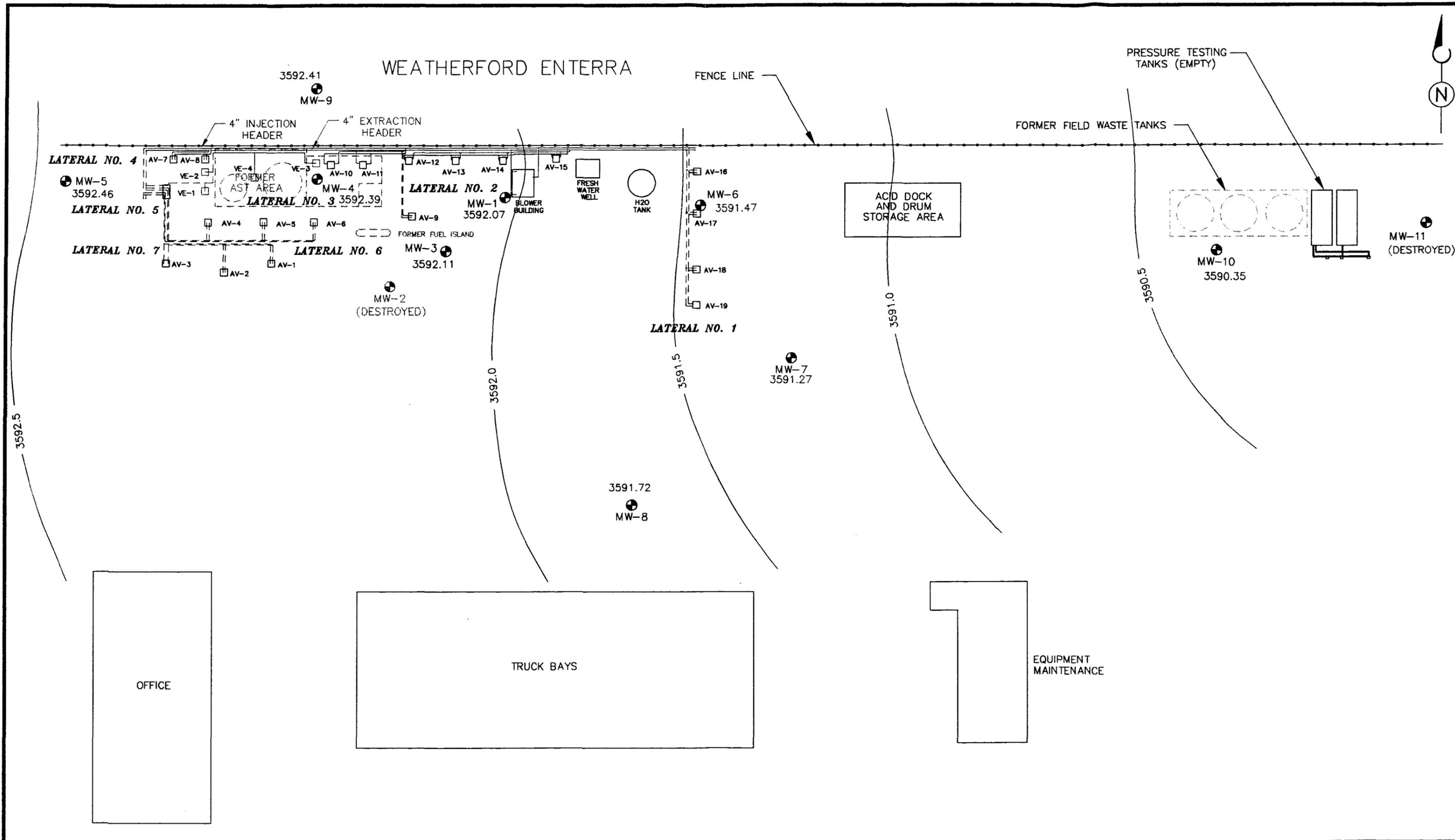


SCALE: 1" = 40'
DRAWN BY: JEB DATE: 5/97
CHK'D BY: _____ DATE: _____
APPROVED: _____ DATE: _____

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	SITE MAP	DATE	05/07/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-12
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	1



T:\2832\PO\TNI297 (1-30) 01-05-98 JR

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 20 40

SCALE: 1" = 40'

DRAWN BY: JR DATE 1/98

CHK'D BY: _____ DATE _____

APPROVED: _____ DATE _____

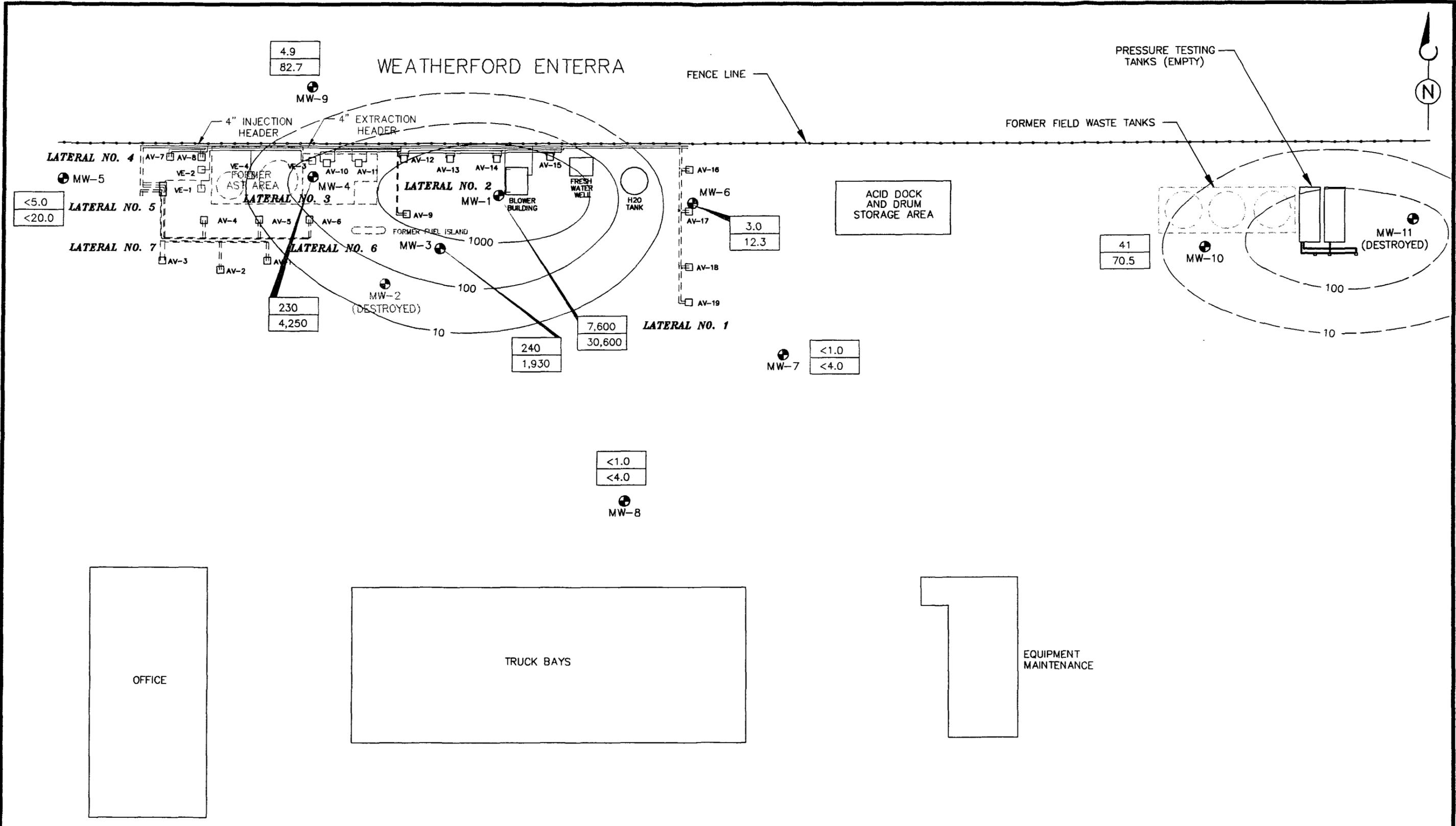
3592.11
MW-8

LEGEND

MONITORING WELL LOCATION AND IDENTIFICATION

3592 POTENTIOMETRIC CONTOUR

TITLE	POTENTIOMETRIC SURFACE CONTOUR MAP FOR DECEMBER 10, 1997	DATE	01/05/98
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-13
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	2



T:\2832\BENZ1297 (1=30) 12-30-97 JR

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 20 40

SCALE: 1" = 40'

DRAWN BY: JR DATE 12/97

CHK'D BY: _____ DATE _____

APPROVED: _____ DATE _____

LEGEND

MW-8 MONITORING WELL LOCATION AND IDENTIFICATION

<1.0 - BENZENE CONCENTRATION (ug/L)

<4.0 - TOTAL BTEX CONCENTRATION (ug/L)

10 - BENZENE ISOCONCENTRATION CONTOUR (ug/L)

CONTOUR INTERVAL = LOGARITHMIC

TITLE	BENZENE ISOCONCENTRATION AND TOTAL BTEX MAP FOR DECEMBER 10, 1997	DATE	12/30/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-13
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	3

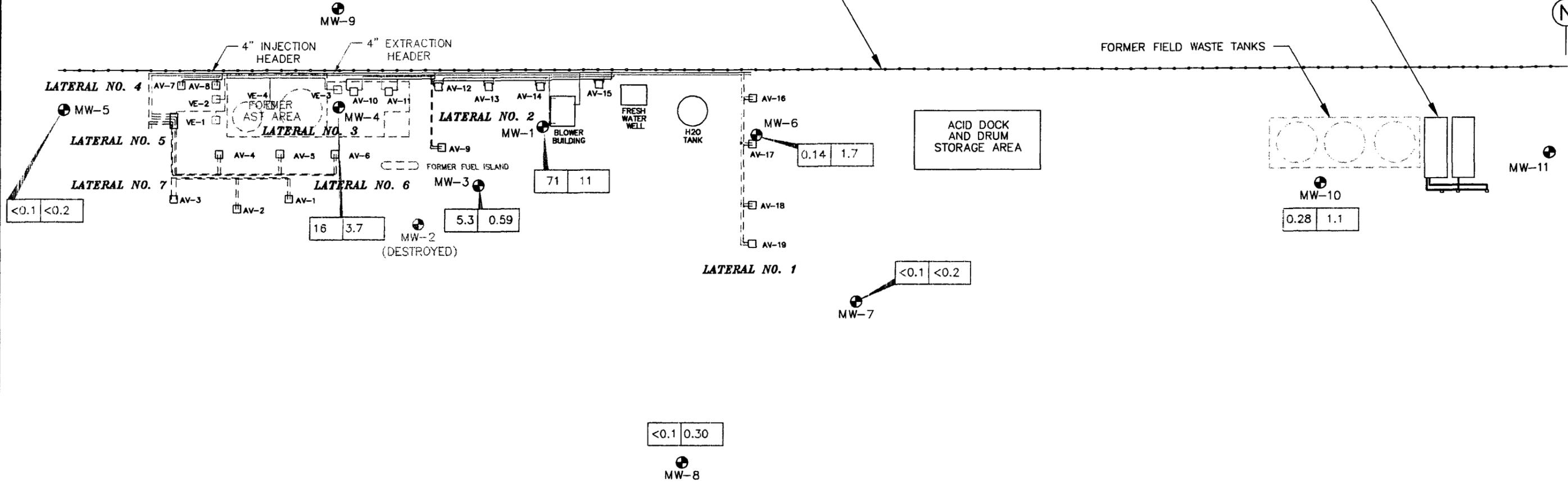
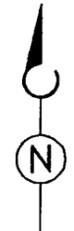
0.92 0.86

WEATHERFORD ENTERRA

FENCE LINE

PRESSURE TESTING TANKS (EMPTY)

FORMER FIELD WASTE TANKS



OFFICE

TRUCK BAYS

EQUIPMENT MAINTENANCE

T:\2832\HYDR1297 (1-30) 01-05-98 JR

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 20 40
SCALE: 1" = 40'
DRAWN BY: JR DATE 1/98
CHK'D BY: _____ DATE _____
APPROVED: _____ DATE _____

LEGEND

MW-8 MONITORING WELL LOCATION AND IDENTIFICATION
<0.1 <0.30 - TRH-G (mg/L)/TPH-D (mg/L)

TITLE TOTAL PETROLEUM HYDROCARBONS DISTRIBUTION MAP FOR DECEMBER 10, 1997

CLIENT BJ SERVICES COMPANY, U.S.A.

SITE HOBBS, NEW MEXICO

DATE 01/05/98
PROJECT NUMBER 2832-13
FIGURE NUMBER 4

Tables

TABLES

Table 1
Site Chronology
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
February 7, 1991	The State of New Mexico Oil Conservation Division (OCD) conducted an on-site inspection, including sampling of the on-site fresh water well.
August 6, 1991	OCD requested submittal of an investigation work plan.
September 5, 1991	Roberts/Schornick and Associates, Inc. (RSA) submitted Technical Work Plan for soil and groundwater investigation to the OCD.
November 15, 1991	The OCD approved Technical Work Plan submitted by RSA.
December 16, 1991	RSA sampled the fresh water well. Analytical results were submitted to the OCD.
February 21, 1992	Western sampled the fresh water well. Analytical results were submitted to the OCD.
July 29 - August 10, 1992	Brown and Caldwell conducted a soil and groundwater investigation according to the approved Technical Work Plan. Investigation included drilling and sampling 9 soil borings, sampling 6 hand-augured soil borings, the installation and sampling of 5 monitoring wells, and the sampling of the fresh water well.
October 12, 1992	Brown and Caldwell submitted Soil and Groundwater Investigation Report to the OCD.
December 2, 1992	The OCD requested the installation and sampling of 4 additional monitoring wells, including a monitoring well on an adjacent property.
April 13, 1993	Brown and Caldwell conducted a vapor extraction pilot test on existing groundwater monitoring wells.
April 15, 1993	Brown and Caldwell installed off-site monitoring well.
April 22, 1993	Brown and Caldwell sampled off-site monitoring well.
May 27, 1993	Brown and Caldwell submitted a letter report documenting the installation and sampling of the off-site monitoring well to the OCD.
June 2, 1993	Brown and Caldwell conducted a short-term aquifer test using the fresh water well at the facility.
June 8, 1993	USTank Management, Inc. conducted a non-volumetric tank system tightness test on the diesel and unleaded gasoline aboveground storage tanks at the facility.

Table 1 (Continued)
Site Chronology
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
June 21, 1993	ENSR Consulting and Engineering (ENSR), the environmental consultant of the adjacent property owner on which the off-site well is located, submitted a request to sample the off-site monitoring well.
July 15, 1993	ENSR split one groundwater sample, collected from the off-site monitoring well, with Brown and Caldwell.
July 30, 1993	USTank Management, Inc. submitted the tank tightness test report to Brown and Caldwell. The report indicated that both tanks and their associated piping passed.
August 16-19, 1993	Brown and Caldwell installed two additional downgradient monitoring wells. Brown and Caldwell sampled each of the existing monitoring and the newly installed monitoring wells.
January 26, 1994	Brown and Caldwell performed groundwater monitoring event; existing monitoring wells and the fresh water well were purged and sampled. Groundwater samples were analyzed for BTEX.
May 6, 1994	Remedial Action Plan (RAP) submitted to the OCD.
August 11, 1994	RAP approved by the OCD.
May 3, 1995	Brown and Caldwell conducted the May 1995 groundwater sampling event.
July 31, 1995	Brown and Caldwell conducted the July 1995 groundwater sampling event.
August 2-9, 1995	Installation of biosparging system was initiated. Nineteen combined injection/extraction wells and three vacuum extraction wells were installed.
August 14-26, 1995	Remedial Construction Services, Inc. (RCS) began construction of the biosparging system.
September 19, 1995	Began operation of the extraction portion of the biosparging system.
November 13, 1995	Began operation of the injection portion of the biosparging system.
November 14, 1995	Brown and Caldwell conducted the November 1995 groundwater sampling event.
February 23, 1996	Brown and Caldwell conducted the February 1996 groundwater sampling event.
May 31, 1996	Brown and Caldwell conducted the May 1996 groundwater sampling event.

Table 1 (Continued)
Site Chronolgy
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
August 23, 1996	Brown and Caldwell conducted the August 1996 groundwater sampling event.
December 2, 1996	Brown and Caldwell conducted the December 1996 groundwater sampling event.
March 12, 1997	Brown and Caldwell conducted the March 1997 groundwater sampling event.
March 14, 1997	Vapor extraction well VE-4 installed.
April 1997	Vapor extraction well VE-4 connected to the vapor extraction system.
June 12, 1997	Brown and Caldwell conducted the June 1997 groundwater sampling event.
September 11-12, 1997	Brown and Caldwell conducted the September 1997 groundwater sampling event.
December 10, 1997	Brown and Caldwell conducted the December 1997 groundwater sampling event.

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-1						
	3,647.53	8/10/92	53.22	0.00	3,594.31	(1)
	3,647.53	2/9/93	53.03	0.00	3,594.50	
	3,647.53	8/18/93	53.10	0.00	3,594.43	
	3,647.53	1/26/94	53.31	0.00	3,594.22	
	3,647.53	5/3/95	54.64	0.20	3,593.05	(2)
	3,647.53	7/31/95	54.14	0.00	3,593.39	
	3,647.53	11/14/95	53.69	0.00	3,593.84	
	3,647.53	2/23/96	54.32	0.00	3,593.21	
	3,647.53	5/31/96	54.14	0.00	3,593.39	
	3,647.53	8/23/96	56.17	0.00	3,591.36	
	3,647.53	12/2/96	55.27	0.00	3,592.26	
	3,647.53	3/12/97	55.70	0.27	3,592.05	(3)
	3,647.53	6/12/97	55.08	0.02	3,592.47	
	3,647.53	9/12/97	55.64	0.51	3,592.31	
	3,647.53	12/10/97	55.46	0.00	3,592.07	PSH Sheen
MW-2						
	3,647.59	8/10/92	52.82	0.00	3,594.77	(1)
	3,644.84	2/9/93	49.60	0.00	3,595.24	
	3,644.84	8/18/93	49.71	0.00	3,595.13	
	3,644.84	1/26/94	49.97	0.00	3,594.87	
		5/3/95				(4)

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-3						
	3,647.68	8/10/92	52.99	0.00	3,594.69	(1)
	3,647.68	2/9/93	52.72	0.00	3,594.96	
	3,647.68	8/18/93	52.82	0.00	3,594.86	
	3,647.68	1/26/94	53.05	0.00	3,594.63	
	3,647.68	5/3/95	54.31	0.00	3,593.37	
	3,645.00	7/31/95	51.24	0.00	3,593.76	
	3,645.00	11/14/95	51.10	0.00	3,593.90	
	3,645.00	2/23/96	51.68	0.00	3,593.32	
	3,645.00	5/31/96	51.45	0.00	3,593.55	
	3,645.00	8/23/96	51.55	0.00	3,593.45	
	3,645.00	12/2/96	52.23	0.00	3,592.77	
	3,645.00	3/12/97	52.67	0.00	3,592.33	(3)
	3,645.00	6/12/97	52.68	0.00	3,592.32	
	3,645.00	9/11/97	52.71	0.00	3,592.29	
	3,645.00	12/10/97	52.89	0.00	3,592.11	
MW-4						
	3,645.28	8/10/92	50.55	0.00	3,594.73	(1)
	3,645.28	2/9/93	50.26	0.00	3,595.02	
	3,645.28	8/18/93	50.38	0.00	3,594.90	
	3,645.28	1/26/94	50.90	0.30	3,594.63	
	3,645.28	5/3/95	51.51	0.45	3,594.14	
	3,645.28	7/31/95	51.74	0.26	3,593.75	
	3,645.28	11/14/95	51.03	0.00	3,594.25	
	3,645.28	2/23/96	51.65	0.01	3,593.64	
	3,645.28	5/31/96	51.48	0.00	3,593.80	
	3,645.28	8/23/96	53.49	0.00	3,591.79	
	3,645.28	12/2/96	52.32	0.00	3,592.96	
	3,645.28	3/12/97	52.74	0.05	3,592.58	(3)
	3,645.28	6/12/97	53.08	0.44	3,592.56	
	3,645.28	9/12/97	52.60	0.15	3,592.80	
	3,645.28	12/10/97	52.89	0.00	3,592.39	PSH Sheen

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-5						
	3,647.72	8/10/92	52.38	0.00	3,595.34	(1)
	3,647.72	2/9/93	52.06	0.00	3,595.66	
	3,647.72	8/18/93	52.16	0.00	3,595.56	
	3,647.72	1/26/94	52.50	0.00	3,595.22	
	3,647.72	5/3/95	53.57	0.00	3,594.15	
	3,647.72	7/31/95	53.27	0.00	3,594.45	
	3,647.72	11/14/95	52.83	0.00	3,594.89	
	3,647.72	2/23/96	53.57	0.00	3,594.15	
	3,647.72	5/31/96	53.16	0.00	3,594.56	
	3,647.72	8/23/96	53.41	0.00	3,594.31	
	3,647.72	12/2/96	53.98	0.00	3,593.74	
	3,647.72	3/12/97	54.44	0.00	3,593.28	(3)
	3,647.72	6/12/97	54.48	0.00	3,593.24	
	3,647.72	9/12/97	54.29	0.00	3,593.43	
	3,647.12	12/10/97	54.66	0.00	3,592.46	
MW-6						
	3,644.74	2/9/93	50.58	0.00	3,594.16	(1)
	3,644.74	8/18/93	50.78	0.00	3,593.96	
	3,644.74	1/26/94	51.00	0.00	3,593.74	
	3,644.74	5/3/95	52.63	0.00	3,592.11	
	3,644.74	7/31/95	51.90	0.00	3,592.84	
	3,644.74	11/14/95	51.19	0.00	3,593.55	
	3,644.74	2/23/96	52.10	0.00	3,592.64	
	3,644.74	5/31/96	51.76	0.00	3,592.98	
	3,644.74	8/23/96	51.63	0.00	3,593.11	
	3,644.74	12/2/96	52.85	0.00	3,591.89	
	3,644.74	3/12/97	53.55	0.00	3,591.19	(3)
	3,644.74	6/12/97	52.08	0.00	3,592.66	
	3,644.74	9/11/97	53.72	0.00	3,591.02	
	3,644.74	12/10/97	53.27	0.00	3,591.47	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-7						
	3,644.55	2/9/93	50.53	0.00	3,594.02	(1)
	3,644.55	8/18/93	50.74	0.00	3,593.81	
	3,644.55	1/26/94	51.01	0.00	3,593.54	
	3,644.55	5/3/95	52.25	0.00	3,592.30	
	3,644.55	7/31/95	51.92	0.00	3,592.63	
	3,644.55	11/14/95	51.48	0.00	3,593.07	
	3,644.55	2/23/96	52.15	0.00	3,592.40	
	3,644.55	5/31/96	51.78	0.00	3,592.77	
	3,644.55	8/23/96	52.02	0.00	3,592.53	
	3,644.55	12/2/96	52.52	0.00	3,592.03	
	3,644.55	3/12/97	52.99	0.00	3,591.56	(3)
	3,644.55	6/12/97	53.08	0.00	3,591.47	
	3,644.55	9/11/97	53.00	0.00	3,591.55	
	3,644.55	12/10/97	53.28	0.00	3,591.27	
MW-8						
	3,644.87	2/9/93	50.48	0.00	3,594.39	(1)
	3,644.87	8/18/93	50.67	0.00	3,594.20	
	3,644.87	1/26/94	50.96	0.00	3,593.91	
	3,644.87	5/3/95	52.15	0.00	3,592.72	
	3,644.87	7/31/95	51.77	0.00	3,593.10	
	3,644.87	11/14/95	51.37	0.00	3,593.50	
	3,644.87	2/23/96	52.17	0.00	3,592.70	
	3,644.87	5/31/96	51.55	0.00	3,593.32	
	3,644.87	8/23/96	51.92	0.00	3,592.95	
	3,644.87	12/2/96	52.43	0.00	3,592.44	
	3,644.87	3/12/97	52.93	0.00	3,591.94	(3)
	3,644.87	6/12/97	53.96	0.00	3,590.91	
	3,644.87	9/11/97	52.73	0.00	3,592.14	
	3,644.87	12/10/97	53.15	0.00	3,591.72	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-9						
	3,644.78	4/22/93	49.73	0.00	3,595.05	(1)
	3,644.78	7/15/93	49.65	0.00	3,595.13	
	3,644.78	8/18/93	49.85	0.00	3,594.93	
	3,644.78	1/26/94	50.02	0.00	3,594.76	
	3,644.78	5/3/95	51.35	0.00	3,593.43	
	3,644.78	7/31/95	50.97	0.00	3,593.81	
	3,644.78	11/14/95	50.43	0.00	3,594.35	
	3,644.78	2/23/96	51.12	0.00	3,593.66	
	3,644.78	5/31/96	50.89	0.00	3,593.89	
	3,644.78	8/23/96	50.98	0.00	3,593.80	
	3,644.78	12/2/96	51.58	0.00	3,593.20	
	3,644.78	3/12/97	52.21	0.05	3,592.61	(3)
	3,644.78	6/12/97	52.10	0.00	3,592.68	PSH sheen
	3,644.78	9/12/97	51.95	0.00	3,592.83	PSH Sheen
	3,644.78	12/10/97	52.37	0.00	3,592.41	slight sheen
MW-10						
	3,644.47	8/18/93	51.54	0.00	3,592.93	(1)
	3,644.47	1/26/94	51.90	0.00	3,592.57	
	3,644.47	5/3/95	52.97	0.00	3,591.50	
	3,644.47	7/31/95	52.87	0.00	3,591.60	
	3,644.47	11/14/95	52.51	0.00	3,591.96	
	3,644.47	2/23/96	53.05	0.00	3,591.42	
	3,644.47	5/31/96	52.79	0.00	3,591.68	
	3,644.47	8/23/96	53.03	0.00	3,591.44	
	3,644.47	12/2/96	53.41	0.00	3,591.06	
	3,644.47	3/12/97	54.21	0.00	3,590.26	(3)
	3,644.47	6/12/97	53.99	0.00	3,590.48	
	3,644.47	9/12/97	53.94	0.00	3,590.53	
	3,644.47	12/10/97	54.12	0.00	3,590.35	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-11						
	3,643.78	8/18/93	51.92	0.00	3,591.86	(1)
	3,643.78	1/26/94	52.32	0.00	3,591.46	
	3,643.78	5/3/95	53.38	0.00	3,590.40	
	3,643.78	7/31/95	53.35	0.00	3,590.43	
	3,643.78	11/14/95	52.96	0.00	3,590.82	
	3,643.78	2/23/96	53.50	0.00	3,590.28	
	3,643.78	5/31/96	53.25	0.00	3,590.53	
	3,643.78	8/23/96	53.49	0.00	3,590.29	
	3,643.78	12/2/96	53.79	0.00	3,589.99	
	3,643.78	3/12/97	53.81	0.00	3,589.97	(3)
	3,643.78	6/12/97	53.96	0.00	3,589.82	
	3,643.78	9/12/97	52.93	0.00	3,590.85	
		12/10/97				(5)

(1) Top of casing elevations and groundwater elevations of all monitor wells were relative to an arbitrary datum of 100.00 feet prior to March 1997 and have been converted to Mean Sea Level (MSL).

(2) For wells with a hydrocarbon layer the groundwater elevation was calculated as follows:

$$\text{Groundwater Elevation} = (\text{TOC elevation}) - (\text{Depth to groundwater}) + \{(\text{Free product thickness}) \times (\text{SG of free product})\}$$

Note: The specific gravity (SG) for the free product was 0.82.

(3) Top of casing elevations and groundwater elevations relative to MSL after March 1997.

(4) MW-2 could not be located and is assumed destroyed after January, 1994.

(5) MW-11 could not be located and is assumed destroyed after September 12, 1997.

Table 3
 Field Screening Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	Date Measured	Well Volume	pH	Conductivity (µmhos)	Temperature (°C)	Redox (mV)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)
MW-3	12/10/97	1	7.23	1,167	17.7	-56.2	5.87	0.0
		2	7.23	1,195	17.9	-52.7	5.85	
		3	7.20	1,202	18.1	-52.1	5.74	
		4	7.19	1,212	18.2	-55.4	5.38	
MW-5	12/10/97	0	7.56	1,126	15.1	-31.1	7.34	0.0
		1	7.23	1,146	17.8	-5	5.67	
		2	7.18	1,125	18.0	1.2	5.03	
		3	7.16	1,115	18.0	4.6	4.73	
MW-6	12/10/97	0	7.79	1,040	19.8	-37	8.66	0.0
		1	7.82	990	14.3	-3.8	7.32	
		2	7.88	1,090	14.2	-3.2	6.89	
		3	7.83	1,100	14.0	-6.4	6.29	
MW-7	12/10/97	0	7.43	1,790	16.4	38	6.55	0.0
		1	6.96	1,780	16.5	61	4.57	
		2	6.78	1,740	18.4	-13	3.81	
		3	6.82	1,760	18.6	-12	2.89	
MW-8	12/10/97	0	7.19	1,970	16.8	31.8	5.32	0.0
		1	6.92	1,950	17.9	46.7	2.91	
		2	6.93	1,930	18.3	54.3	2.10	
		3	6.93	1,940	18.3	58.1	2.33	

Table 3
 Field Screening Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	Date Measured	Well Volume	pH	Conductivity (µmhos)	Temperature (°C)	Redox (mV)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)
MW-9	12/10/97	0	7.41	1,253	15.2	-63.5	2.46	0.0
		1	7.03	1,270	18.0	-34.6	0.81	
		2	6.98	1,283	17.8	-27.7	1.08	
		3	7.02	1,255	18.4	-15.1	3.41	
MW-10	12/10/97	0	7.06	4,852	15.3	-60.4	5.73	9.4
		1	6.83	5,617	18.7	-105.7	0.54	
		2	6.82	5,692	18.7	-109.2	0.43	
		3	6.82	5,791	18.7	-115.2	0.33	

MW-2 could not be located and assumed destroyed after January, 1994.

NR = No Reading

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-1	8/10/92	Regular	5550	12090	2160	7370	NA	NA
	2/9/93	Regular	2100	6500	1300	7400	NA	NA
	8/19/93	Regular	3200	7300	1200	3700	NA	NA
	1/27/94	Regular	1930	4580	672	2390	NA	NA
	5/3/95	Regular	NSP	NSP	NSP	NSP	NA	NSP
	8/1/95	Regular	390	1300	230	800	NA	5.7
	11/15/95	Regular	880	1800	300	970	NA	6.8
	2/23/96	Regular	1500	3700	620	2200	NA	21
	5/31/96	Regular	1100	1700	380	990	NA	7.5
	8/23/96	Regular	1800	3300	570	2100	NA	17
	12/2/96	Regular	5600	9600	2100	9600	100	64
	3/12/97	Regular	5500	9700	2600	8200	22	62
	6/12/97	Regular	5300	34000	7500	27000	180	160
	9/12/97	Regular	1800	4400	1000	3000	23	21
	12/10/97	Regular	7600	12000	2800	8200	11	71
MW-2	8/10/92	Regular	14.9	< 4	< 4	< 4	NA	NA
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	100	12	3	13	NA	NA
	1/27/94	Regular	< 1	1.2	2	2.5	NA	NA
MW-3	8/10/92	Regular	304.9	2099	6760	1586	NA	NA
	2/9/93	Regular	130	< 10	< 10	190	NA	NA
	8/19/93	Regular	560	3100	630	1900	NA	NA
	1/27/94	Regular	1070	5380	510	3120	NA	NA
	5/4/95	Regular	770	3300	470	1800	NA	NA
	8/1/95	Regular	490	2900	890	1600	NA	14
	11/15/95	Regular	250	1000	180	440	NA	2.9
	2/23/96	Regular	120	810	170	560	NA	4
	5/31/96	Regular	670	3900	1200	2300	NA	15
	8/23/96	Regular	330	2200	590	1500	NA	12
	12/2/96	Regular	220	1800	670	1000	0.89	7.4
	3/12/97	Regular	370	2000	960	1400	1.8	11
	6/12/97	Regular	860	4800	1700	2600	1.9	20
	9/11/97	Regular	770	3000	1600	1900	1.6	16
12/10/97	Regular	240	740	500	450	0.59	5.3	

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-4								
	8/10/92	Regular	2594	10360	2160	6740	NA	NA
	2/9/93	Regular	5200	15000	2200	10000	NA	NA
	8/19/93	Regular	3000	12000	< 2000	7000	NA	NA
	1/27/94	Regular	NSP	NSP	NSP	NSP	NA	NSP
	5/3/95	Regular	NSP	NSP	NSP	NSP	NA	NSP
	8/1/95	Regular	5700	17000	3500	13000	NA	120
	11/15/95	Regular	490	1600	310	1100	NA	5.2
	2/23/96	Regular	360	2800	560	2500	NA	18
	5/31/96	Regular	84	830	280	1100	NA	6.2
	8/23/96	Regular	110	1400	430	1800	NA	9.8
	12/2/96	Regular	190	2000	1800	7200	56	43
	3/12/97	Regular	220	1500	1500	4400	27	27
	6/12/97	Regular	47	270	360	950	2.5	6.2
	9/12/97	Regular	92	840	670	2100	15	7.6
	12/10/97	Regular	230	750	970	2300	3.7	16
MW-5								
	8/10/92	Regular	< 4	< 4	< 4	< 4	NA	NA
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/10/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	1/27/94	Regular	8.7	29.9	4	11.3	NA	NA
	5/3/95	Regular	3.7	5.3	0.92	4.6	NA	NA
	8/1/95	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	11/15/95	Regular	< 0.3	1.2	< 0.3	1.5	NA	NA
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	5/31/96	Regular	31	86	10	20	NA	NA
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	9/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	12/10/97	Regular	< 5	< 5	< 5	< 5	< 0.2	< 0.1

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-6								
	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	7000	19000	3100	7200	NA	NA
	8/19/93	Regular	8100	19000	3500	6400	NA	NA
	1/27/94	Regular	7960	20200	3830	6150	NA	NA
	5/4/95	Regular	11000	17000	2900	6000	NA	NA
	8/1/95	Regular	8300	12000	2500	5100	NA	60
	11/15/95	Regular	8900	17000	2900	5500	NA	57
	2/23/96	Regular	8100	10000	2300	4000	NA	58
	5/31/96	Regular	83	150	15	51	NA	0.57
	5/31/96	Duplicate	87	160	13	47	NA	0.52
	8/23/96	Regular	31	28	9.4	7.9	NA	0.46
	12/2/96	Regular	< 1	< 1	< 1	1.7	5.6	< 0.1
	3/12/97	Regular	12	< 5	6.8	18	12	< 0.5
	6/12/97	Regular	1900	1400	410	310	7.8	7.4
	9/11/97	Regular	11	1.3	3.4	< 1	1	< 0.1
	12/10/97	Regular	3	4.2	1.2	3.9	1.7	0.14
MW-7								
	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	< 2	3	< 2	< 2	NA	NA
	1/27/94	Regular	1.1	< 1	< 1	< 1	NA	NA
	5/3/95	Regular	52	3.4	0.67	2.8	NA	NA
	8/1/95	Regular	22	2.2	0.85	2.8	NA	< 0.1
	11/15/95	Regular	8.4	0.77	< 0.3	0.93	NA	< 0.1
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	2/23/96	Duplicate	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	5/31/96	Regular	29	83	10	21	NA	0.25
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	9/11/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	12/10/97	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L					
MW-8								
	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA	NA
	1/27/94	Regular	< 1	< 1	< 1	< 1	NA	NA
	5/3/95	Regular	3	4.9	0.75	3.7	NA	NA
	8/1/95	Regular	3.1	1.2	0.47	1.6	NA	< 0.001
	8/1/95	Duplicate	3.6	1.5	0.51	1.5	NA	< 0.1
	11/15/95	Regular	< 0.3	0.52	< 0.3	< 0.6	NA	< 0.1
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	5/31/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	1.8	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	9/11/97	Regular	< 1	< 1	< 1	< 1	0.1	< 0.1
	12/10/97	Regular	< 1	< 1	< 1	< 1	0.3	< 0.1
MW-9								
	4/22/93	Regular	570	380	< 50	870	NA	NA
	7/15/93	Regular	121	7.3	3	458	NA	NA
	8/19/93	Regular	390	290	40	250	NA	NA
	1/27/94	Regular	327	357	51.1	293	NA	NA
	5/3/95	Regular	380	110	19	120	NA	NA
	8/1/95	Regular	660	410	91	310	NA	6.2
	11/15/95	Regular	240	24	11	140	NA	1.5
	11/15/95	Duplicate	170	18	10	120	NA	1.9
	2/23/96	Regular	170	18	2.3	160	NA	4.3
	5/31/96	Regular	120	16	3	200	NA	NA
	8/23/96	Regular	82	13	6	270	NA	4
	8/23/96	Duplicate	76	14	4.8	250	NA	4.4
	12/2/96	Regular	61	< 25	< 25	210	2.6	2.8
	12/2/96	Duplicate	86	13	2.4	270	3.7	2.9
	3/12/97	Regular	30	48	420	880	8.2	19
	6/12/97	Regular	4.7	2.1	11	97	2.6	2.2
	6/12/97	Duplicate	< 5	< 5	6.6	69	5.2	1.9
	9/12/97	Regular	2.1	2.3	2.1	120	1.2	1.9
	12/10/97	Regular	4.9	9	6.8	62	0.86	0.92

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-10								
	8/19/93	Regular	190	460	< 200	240	NA	NA
	1/27/94	Regular	13.4	4	5.5	33.6	NA	NA
	5/4/95	Regular	980	15	11	84	NA	NA
	8/1/95	Regular	1300	32	32	100	NA	3.6
	11/15/95	Regular	1000	24	15	36	NA	1.7
	2/23/96	Regular	810	23	27	44	NA	2.4
	5/31/96	Regular	700	24	34	28	NA	2
	8/23/96	Regular	290	3.4	6.4	13	NA	1.4
	12/2/96	Regular	280	1.3	17	8	0.94	0.97
	3/12/97	Regular	110	< 5	17	< 5	0.61	0.57
	6/12/97	Regular	150	12	30	< 5	0.68	< 0.5
	9/12/97	Regular	87	2.3	26	2.7	0.76	0.33
	9/12/97	Duplicate	87	2.4	26	2.8	0.79	0.33
	12/10/97	Regular	41	9.8	12	7.7	1.1	0.28
	12/10/97	Duplicate	36	8.5	10	6.7	1.2	0.24
MW-11								
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA	NA
	1/27/94	Regular	< 1	< 1	< 1	< 1	NA	NA
	5/4/95	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	8/1/95	Regular	44	29	5.5	13	NA	0.2
	11/15/95	Regular	190	2.8	6.2	11	NA	0.4
	2/23/96	Regular	49	1.2	0.51	4	NA	0.25
	5/31/96	Regular	300	83	12	28	NA	0.8
	8/23/96	Regular	100	1.2	0.3	4.7	NA	0.26
	12/2/96	Regular	970	< 5	6	8.1	2	1.3
	3/12/97	Regular	130	< 5	13	5.8	0.42	< 0.5
	3/12/97	Duplicate	100	< 5	10	5.1	0.43	< 0.5
	6/12/97	Regular	150	23	19	< 5	1.1	0.55
	9/12/97	Regular	220	15	27	13	1	0.46

MW-2 destroyed after January, 1994 MW-11 destroyed after September, 1997

NA = Not Analysed NS = Not Sampled

NSP = Not Sampled due to Phase Separated Hydrocarbons

Table 5
 Summary of Analytical Results for Air Emissions
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Sample Number	Sample Date	parts per million by volume, ppmv							Discharge Rate, scfm	Benzene Emission Rate, lb/hr	Total BTEX Emission Rate, lb/hr	TPH Emission Rate, lb/hr
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH						
Extraction-1	9/19/95	790	1100	340	920	9700	132.47	1.24	5.94	16.31		
Effluent-1	9/20/95	990	2500	560	1600	16000	135.76	1.58	10.94	27.37		
Effluent-2	9/28/95	13	28	6	18	2533	123.56	0.02	0.11	3.89		
Effluent-4	11/7/95	15	58	12	36	1500	131.10	0.02	0.24	2.59		
Effluent11595-01	11/15/95	39	180	42	130	1870	133.33	0.06	0.77	3.21		
Effluent121995-01	12/19/95	10	45	11	33	530	129.64	0.02	0.19	0.89		
Effluent012996-01	1/29/96	12	61	17	53	1200	128.45	0.02	0.27	1.95		
Effluent032296-01	3/22/96	6	44	12	40	990	124.68	0.01	0.19	1.56		
Effluent042496-01	4/25/96	4	37	10	36	900	118.34	0.01	0.15	1.29		
Effluent053196-01	5/31/96	3.7	40	10	33	670	124.11	0.01	0.16	1.04		
Effluent082396-01	8/23/96	< 5	12	< 5	< 5	200	126.18	0.01	0.05	0.31		
Effluent120296-01	12/2/96	< 1	< 1	< 1	< 1	< 5	129.04	0.00	0.01	0.01		
Eff-31297-1	3/12/97	2.1	15	4.6	15	250	110.56	0.00	0.06	0.33		
Effluent070297-01	7/2/97	< 1	6.3	2.4	8.6	65	109.90	0.00	0.03	0.08		
Monitor970912	9/12/97	NA	NA	NA	NA	340	105.40	NA	NA	0.39 (1)		
EFF-1-2832	12/10/97	< 0.001	0.013	0.009	0.031	210	106.27	0.00	0.00	0.28		

Emission rates reported for 12/02/96 sampling event were calculated using the detection limits. The actual emissions are Benzene <0.001 lb/hr, BTEX: <0.01 lb/hr and TPH: <0.01 lb/hr.

NA = Not analyzed

(1) All analyses on September 12, 1997 based on field FID readings.

Table printed: 1/9/98



Appendices

APPENDICES

A



APPENDIX A

Groundwater Sampling Forms

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Bailer</u>	Equipment Calibration - Time	
Total Depth of Well from TOC feet		pH = _____ at _____ °C	
Static Water from TOC <u>55.46</u> feet	Sample Equipment <u>N/A Bailer</u> <u>RAW</u>	pH = _____ at _____ °C	
Product Level from TOC <u>0</u> feet		Conductivity Conductance Standard: _____ μmhos/cm at 25° C	
Length of Water Column feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>N/A</u>	Measured Value: _____ μmhos/cm at 25° C	
Well Volume gal		Dissolved Oxygen DO Meter Calibrated to: _____ mg/L	
Screened Interval (from GS) feet			

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
<u>1405</u>	<u>no</u>	<u>Readings</u>	<u>Sheen</u>					<u>Sheen</u>

Geochemical Parameters	Comments:
Ferrous Iron: <u>—</u> mg/L	<u>1435 - Sample</u>
Dissolved Oxygen: <u>—</u> mg/L	
Nitrate: _____ mg/L	
Alkalinity _____ mg/L	

PPE Worn: <u>Gloves & Glasses</u>	Sampler's Signature: <u>Thomas A. Wajda</u>
Disposition of Purge Water: <u>on-site drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Sub Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>64.31</u> feet		pH <u>7.03</u> = <u>7.01</u> at <u>25</u> °C	
Static Water from TOC <u>52.49</u> feet	Sample Equipment <u>Sub Pump</u>	pH <u>4.0</u> = <u>4.01</u> at <u>25</u> °C	
Product Level from TOC <u>0</u> feet		Conductivity Conductance Standard: <u>10</u> µmhos/cm at 25° C	
Length of Water Column <u>11.42</u> feet	Analytical Equipment (pH, DO, Redox, titration, etc.) <u>YSI 600 XL</u> <u>HACH DO, Fe</u>	Measured Value: <u>9.939</u> µmhos/cm at 25° C	
Well Volume <u>1.87</u> gal <u>5.61</u>		Dissolved Oxygen <u>98.8</u>	
Screened Interval (from GS) feet		DO Meter Calibrated to: <u>100.0</u> mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1030	<u>1.87</u>	1.87 <u>1.9</u>	7.23	17.68	1.167	-56.2	5.87	<u>1.5.11.11</u> <u>Trans clear</u>
1035	<u>2</u>	3.87 <u>3.74</u>	7.33	17.95	1.195	-52.7	5.85	
1039	<u>3</u>	5.77 <u>5.61</u>	7.20	18.06	1.202	-52.1	5.74	
1042		<u>7</u>	7.19	18.23	1.212	-55.4	5.35	
1045	<u>Sample</u>							

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	
Dissolved Oxygen: <u>4.4</u> mg/L	
Nitrate: mg/L	
Alkalinity mg/L	

PPE Worn: <u>Gloves - glasses</u>	Sampler's Signature: <u>Thomas A. Wagoner</u>
Disposition of Purge Water: <u>on-site drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Sub Pump Bailer</u>	Equipment Calibration - Time	
Total Depth of Well from TOC feet		pH = _____ at _____ °C	
Static Water from TOC <u>52.89</u> feet	Sample Equipment <u>Sub Pump Bailer</u>	pH = _____ at _____ °C	
Product Level from TOC <u>0</u> feet		Conductivity Conductance Standard: _____ μmhos/cm at 25° C	
Length of Water Column feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>N/A</u>	Measured Value: _____ μmhos/cm at 25° C	
Well Volume <u>0</u> gal		Dissolved Oxygen DO Meter Calibrated to: _____ mg/L	
Screened Interval (from GS) feet			

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
<u>1435</u>	<u>0</u>	<u>0</u>						<u>Screen prevented use of flowcell</u>

Geochemical Parameters	Comments:
Ferrous Iron: _____ mg/L	<u>1455 - Sample Well</u>
Dissolved Oxygen: _____ mg/L	
Nitrate: _____ mg/L	
Alkalinity: _____ mg/L	

PPE Worn: <u>Gloves + Goggles</u>	Sampler's Signature: <u>Thomas A. Wagner</u>
Disposition of Purge Water: <u>on-site drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Sub pump</u>	Equipment Calibration - Time pH <u>7.03</u> = <u>7.01</u> at <u>25</u> °C
Total Depth of Well from TOC <u>64.60</u> feet		pH <u>4.0</u> = <u>4.01</u> at <u>25</u> °C
Static Water from TOC <u>54.66</u> feet	Sample Equipment <u>Sub pump</u>	Conductivity Conductance Standard: <u>10</u> µmhos/cm at 25° C
Product Level from TOC feet		Measured Value: <u>9.939</u> µmhos/cm at 25° C
Length of Water Column <u>9.94</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600XL</u> <u>HACH DO, Fe</u>	Dissolved Oxygen <u>98.8</u> mg/L
Well Volume <u>1.6</u> gal		DO Meter Calibrated to: <u>100</u> mg/L
Screened Interval (from GS) feet		

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1141								
1141	<u>0.1</u>	<u>0.5</u>	<u>7.56</u>	<u>15.11</u>	<u>1.126</u>	<u>-31.1</u>	<u>7.34</u>	<u>clear</u>
1144 1144	<u>1</u>	<u>1.6</u>	<u>7.23</u>	<u>17.81</u>	<u>1.146</u>	<u>5.0</u>	<u>5.67</u>	
1146	<u>2</u>	<u>3.2</u>	<u>7.18</u>	<u>17.97</u>	<u>1.125</u>	<u>1.2</u>	<u>5.03</u>	
1149	<u>3</u>	<u>4.8</u>	<u>7.16</u>	<u>18.02</u>	<u>1.115</u>	<u>4.6</u>	<u>4.73</u>	
1151	<u>sample</u>							

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	
Dissolved Oxygen: <u>0</u> mg/L	
Nitrate: mg/L	
Alkalinity mg/L	

PPE Worn: <u>gloves + Goggles</u>	Sampler's Signature: <u>Thomas A. Wolfe</u>
Disposition of Purge Water: <u>on-site drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/47

Casing Diameter <u>2</u> inches	Purge Equipment <u>Sub. Pump</u>	Equipment Calibration - Time pH <u>7.03 = 7.01</u> at <u>25</u> °C
Total Depth of Well from TOC <u>60.17</u> feet	Sample Equipment <u>Sub. Pump</u>	pH <u>4.0 = 4.01</u> at <u>25</u> °C
Static Water from TOC <u>53.27</u> feet		Conductivity Conductance Standard: <u>10.0</u> µmhos/cm at 25° C
Product Level from TOC <u>-</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>USE GOODXL HACH DO, Fe</u>	Measured Value: <u>9.939</u> µmhos/cm at 25° C
Length of Water Column <u>6.9</u> feet		Dissolved Oxygen <u>98.8</u>
Well Volume <u>1.17</u> gal		DO Meter Calibrated to: <u>100.0</u> mg/L
Screened Interval (from GS) <u>-</u> feet		

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0937	P	P	7.79	19.79	1.04	-37	8.66	clear
0936	1	15	7.82	14.3	0.99	-3.8	7.32	"
0943	2	15	7.88	14.2	1.09	-3.2	6.89	"
0948	2	15	7.83	14.0	1.10	-6.4	6.29	"

Geochemical Parameters	Comments:
Ferrous Iron: <u>0</u> mg/L	<u>0950 SAMPLE MW-6</u>
Dissolved Oxygen: <u>4.0</u> mg/L	
Nitrate: <u>-</u> mg/L	
Alkalinity: <u>-</u> mg/L	

PPE Worn: <u>goggles, gloves</u>	Sampler's Signature: <u>[Signature]</u>
Disposition of Purge Water: <u>in gate down</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

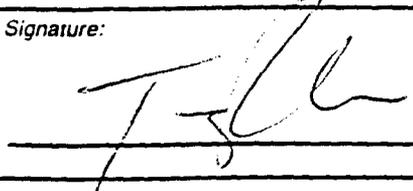
Task Number: 12

Date: 12/10/97

Casing Diameter 2 inches	Purge Equipment sub pump	Equipment Calibration - Time	
Total Depth of Well from TOC 61.46 feet	Sample Equipment sub. pump	pH 7.03 = 7.01 at 25 °C	
Static Water from TOC 53.28 feet		pH 4.0 = 4.01 at 25 °C	
Product Level from TOC — feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) ISE WORK HACH DO, PC	Conductivity Conductance Standard: 10.0 µmhos/cm at 25° C	
Length of Water Column 8.18 feet		Measured Value: 9.939 µmhos/cm at 25° C	
Well Volume 1.33 gal	Screened Interval (from GS) — feet	Dissolved Oxygen 98.3	
—		DO Meter Calibrated to: 100.0 mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0900	P	P	7.43	16.4	1.79	38	6.55	clear
0903	1	1.5	6.96	16.5	1.78	61	4.57	"
0906	2	1.5	6.78	18.4	1.74	-13	3.81	cloudy
0909	3	1.5	6.87	18.6	1.76	-12	2.89	"

Geochemical Parameters	Comments:
Ferrous Iron: ϕ mg/L	0910 SAMPLE MW-7
Dissolved Oxygen: 3.5 mg/L	
Nitrate: mg/L	
Alkalinity: mg/L	

PPE Worn: gloves, glasses	Sampler's Signature: 
Disposition of Purge Water: on site down	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Sub Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>42.37</u> feet		pH <u>7.13</u> = <u>7.01</u> at <u>25</u> °C	
Static Water from TOC <u>53.15</u> feet	Sample Equipment <u>Sub Pump</u>	pH <u>4.0</u> = <u>4.01</u> at <u>25</u> °C	
Product Level from TOC <u>—</u> feet		Conductivity Conductance Standard: <u>10.0</u> µmhos/cm at 25° C	
Length of Water Column <u>9.23</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600 XL</u> <u>1MCM DO, PC</u>	Measured Value: <u>9.939</u> µmhos/cm at 25° C	
Well Volume <u>1.50</u> gal		Dissolved Oxygen <u>98.8</u>	
Screened Interval (from GS) <u>—</u> feet		DO Meter Calibrated to: <u>100.0</u> mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
<u>0832</u>	<u>1</u>	<u>1</u>	<u>7.19</u>	<u>16.8</u>	<u>1.97</u>	<u>31.8</u>	<u>5.32</u>	<u>clear</u>
<u>0835</u>	<u>1</u>	<u>1.5</u>	<u>6.92</u>	<u>17.9</u>	<u>1.95</u>	<u>46.7</u>	<u>2.91</u>	<u>"</u>
<u>0838</u>	<u>2</u>	<u>1.5</u>	<u>6.93</u>	<u>18.3</u>	<u>1.93</u>	<u>54.3</u>	<u>2.10</u>	<u>"</u>
<u>0841</u>	<u>3</u>	<u>1.5</u>	<u>6.93</u>	<u>18.3</u>	<u>1.94</u>	<u>55.1</u>	<u>2.33</u>	<u>"</u>

Geochemical Parameters	Comments:
Ferrous Iron: <u>4</u> mg/L	<u>0842 SAMPLE MW-8</u>
Dissolved Oxygen: <u>2.5</u> mg/L	
Nitrate: <u>—</u> mg/L	
Alkalinity: <u>—</u> mg/L	

PPE Worn: <u>Gloves, glasses</u>	Sampler's Signature: <u>[Signature]</u>
Disposition of Purge Water: <u>on site down</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Sub Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>60.27</u> feet		pH <u>7.03</u> = <u>7.01</u> at <u>25</u> °C	
Static Water from TOC <u>52.37</u> feet	Sample Equipment <u>Sub Pump</u>	pH <u>4.0</u> = <u>4.01</u> at <u>25</u> °C	
Product Level from TOC <u>2.0' thick</u> feet		Conductivity: Conductance Standard: <u>10</u> µmhos/cm at 25° C	
Length of Water Column <u>7.90</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600VC</u> <u>Hach DO, Fe</u>	Measured Value: <u>9.939</u> µmhos/cm at 25° C	
Well Volume <u>1.3</u> gal		Dissolved Oxygen <u>988</u>	
Screened Interval (from GS) <u>-</u> feet		DO Meter Calibrated to: <u>100.0</u> mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1405	P	P	7.41	15.17	1.253	63.5	2.46	Mud/s etc
1407	1	1.3	7.03	17.98	1.270	34.6 24 10.1	0.81	clouds
1409	2	2.6	6.98	17.84	1.283	27.7	1.08	
1416	3	3.9	7.02	18.43	1.255	15.1	3.41	

Geochemical Parameters	Comments: <u>May be Flashed by or</u> <u>1420</u>
Ferrous Iron: <u>0</u> mg/L	
Dissolved Oxygen: <u>3.0</u> mg/L	
Nitrate: _____ mg/L	
Alkalinity _____ mg/L	

PPE Worn: <u>gloves, glasses</u>	Sampler's Signature: <u>Thomas A. Wagner</u>
Disposition of Purge Water: <u>on-site drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

Date: 12/10/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Sub Pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>63.60</u> feet		pH <u>7.03</u> = <u>7.01</u> at <u>25</u> °C	
Static Water from TOC <u>54.12</u> feet	Sample Equipment <u>Sub Pump</u>	pH <u>4.0</u> = <u>4.01</u> at <u>25</u> °C	
Product Level from TOC <u>0</u> ^{TPH} feet		Conductivity Conductance Standard: <u>10</u> µmhos/cm at 25° C	
Length of Water Column <u>1.55</u> ^{TPH} feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600VC</u> <u>Hach DO, Fe</u>	Measured Value: <u>9.939</u> µmhos/cm at 25° C	
Well Volume <u>1.55</u> gal		Dissolved Oxygen <u>98.8</u>	
Screened Interval (from GS) feet		DO Meter Calibrated to: <u>100.0</u> mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1238	P	P	7.06	15.26	4.852	-60.4	5.73	
1241	1	1.5	6.93	18.68	5.617	-105.74	0.54	
1244	2	3.0	6.82	18.69	5.692	-109.2	0.43	
1249	3	4.5	6.82	18.70	5.791	-115.2	0.33	
1251								

Geochemical Parameters	Comments:
Ferrous Iron: <u>9.4</u> mg/L	<u>Dup - Ex vol for TPH</u>
Dissolved Oxygen: <u>Ø</u> mg/L	
Nitrate: <u> </u> mg/L	
Alkalinity: <u> </u> mg/L	

PPE Worn: <u>gloves, glasses</u>	Sampler's Signature: <u>Thomas A. Wagoner</u>
Disposition of Purge Water: <u>on-site drum</u>	

B



APPENDIX B

Laboratory Analytical Report for Groundwater Samples



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

December 29, 1997

Mr. Rick Rexroad
BROWN AND CALDWELL
1415 Louisiana
Houston, TX 77002

The following report contains analytical results for samples received at Southern Petroleum Laboratories (SPL) on December 11, 1997. The samples were assigned to Certificate of Analysis No.(s) 9712590 and analyzed for all parameters as listed on the chain of custody.

Any data flag or quality control exception associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s).

If you have any questions or comments pertaining to this data report, please do not hesitate to contact me. Please reference the above Certificate of Analysis No. during any inquiries.

Again, SPL is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

Southern Petroleum Laboratories


Bernadette A. Fini
Project Manager



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

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate of Analysis Number: 97-12-590

Approved for Release by:


Bernadette A. Fini, Project Manager

12-29-97
Date:

Greg Grandits
Laboratory Director

Idelis Williams
Quality Assurance Officer

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory.



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

Certificate of Analysis No. H9-9712590-01

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-8

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 12/10/97 08:42:00
DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.1 P	mg/L

Surrogate	% Recovery
4-Bromofluorobenzene	107
1,4-Difluorobenzene	73

Method Modified 8015A*** for Gasoline
Analyzed by: MF
Date: 12/21/97

BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	100
4-Bromofluorobenzene	100

Method 8020A ***
Analyzed by: MF
Date: 12/21/97

Total Petroleum Hydrocarbons-Diesel	0.30	0.2 P	mg/L
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Surrogate	% Recovery
n-Pentacosane	112

Method Modified 8015A*** for Diesel
Analyzed by: RR
Date: 12/16/97 07:03:00

ND - Not detected.

(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.

COMMENTS: Sample contains petroleum hydrocarbons from C10-C24 that do not resemble a diesel pattern. (C10-C24) RR
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. H9-9712590-02

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-7

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97 09:10:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.1 P	mg/L
Surrogate			
	% Recovery		
4-Bromofluorobenzene	100		
1,4-Difluorobenzene	73		
Method Modified 8015A*** for Gasoline			
Analyzed by: MF			
Date: 12/21/97			
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L
Surrogate			
	% Recovery		
1,4-Difluorobenzene	100		
4-Bromofluorobenzene	97		
Method 8020A ***			
Analyzed by: MF			
Date: 12/21/97			
Total Petroleum Hydrocarbons-Diesel	ND	0.2 P	mg/L
Surrogate			
	% Recovery		
n-Pentacosane	62		
Method Modified 8015A*** for Diesel			
Analyzed by: RR			
Date: 12/16/97 07:48:00			

ND - Not detected.

(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. H9-9712590-03

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-6

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97 09:50:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.14	0.1 P	mg/L

Surrogate	% Recovery
4-Bromofluorobenzene	107
1,4-Difluorobenzene	87

Method Modified 8015A*** for Gasoline
 Analyzed by: MF
 Date: 12/21/97

BENZENE	3.0	1.0 P	µg/L
TOLUENE	4.2	1.0 P	µg/L
ETHYLBENZENE	1.2	1.0 P	µg/L
TOTAL XYLENE	3.9	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	12.3		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	110
4-Bromofluorobenzene	93

Method 8020A ***
 Analyzed by: MF
 Date: 12/21/97

Total Petroleum Hydrocarbons-Diesel	1.7	1.0 P	mg/L
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Surrogate	% Recovery
n-Pentacosane	90

Method Modified 8015A*** for Diesel
 Analyzed by: RR
 Date: 12/16/97 08:34:00

(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.

COMMENTS: Sample contains petroleum hydrocarbons from C10-C24 that do not resemble a diesel pattern. (C10-C24) RR
 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. H9-9712590-04

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-3

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97 10:45:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	5.3	1.0 P	mg/L
Surrogate			
	% Recovery		
4-Bromofluorobenzene	97		
1,4-Difluorobenzene	77		
Method Modified 8015A*** for Gasoline			
Analyzed by: MF			
Date: 12/22/97			
BENZENE	240	1.0 P	µg/L
TOLUENE	740	10.0 P	µg/L
ETHYLBENZENE	500	10.0 P	µg/L
TOTAL XYLENE	450	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	1930		µg/L
Surrogate			
	% Recovery		
1,4-Difluorobenzene	103		
4-Bromofluorobenzene	93		
Method 8020A ***			
Analyzed by: MF			
Date: 12/22/97			
Total Petroleum Hydrocarbons-Diesel	0.59	0.2 P	mg/L
Surrogate			
	% Recovery		
n-Pentacosane	98		
Method Modified 8015A*** for Diesel			
Analyzed by: RR			
Date: 12/17/97 01:42:00			

(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.

COMMENTS: Sample contains petroleum hydrocarbons from C10-C24 that do not resemble a diesel pattern. (C10-C24) RR

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. H9-9712590-05

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-5

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97 11:51:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.1 P	mg/L
Surrogate			
4-Bromofluorobenzene	% Recovery 100		
1,4-Difluorobenzene	73		
Method Modified 8015A*** for Gasoline			
Analyzed by: MF			
Date: 12/21/97			
BENZENE	ND	5.0 P	µg/L
TOLUENE	ND	5.0 P	µg/L
ETHYLBENZENE	ND	5.0 P	µg/L
TOTAL XYLENE	ND	5.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L
Surrogate			
1,4-Difluorobenzene	% Recovery 100		
4-Bromofluorobenzene	100		
Method 8020A ***			
Analyzed by: LJ			
Date: 12/23/97			
Total Petroleum Hydrocarbons-Diesel	ND	0.2 P	mg/L
Surrogate			
n-Pentacosane	% Recovery 102		
Method Modified 8015A*** for Diesel			
Analyzed by: RR			
Date: 12/16/97 10:06:00			

ND - Not detected.

(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. H9-9712590-06

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-10

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 12/10/97 12:51:00
DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.28	0.1 P	mg/L
Surrogate			
4-Bromofluorobenzene	103		% Recovery
1,4-Difluorobenzene	80		% Recovery
Method Modified 8015A*** for Gasoline			
Analyzed by: MF			
Date: 12/21/97			
BENZENE	41	1.0 P	µg/L
TOLUENE	9.8	1.0 P	µg/L
ETHYLBENZENE	12	1.0 P	µg/L
TOTAL XYLENE	7.7	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	70.5		µg/L
Surrogate			
1,4-Difluorobenzene	107		% Recovery
4-Bromofluorobenzene	97		% Recovery
Method 8020A ***			
Analyzed by: MF			
Date: 12/21/97			
Total Petroleum Hydrocarbons-Diesel	1.1	1.0 P	mg/L
Surrogate			
% Recovery			

(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.

COMMENTS: Sample contains petroleum hydrocarbons from C10-C24 that do not resemble a diesel pattern. (C10-C24) RR

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. H9-9712590-06

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-10

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97 12:51:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
n-Pentacosane Method Modified 8015A*** for Diesel Analyzed by: RR Date: 12/16/97 10:52:00	120 «		
Nitrate nitrogen(as N) Method 353.3 * Analyzed by: EM Date: 12/12/97	ND	0.05	mg/L
Sulfate Method 375.4 * Analyzed by: EM Date: 12/23/97	229	25	mg/L

« - Recovery beyond control limits. ND - Not detected.

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.

COMMENTS: Sample contains petroleum hydrocarbons from C10-C24 that do not resemble a diesel pattern.(C10-C24) RR

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. H9-9712590-09

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-1

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97 14:25:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	71	10 P	mg/L
Surrogate			
	% Recovery		
4-Bromofluorobenzene	153		
1,4-Difluorobenzene	80		
Method Modified 8015A*** for Gasoline			
Analyzed by: MF			
Date: 12/22/97			
BENZENE	7600	100 P	µg/L
TOLUENE	12000	100 P	µg/L
ETHYLBENZENE	2800	100 P	µg/L
TOTAL XYLENE	8200	100 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	30600		µg/L
Surrogate			
	% Recovery		
1,4-Difluorobenzene	107		
4-Bromofluorobenzene	97		
Method 8020A ***			
Analyzed by: MF			
Date: 12/22/97			
Total Petroleum Hydrocarbons-Diesel	11	1.0 P	mg/L
Surrogate			
	% Recovery		
n-Pentacosane	114		
Method Modified 8015A*** for Diesel			
Analyzed by: RR			
Date: 12/16/97 01:09:00			

(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.

COMMENTS: Sample contains petroleum hydrocarbons from C10-C24 that resemble a diesel pattern. (C10-C24) RR

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. H9-9712590-10

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-4

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97 14:55:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	16	5 P	mg/L
Surrogate			
	% Recovery		
4-Bromofluorobenzene	100		
1,4-Difluorobenzene	73		
Method Modified 8015A*** for Gasoline			
Analyzed by: MF			
Date: 12/21/97			
BENZENE	230	50 P	µg/L
TOLUENE	750	50 P	µg/L
ETHYLBENZENE	970	50 P	µg/L
TOTAL XYLENE	2300	50 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	4250		µg/L
Surrogate			
	% Recovery		
1,4-Difluorobenzene	100		
4-Bromofluorobenzene	100		
Method 8020A ***			
Analyzed by: MF			
Date: 12/21/97			
Total Petroleum Hydrocarbons-Diesel	3.7	0.2 P	mg/L
Surrogate			
	% Recovery		
n-Pentacosane	110		
Method Modified 8015A*** for Diesel			
Analyzed by: RR			
Date: 12/16/97 01:54:00			

(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.

COMMENTS: Sample contains petroleum hydrocarbons from C10-C24 that resemble a diesel pattern. (C10-C24) RR

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. H9-9712590-11

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: EFF-1-2832

PROJECT NO: 2832.12
 MATRIX: AIR
 DATE SAMPLED: 12/10/97 15:05:00
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	0.001 P	PPMV
TOLUENE	0.013	0.001 P	PPMV
ETHYLBENZENE	0.009	0.001 P	PPMV
TOTAL XYLENE	0.031	0.001 P	PPMV
TOTAL VOLATILE AROMATIC HYDROCARBONS	0.053		PPMV
Method Modified 5030/8020A***			
Analyzed by: RL			
Date: 12/12/97			
Total Petroleum Hydrocarbons	210	5	ppm
Method Modified 8015A Air ***			
Analyzed by: RL			
Date: 12/12/97 04:10:00			

ND - Not detected.

(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. H9-9712590-12

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 12/29/97

PROJECT: BJS Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Provided By SPL
 SAMPLE ID: Trip Blank

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 12/10/97
 DATE RECEIVED: 12/11/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.1 P	mg/L

Surrogate	% Recovery
4-Bromofluorobenzene	103
1,4-Difluorobenzene	73

Method Modified 8015A*** for Gasoline
 Analyzed by: MF
 Date: 12/21/97

BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	100
4-Bromofluorobenzene	100

Method 8020A ***
 Analyzed by: MF
 Date: 12/21/97

ND - Not detected.

(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



** SPL BATCH QUALITY CONTROL REPORT **
 Method Modified 8015A*** for Gasoline

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

Matrix: Aqueous
 Units: mg/L

Batch Id: HP_S971220180900

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Gasoline Range Organics	ND	1.0	0.97	97.0	64 - 131

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	0.15	0.9	1.05	100	1.04	98.9	1.11	36	36 - 160

Analyst: MF

Sequence Date: 12/20/97

SPL ID of sample spiked: 9712676-06A

Sample File ID: SSL3625.TX0

Method Blank File ID:

Blank Spike File ID: SSL3616.TX0

Matrix Spike File ID: SSL3620.TX0

Matrix Spike Duplicate File ID: SSL3621.TX0

* = Values Outside QC Range. « = Data outside Method Specification Limits.

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: SPL-Houston Historical data (1st Q '97)

(***) = Source: SPL-Houston Historical Data (1st Q '97)

SAMPLES IN BATCH(SPL ID):

9712590-01A 9712590-02A 9712590-03A 9712676-04A
 9712676-01A 9712676-06A 9712482-28A 9712482-29A



** SPL BATCH QUALITY CONTROL REPORT **
Method Modified 8015A*** for Gasoline

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

Matrix: Aqueous
Units: mg/L

Batch Id: HP_S971221154900

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Gasoline Range Organics	ND	1.0	1.1	110	64 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	ND	0.9	1.1	122	1.1	122	0	36	36 - 160

Analyst: MF

Sequence Date: 12/21/97

SPL ID of sample spiked: 9712717-05C

Sample File ID: SSL3673A.TX0

Method Blank File ID:

Blank Spike File ID: SSL3649.TX0

Matrix Spike File ID: SSL4007.TX0

Matrix Spike Duplicate File ID: SSL4008.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: SPL-Houston Historical data (1st Q '97)

(***) = Source: SPL-Houston Historical Data (1st Q '97)

SAMPLES IN BATCH(SPL ID):

9712590-07A 9712590-10A 9712590-09A 9712717-01C
 9712717-02C 9712717-03C 9712717-05C 9712717-06C
 9712717-10C 9712717-09C 9712590-05A 9712590-12A
 9712674-01A 9712590-06A 9712590-08A



** SPL BATCH QUALITY CONTROL REPORT **
 Method Modified 8015A*** for Gasoline

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

Matrix: Aqueous
 Units: mg/L

Batch Id: HP_S971222090700

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Gasoline Range Organics	ND	1.0	0.96	96.0	64 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	ND	0.9	1.08	120	0.97	108	10.5	36	36 - 160

Analyst: MF
 Sequence Date: 12/22/97
 SPL ID of sample spiked: 9712717-08C
 Sample File ID: SSL4015.TX0
 Method Blank File ID:
 Blank Spike File ID: SSL4004.TX0
 Matrix Spike File ID: SSL4012.TX0
 Matrix Spike Duplicate File ID: SSL4013.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.
 NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
 ND = Not Detected/Below Detection Limit
 $\% \text{ Recovery} = [(<1> - <2>) / <3>] \times 100$
 $\text{LCS } \% \text{ Recovery} = (<1> / <3>) \times 100$
 $\text{Relative Percent Difference} = [(<4> - <5>) / [(<4> + <5>) \times 0.5]] \times 100$
 (**) = Source: SPL-Houston Historical data (1st Q '97)
 (***) = Source: SPL-Houston Historical Data (1st Q '97)

SAMPLES IN BATCH(SPL ID):

9712717-04C	9712717-07C	9712590-04A	9712482-27A
9712719-17C	9712719-18C	9712719-20C	9712719-21C
9712717-08C	9712676-05A	9712676-07A	9712676-08A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020/602

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_S971220174200

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
MTBE	ND	50	41	82.0	72 - 128
Benzene	ND	50	45	90.0	61 - 119
Toluene	ND	50	44	88.0	65 - 125
EthylBenzene	ND	50	43	86.0	70 - 118
O Xylene	ND	50	44	88.0	72 - 117
M & P Xylene	ND	100	88	88.0	72 - 116

M A T R I X 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		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
MTBE	870	20	780	NC	790	NC	NC	20	39 - 150
BENZENE	ND	20	18	90.0	19	95.0	5.41	21	32 - 164
TOLUENE	ND	20	18	90.0	18	90.0	0	20	38 - 159
ETHYLBENZENE	ND	20	17	85.0	16	80.0	6.06	19	52 - 142
O XYLENE	ND	20	18	90.0	18	90.0	0	18	53 - 143
M & P XYLENE	ND	40	35	87.5	35	87.5	0	17	53 - 144

Analyst: MF

Sequence Date: 12/20/97

SPL ID of sample spiked: 9712676-05A

Sample File ID: S_L3624.TX0

Method Blank File ID:

Blank Spike File ID: S_L3615.TX0

Matrix Spike File ID: S_L3618.TX0

Matrix Spike Duplicate File ID: S_L3619.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: SPL-Houston Historical Data (1st Q '97)

(***) = Source: SPL-Houston Historical Data (1st Q '97)

SAMPLES IN BATCH(SPL ID):

9712482-27A 9712482-28A 9712482-29A 9712590-01A
 9712590-02A 9712590-03A 9712676-04A 9712676-07A
 9712676-08A 9712676-01A 9712674-02A 9712437-03A
 9712676-05A 9712676-06A 9712676-07A 9712676-08A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020/602

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_S971221144000

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
MTBE	ND	50	44	88.0	72 - 128
Benzene	ND	50	43	86.0	61 - 119
Toluene	ND	50	43	86.0	65 - 125
EthylBenzene	ND	50	43	86.0	70 - 118
O Xylene	ND	50	44	88.0	72 - 117
M & P Xylene	ND	100	88	88.0	72 - 116

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
MTBE	ND	20	22	110	19	95.0	14.6	20	39 - 150
BENZENE	3.5	20	28	122	20	82.5	38.6 *	21	32 - 164
TOLUENE	15	20	37	110	28	65.0	51.4 *	20	38 - 159
ETHYLBENZENE	8.9	20	31	110	23	70.5	43.8 *	19	52 - 142
O XYLENE	4.0	20	28	120	21	85.0	34.1 *	18	53 - 143
M & P XYLENE	3.4	40	52	122	38	86.5	34.1 *	17	53 - 144

Analyst: MF

Sequence Date: 12/21/97

SPL ID of sample spiked: 9712590-05A

Sample File ID: S_L3663A.TX0

Method Blank File ID:

Blank Spike File ID: S_L3647.TX0

Matrix Spike File ID: S_L3651.TX0

Matrix Spike Duplicate File ID: S_L3652.TX0

* = Values Outside QC Range. « = Data outside Method Specification Limits.

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: SPL-Houston Historical Data (1st Q '97)

(***) = Source: SPL-Houston Historical Data (1st Q '97)

SAMPLES IN BATCH(SPL ID):

9712590-10A 9712590-09A 9712590-12A 9712674-01A
9712590-06A 9712590-08A 9712590-07A 9712590-04A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020/602

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_S971222093300

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
MTBE	ND	50	42	84.0	72 - 128
Benzene	ND	50	45	90.0	61 - 119
Toluene	ND	50	44	88.0	65 - 125
EthylBenzene	ND	50	43	86.0	70 - 118
O Xylene	ND	50	46	92.0	72 - 117
M & P Xylene	ND	100	89	89.0	72 - 116

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
MTBE	2.1	20	20	89.5	20	89.5	0	20	39 - 150
BENZENE	ND	20	19	95.0	19	95.0	0	21	32 - 164
TOLUENE	ND	20	19	95.0	19	95.0	0	20	38 - 159
ETHYLBENZENE	ND	20	19	95.0	18	90.0	5.41	19	52 - 142
O XYLENE	ND	20	19	95.0	19	95.0	0	18	53 - 143
M & P XYLENE	ND	40	38	95.0	38	95.0	0	17	53 - 144

Analyst: MF

Sequence Date: 12/22/97

SPL ID of sample spiked: 9712778-04A

Sample File ID: S_L4016.TX0

Method Blank File ID:

Blank Spike File ID: S_L4003.TX0

Matrix Spike File ID: S_L4010.TX0

Matrix Spike Duplicate File ID: S_L4011.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: SPL-Houston Historical Data (1st Q '97)

(***) = Source: SPL-Houston Historical Data (1st Q '97)

SAMPLES IN BATCH(SPL ID): 9712778-02A 9712778-01A 9712778-04A 9712674-03A
9712590-04A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020/602

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_S971223163000

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
MTBE	ND	50	52	104	72 - 128
Benzene	ND	50	53	106	61 - 119
Toluene	ND	50	52	104	65 - 125
EthylBenzene	ND	50	51	102	70 - 118
O Xylene	ND	50	53	106	72 - 117
M & P Xylene	ND	100	100	100	72 - 116

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
MTBE	21000	20	4100	NC	4100	NC	NC	20	39 - 150
BENZENE	ND	20	21	105	19	95.0	10.0	21	32 - 164
TOLUENE	ND	20	20	100	20	100	0	20	38 - 159
ETHYLBENZENE	ND	20	19	95.0	19	95.0	0	19	52 - 142
O XYLENE	ND	20	20	100	21	105	4.88	18	53 - 143
M & P XYLENE	ND	40	39	97.5	39	97.5	0	17	53 - 144

Analyst: LJ

Sequence Date: 12/23/97

SPL ID of sample spiked: 9712778-06A

Sample File ID: S_L4053.TX0

Method Blank File ID:

Blank Spike File ID: S_L4041.TX0

Matrix Spike File ID: S_L4061.TX0

Matrix Spike Duplicate File ID: S_L4062.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: SPL-Houston Historical Data (1st Q '97)

(***) = Source: SPL-Houston Historical Data (1st Q '97)

SAMPLES IN BATCH(SPL ID):

9712991-01A 9712991-02A 9712991-05A 9712991-06A
9712991-03A 9712778-06A 9712590-05A 9712778-01A
9712778-03A 9712778-05A



** SPL BATCH QUALITY CONTROL REPORT **
Method Modified 8015A*** for Diesel

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

Matrix: Aqueous
Units: mg/L

Batch Id: HPV971215065200

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Diesel	ND	5.0	4.9	98.0	53 - 148

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
DIESEL	ND	5.0	4.9	98.0	5.0	100	2.02	39	21 - 175

Analyst: RR

Sequence Date: 12/15/97

SPL ID of sample spiked: 9712548-02D

Sample File ID: VVL2107.TX0

Method Blank File ID:

Blank Spike File ID: VVL2104.TX0

Matrix Spike File ID: VVL2108.TX0

Matrix Spike Duplicate File ID: VVL2109.TX0

* = Values Outside QC Range. « = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

% Recovery = $[(<1> - <2>) / <3>] \times 100$

LCS % Recovery = $(<1> / <3>) \times 100$

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

(**) = Source: SPL-Houston Historical Data (4th Q '97)

(***) = Source: SPL-Houston Historical Data (4th Q '97)

SAMPLES IN BATCH(SPL ID):

9712548-07D	9712548-09D	9712548-10D	9712548-11D
9712590-01B	9712590-02B	9712590-03B	9712590-05B
9712590-06B	9712590-07B	9712590-08B	9712590-09B
9712590-10B	9712590-04B	9712548-02D	9712548-01D
9712548-03D	9712548-04D	9712548-06D	



Matrix: Air
 Units: ppm

Batch Id: HP_P971212121900

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		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(**) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	ND	20	19.4	97.0	19.0	95.0	2.08	30	37 - 117
TOLUENE	ND	20	19.2	96.0	19.0	95.0	1.05	30	25 - 113
ETHYLBENZENE	ND	20	18.1	90.5	17.5	87.5	3.37	30	25 - 106
O XYLENE	ND	20	18.0	90.0	17.0	85.0	5.71	30	15 - 109
M & P XYLENE	ND	20	18.2	91.0	17.1	85.5	6.23	30	12 - 114

Analyst: fab
 Sequence Date: 12/12/97
 Method Blank File ID:
 Sample File ID:
 Blank Spike File ID: P_L7103.TX0
 Matrix Spike File ID:
 Matrix Spike Duplicate File ID:

* = Values Outside QC Range. « = Data outside Method Specification limits.
 NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
 ND = Not Detected/Below Detection Limit
 $\% \text{ Recovery} = [(<1> - <2>) / <3>] \times 100$
 $\text{Relative Percent Difference} = [(<4> - <5>) / [(<4> + <5>) \times 0.5]] \times 100$
 (**) = Source: Tempo. Limits & SPL-Houston Hist. Data(1st Qtr'97)

SAMPLES IN BATCH(SPL ID): 9712590-11A 9712618-01A 9712620-01A



Matrix: Air
 Units: ppm

Batch Id: HP_P971212153100

BLANK SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(**) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
TPHAIR	ND	200	100	50.0	94	47.0	6.19	30	20 - 150

Analyst: fab
 Sequence Date: 12/12/97
 Method Blank File ID:
 Sample File ID:
 Blank Spike File ID: PPL7103.TX0
 Matrix Spike File ID:
 Matrix Spike Duplicate File ID:

* = Values Outside QC Range. « = Data outside Method Specification limits.
 NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
 ND = Not Detected/Below Detection Limit
 $\% \text{ Recovery} = [(<1> - <2>) / <3>] \times 100$
 $\text{Relative Percent Difference} = [(<4> - <5>) / [(<4> + <5>) \times 0.5]] \times 100$
 (**) = Source: Temporary limits

SAMPLES IN BATCH(SPL ID): 9712590-11A 9712618-01A 9712620-01A



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 12/12/97
Analyzed on: 12/12/97
Analyst: EM

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Nitrate nitrogen(as N)
Method 353.3 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	2.00	1.84	92.0	92 - 113

-9712516

Samples in batch:

9712590-06C 9712647-01H 9712647-02H 9712647-03H
9712647-04H

COMMENTS:

SPL LCS#: 95535142-26



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 12/12/97
Analyzed on: 12/12/97
Analyst: EM

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Nitrate nitrogen(as N)
Method 353.3 *

SPL Sample ID Number	Method Blank mg/L	Sample Result mg/L	Spike Added mg/L	Matrix Spike		Matrix Spike Duplicate		RPD (%)	QC LIMITS (Advisory)		
				Result mg/L	Recovery %	Result mg/L	Recovery %		RPD Max	% REC	
9712590-06C	ND	ND	0.40	0.38	95.0	0.38	95.0	0	12	84	-125

-9712515

Samples in batch:

9712590-06C 9712647-01H 9712647-02H 9712647-03H
9712647-04H

COMMENTS:



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 12/23/97

Analyzed on: 12/23/97

Analyst: EM

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Sulfate
Method 375.4 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.15	11.12	110	82 - 111

-9712928

Samples in batch:

9712590-06C 9712839-01A 9712868-03E 9712868-04E
9712868-05E 9712947-01E 9712947-02E 9712947-03E
9712947-04E 9712947-05E 9712957-01E 9712957-02E
9712957-03E 9712957-04E 9712957-05E 9712957-06E
9712957-07E 9712957-08E 9712A06-01A 9712A06-02A

COMMENTS:

SPL LCS#: 95535154-3



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 12/23/97
Analyzed on: 12/23/97
Analyst: EM

This sample was randomly selected for use in the SPL quality control program. Samples chosen are fortified with a known concentration in duplicate. The results are as follows:

Sulfate
Method 375.4 *

SPL Sample ID Number	Method Blank mg/L	Sample Result mg/L	Spike Added mg/L	Matrix Spike		Matrix Spike Duplicate		RPD (%)	QC LIMITS (Advisory)		
				Result mg/L	Recovery %	Result mg/L	Recovery %		RPD Max	% REC	
9712590-06C	ND	9.17	10.00	19.34	102	19.14	99.7	2.3	9.5	84	-120

-9712927

Samples in batch:

9712590-06C 9712839-01A 9712868-03E 9712868-04E
9712868-05E 9712947-01E 9712947-02E 9712947-03E
9712947-04E 9712947-05E

COMMENTS:

CHAIN OF CUSTODY
AND
SAMPLE RECEIPT CHECKLIST

SPL Houston Environmental Laboratory

Sample Login Checklist

Date: 12/11/97	Time: 1300
----------------	------------

SPL Sample ID:

9712590

		<u>Yes</u>	<u>No</u>
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:		4 C
10	Method of sample delivery to SPL:		
	SPL Delivery		
	Client Delivery		
	FedEx Delivery (airbill #)		800816702851
	Other:		
11	Method of sample disposal:		
	SPL Disposal	✓	
	HOLD		
	Return to Client		

Name: <i>Mulien Estrada</i>	Date: 12/11/97
-----------------------------	----------------



SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No:

9712590

20212

page of

Client Name: Brown and Caldwell
 Address/Phone: 1415 Louisiana Street Sat 2500
 Client Contact: Rick Rexroad 713-759-0999
 Project Name: BSS Hobbs
 Project Number: 2832.12
 Project Location: Hobbs NM
 Invoice To: Brown and Caldwell

SAMPLE ID	DATE	TIME	comp	grab	matrix		bottle	size	pres.	Number of Containers	Requested Analysis					
					W=water S=soil SL=sludge O=other	A=amber glass V=vial G=glass					1=1 liter 4=4oz 40=vial 8=8oz 16=16oz	1=HCl 2=HNO3 3=H2SO4 O=other	TPH GRO 8015	TPH PRO 8015	Nitrate	Sulfate
MW-8	12/10/97	0842		✓	W	PLG	1-liter	1		5	4	1				
MW-7	12/10/97	0910		✓	W	G	"	"		5	4	1				
MW-6	12/10/97	0950		✓	W	G	"	"		5	4	1				
MW-3	12/10/97	1045		✓	W	G	"	"		5	4	1				
MW-5	12/10/97	1151		✓	W	G	"	"		5	4	1				
MW-10	12/10/97	1251		✓	W	G	40 vials 3-1 liter	HCL		7	4	3	1			
MW-09	12/10/97	1420		✓	W	G	40 vials 3-1 liter	HCL		5	4	1				
MW-2832	12/10/97	—		✓	W	G	"	"		5	4	1				
MW-1	12/10/97	1425		✓	W	G	"	"		5	4	1				
MW-4	12/10/97	1455		✓	W	G	"	"		5	4	1				

RUSH

Client/Consultant Remarks: Laboratory remarks: PCT
 Intact? Y N
 Temp: 4c
 Special Reporting Requirements: Raw Data Fax Results Level 3 QC Level 4 QC
 Standard QC
 1. Relinquished by Sampler: Thomas G. Walsh
 3. Relinquished by:
 5. Relinquished by:
 2. Received by: Fed Ex
 800 816 702851
 4. Received by:
 6/ Received by Laboratory: Walden C. Taylor 12/11/97

Requested TAT: 24hr 72hr Standard Other
 Requested Analysis: TPH GRO 8015, TPH PRO 8015, Nitrate, Sulfate
 Special Detection Limits (specify):
 time: 1600
 date: 12/10/97
 date:
 date:
 PM review (initial):



B R O W N A N D C A L D W E L L

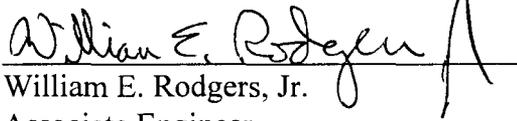
FINAL
JUNE 1997 GROUNDWATER SAMPLING
REPORT
HOBBS, NEW MEXICO FACILITY
BJ SERVICES COMPANY, U.S.A.
DECEMBER 31, 1997

**FINAL
JUNE 1997 GROUNDWATER SAMPLING REPORT
HOBBS, NEW MEXICO FACILITY
BJ SERVICES COMPANY, U.S.A.**

Prepared for

BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas

BC Project Number: 2832.12


William E. Rodgers, Jr.
Associate Engineer

December 31, 1997

Brown and Caldwell
1415 Louisiana, Suite 2500
Houston, Texas 77002 - (713) 759-0999

"This report was prepared in accordance with the standards of the environmental consulting industry at the time it was prepared. It should not be relied upon by parties other than those for whom it was prepared, and then only to the extent of the scope of work which was authorized. This report does not guarantee that no additional environmental contamination beyond that described in this report exists at this site."



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DISTRIBUTION AND QA/QC REVIEWER'S SIGNATURE

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3	Benzene Isoconcentration and Total BTEX Distribution Map for June 12, 1997
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2	Cumulative Groundwater Elevation Data
3	Field Screening Results for Groundwater Samples
4	Cumulative Analytical Results for Groundwater Samples
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B	Laboratory Analytical Report for Groundwater Samples
C	Laboratory Analytical Report for Air Sample

1.0 INTRODUCTION

Brown and Caldwell conducted field activities associated with the June 1997 quarterly groundwater sampling event at BJ Services Company, U.S.A. (BJ Services) facility located at 2708 West County Road, in Hobbs, New Mexico. The facility layout is shown in Figure 1.

The facility formerly operated an above-grade on-site fueling system. Subsurface impact near the fueling system from a diesel fuel release was first detected by the New Mexico Oil Conservation Division (OCD) during an on-site inspection on February 7, 1991. The fueling system was taken out of operation in July 1995. As the result of the diesel fuel release, the New Mexico OCD has required a quarterly groundwater monitoring program to assess the hydrocarbon constituents in the groundwater. A biosparging system was fully activated in November 1995 to remediate soil and groundwater at the facility. A site chronology detailing the history of the fueling system, the groundwater recovery system, and the previous sampling events is presented on Table 1.

During the June 1997 sampling event, groundwater samples were collected and analyzed for gasoline and diesel range total petroleum hydrocarbons (TPH) and for benzene, toluene, ethylbenzene, and total xylenes (BTEX). This report presents the results of the groundwater sampling event, a description of the field activities, and a summary of the analytical results. Also included is a groundwater potentiometric surface map, a benzene concentration map, and a hydrocarbon distribution map. On April 10, 1997, a survey was conducted to determine the top of casing elevations relative to mean sea level (MSL) and the state plane coordinates of the ten monitor wells at the site. The survey data has been used to update the applicable maps and tables presented in this report.

2.0 GROUNDWATER SAMPLING AND ANALYSES

On June 12, 1997 Brown and Caldwell purged and sampled the groundwater monitoring wells to determine concentrations of dissolved-phase hydrocarbons in groundwater at the facility. The following subsection describes the field activities conducted during this sampling event.

2.1 Groundwater Measurements and Sampling

Ten monitoring wells were sampled during the June 1997 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 the 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 2. The groundwater elevation data indicates that the general groundwater flow direction is towards the southeast with a hydraulic gradient of 0.01 ft/ft. A potentiometric surface map is presented in Figure 2. Phase-separated hydrocarbons were detected in monitoring wells MW-1 (0.02 ft), MW-4 (0.44 ft), and MW-9 (0.05 ft) during this sampling event.

Groundwater samples were collected from the monitoring wells on June 12, 1997. The samples were collected after purging the wells with a submersible pump to remove at least three well volumes of groundwater. 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 during the purging and sampling activities to assess the potential for natural attenuation. These parameters were dissolved oxygen, dissolved ferrous iron, and reduction-oxidation potential (redox). The field parameter readings were recorded in the field log book and are listed on the groundwater sampling forms included in Appendix A. The field screening results for groundwater samples are presented on Table 3.

Following recovery, 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 or plastic containers sealed with Teflon[®]-lined lids, labeled, and placed on ice in an insulated cooler for shipment via overnight courier to the analytical laboratory. Each cooler was accompanied by completed chain-of-custody documentation.

The field measurement equipment was decontaminated prior to and after each use. Decontamination procedures consisted of washing with fresh water and a non-phosphate detergent and rinsing with deionized (DI) water. Purged water and excess water generated by equipment cleaning operations were 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 BTEX by EPA Method 5030/8020 and for TPH by EPA Method 8015 Modified for gasoline and diesel.

BTEX constituent concentrations in excess of applicable laboratory detection limits were reported in seven of the 10 groundwater samples obtained during this sampling event. Current and cumulative analytical results for BTEX and TPH gasoline and diesel are presented in Table 4. Benzene concentrations are below the New Mexico Water Quality Control Commission Standard of 0.01 mg/L in monitor wells MW-5, MW-7, MW-8, and MW-9. Figure 3 presents a benzene isoconcentration and total BTEX distribution map for the June 1997 sampling event. A total

petroleum hydrocarbons distribution map for the June 1997 sampling event is presented in Figure 4. The laboratory analytical reports and chain of custody record for the groundwater samples are included in Appendix B.

A total BTEX assimilative capacity for the site of 35,760 micrograms per liter ($\mu\text{g/L}$) was calculated based on background levels of electron acceptors measured at the facility during the August 1996 sampling event. This assimilative capacity is less than the maximum BTEX concentration measured during the June 1997 sampling event of 73,800 $\mu\text{g/L}$ in MW-1. Therefore, the data from the June 1997 sampling event indicates the site lacks sufficient capacity to intrinsically bioremediate the highest dissolved BTEX levels measured in the groundwater.

However, expressed assimilative capacity is generally considered to be a conservative estimate of an aquifer's geochemical ability to fully support intrinsic bioremediation. Expressed assimilative capacity calculations assume that the only electron acceptor available is that currently measured in site groundwater. At this site, an additional electron acceptor (dissolved oxygen) is being added to the site groundwater through the biosparging system. In addition, the expressed assimilative capacity does not consider other important mechanisms which naturally attenuate dissolved-phase groundwater contaminants. The other mechanisms, which include dilution, dispersion, diffusion, adsorption, and volatilization, can be significant mechanisms for natural attenuation.

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 of 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 adsorbed directly to the soil (i.e., residual) as well as contaminants present in soil moisture (i.e., dissolved phase) within the capillary fringe and vadose zone. Additionally, the biosparging system removes volatile contaminants from the saturated zone. 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 in soil moisture present in the capillary fringe and vadose zone. The elevated dissolved oxygen content facilitates the activities of indigenous microorganisms to accelerate biodegradation of contaminants. The flushing of the air also strips volatile and semivolatile contaminants.

The New Mexico OCD approved the RAP on August 11, 1994. The installation of the biosparging system was conducted between August 2 through 24, 1995. Nineteen combined injection/extraction wells, three vacuum extraction wells, associated piping, and one extraction blower and one injection blower were installed. An additional vapor extraction well, VE-4, was installed and connected to the vapor extraction system in April 1997. The vapors recovered during the extraction process are discharged to the atmosphere in accordance with the State of New Mexico Air Quality Regulations.

During the system startup operations, effluent air samples were collected on a monthly basis from the recovered vapors to monitor the bioremediation process and emission rate. Upon receiving a determination from the State of New Mexico that an air permit is not required, effluent air samples have been collected on a quarterly basis. The air samples are analyzed for TPH using EPA Method Modified 8015A (Air) and for total volatile aromatic hydrocarbons (BTEX) using EPA Method 5030/8020 (modified). The analytical results demonstrate a significant reduction in hydrocarbon

vapor concentrations since November 1995. Total BTEX concentrations have decreased from 391 parts per million by volume (ppmv) to 17.3 ppmv. TPH concentrations have decreased from 1,870 ppmv to 65 ppmv. A cumulative summary of analytical results for air emissions testing is included on Table 5. The laboratory analytical report and chain-of-custody documentation for the air sample are included in Appendix C.

Adjustments were made in air injection and extraction rates within the biosparging system following the March 1997 groundwater sampling event in order to direct air flow into recalcitrant areas of the subsurface. Specifically, vapor extraction well VE-4 was added, and flow rates were increased in the upgradient and central portions of the plume, in the area of monitor wells MW-4, MW-1, and MW-3. The vapor extraction system is currently operating at an average flow of 150 cubic feet per minute (cfm) at 125°F. The air injection system is operating at an average flow of 40 cfm at 5 pounds per square inch (psi) at 188°F. Total BTEX emissions of 0.03 pounds per hour (lb/hr) and TPH emissions of 0.08 lb/hr were calculated for the June 1997 monitoring event.

Review of data presented in Table 4 indicates that concentrations of benzene and total BTEX have decreased in monitor wells MW-7, MW-8 and MW-10, located in the downgradient portion of the plume, during the time period from the start-up of the biosparging system in November 1995 to the present. Substantial reductions in benzene, total BTEX, and TPH concentrations have occurred between March 1997 and June 1997 in monitor wells MW-4 and MW-9, which are located in the generally upgradient portion of the plume. Increases in hydrocarbon concentrations such as those observed in monitor wells MW-1 and MW-3 during the period from March 1997 to June 1997 are anticipated during operation of the biosparging system, as air flow is redirected into areas of the subsurface that were only minimally affected previously by the operation of the remedial system. Samples collected from MW-1, MW-3, MW-6, MW-10 and MW-11 exhibited increases in BTEX concentrations relative to the previous sampling event. Fluctuations in concentrations have been previously observed in site monitor wells over the course of remediation. These fluctuations may be attributed to the presence of PSH, which acts as a continuing source of dissolved phase BTEX. These fluctuations are likely to continue until the PSH is removed

through a combination of passive recovery and volatilization by sparging and soil vapor extraction.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on information obtained during the June 1997 quarterly groundwater sampling event.

4.1 Conclusions

- Groundwater flow was to the southeast with an average hydraulic gradient of 0.01 ft/ft.
- Dissolved BTEX constituent concentrations have generally decreased in monitor wells MW-4 and MW-9 during the time period from March 1997 to June 1997.
- BTEX constituent concentrations have generally increased in monitor wells MW-1, MW-3, MW-6, MW-10, and MW-11 during the March 1997 to June 1997 time period. These short term variations in BTEX concentrations are anticipated during operation of the biosparging system.
- An additional vapor extraction well, VE-4, was installed and connected to the vapor extraction system in April 1997.
- Modifications to air injection and extraction rates have been made to apply increased air flow to the central portion of the plume.
- Substantial reductions in the thickness of phase separated hydrocarbons in monitor wells MW-9 and MW-1 were observed during the period from March 1997 to June 1997.
- Benzene concentrations in monitor wells MW-5, MW-7, MW-8, and MW-9 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.

DISTRIBUTION

Final
June 1997 Groundwater Sampling Report
Hobbs, New Mexico

December 31, 1997

1 copy to: State of New Mexico
Energy, Minerals, and Natural Resources Dept.
Oil Conservation Division
Post Office Box 2088, State Land Office Building
Santa Fe, New Mexico 87504

Attention: Mr. Mark Ashley

1 copy to: State of New Mexico
Oil Conservation Division, Hobbs District Office
Post Office Box 1980
Hobbs, New Mexico 88240

Attention: Mr. Wayne Price

1 copy to: BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas 77381

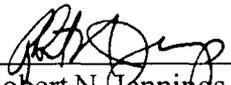
Attention: Ms. Jo Ann Cobb

1 copy to: BJ Services Company, U.S.A.
2708 West County Road
Hobbs, New Mexico 88240

Attention: Mr. Clint Chamberlain

1 copy to: Brown and Caldwell
Project File

QUALITY CONTROL REVIEWER

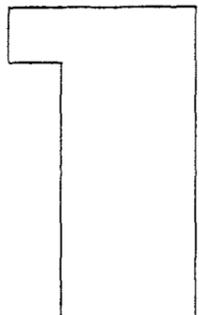
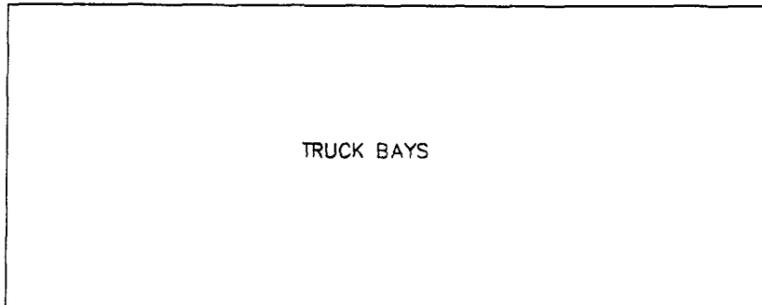
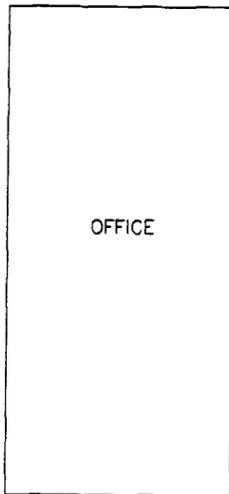
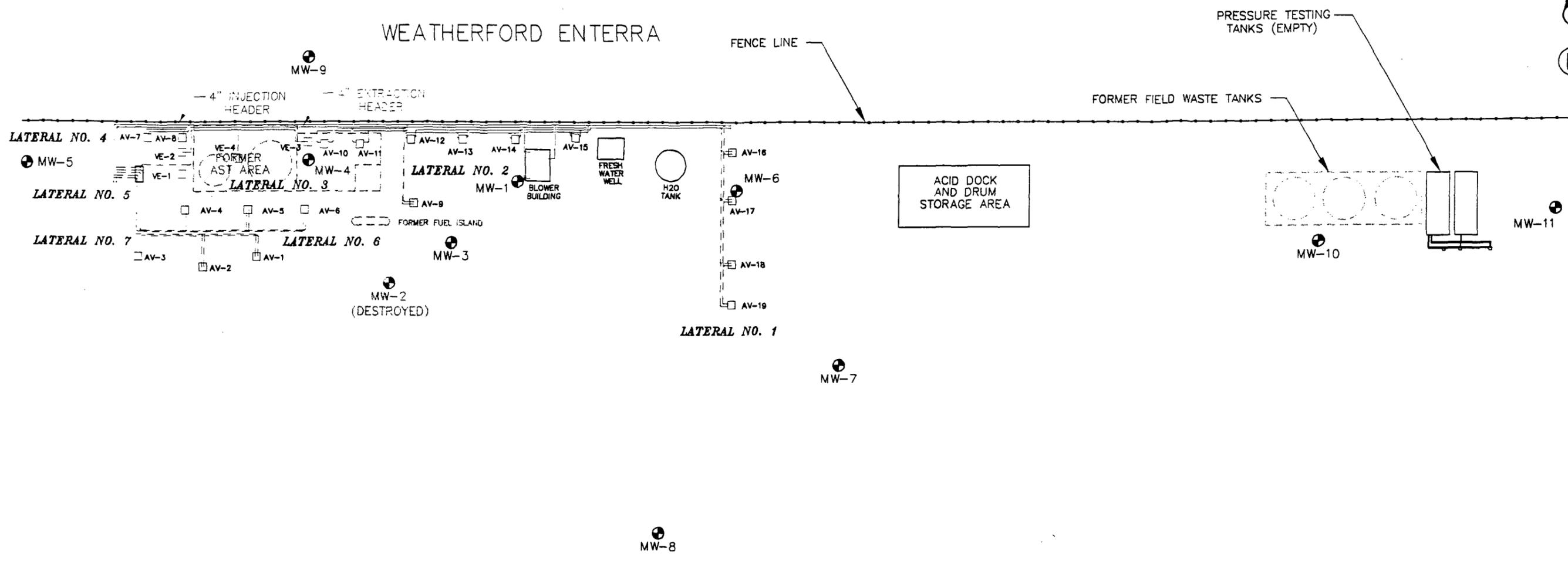


Robert N. Jennings, P.E.
Vice President

WER/RLR/uak
\\StreetTalk\FS DATA@Homer@Servers\WP\bjserv\2832\024r.doc

FIGURES

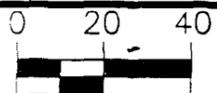
WEATHERFORD ENTERRA



I:\2832\NEWSURVY (1=30) 05-07-97 JEB

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL



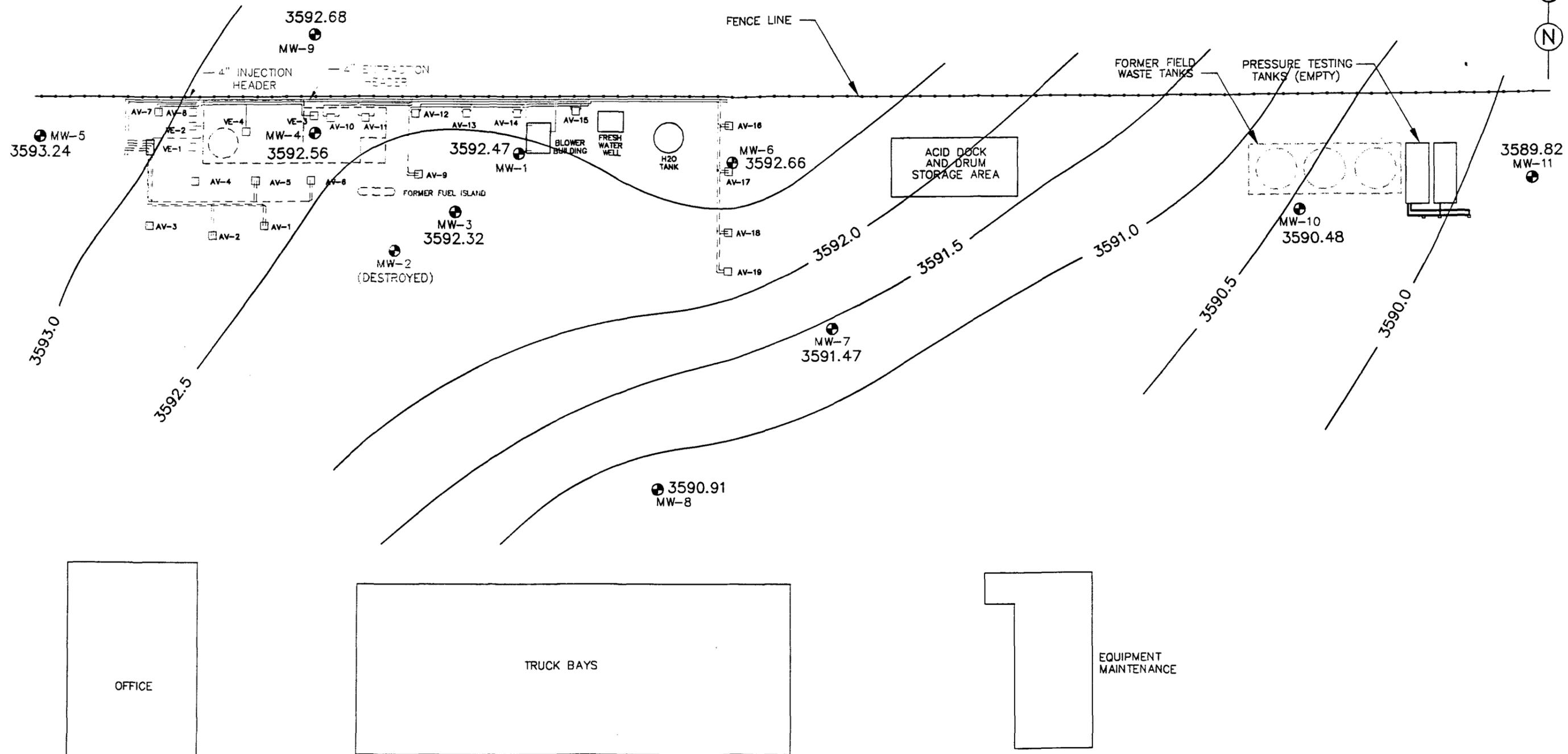
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CHK'D BY: _____ DATE _____
APPROVED: _____ DATE _____

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	SITE MAP	DATE	05/07/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-12
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	1

WEATHERFORD ENTERRA



T:\2832\POTN0697 (1-40) 07-07-97 JEB

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 20 40

SCALE: 1" = 40'

DRAWN BY: JEB DATE: 7/97

CHK'D BY: _____ DATE: _____

APPROVED: _____ DATE: _____

LEGEND

MW-8 3593.24 MONITORING WELL LOCATION AND IDENTIFICATION

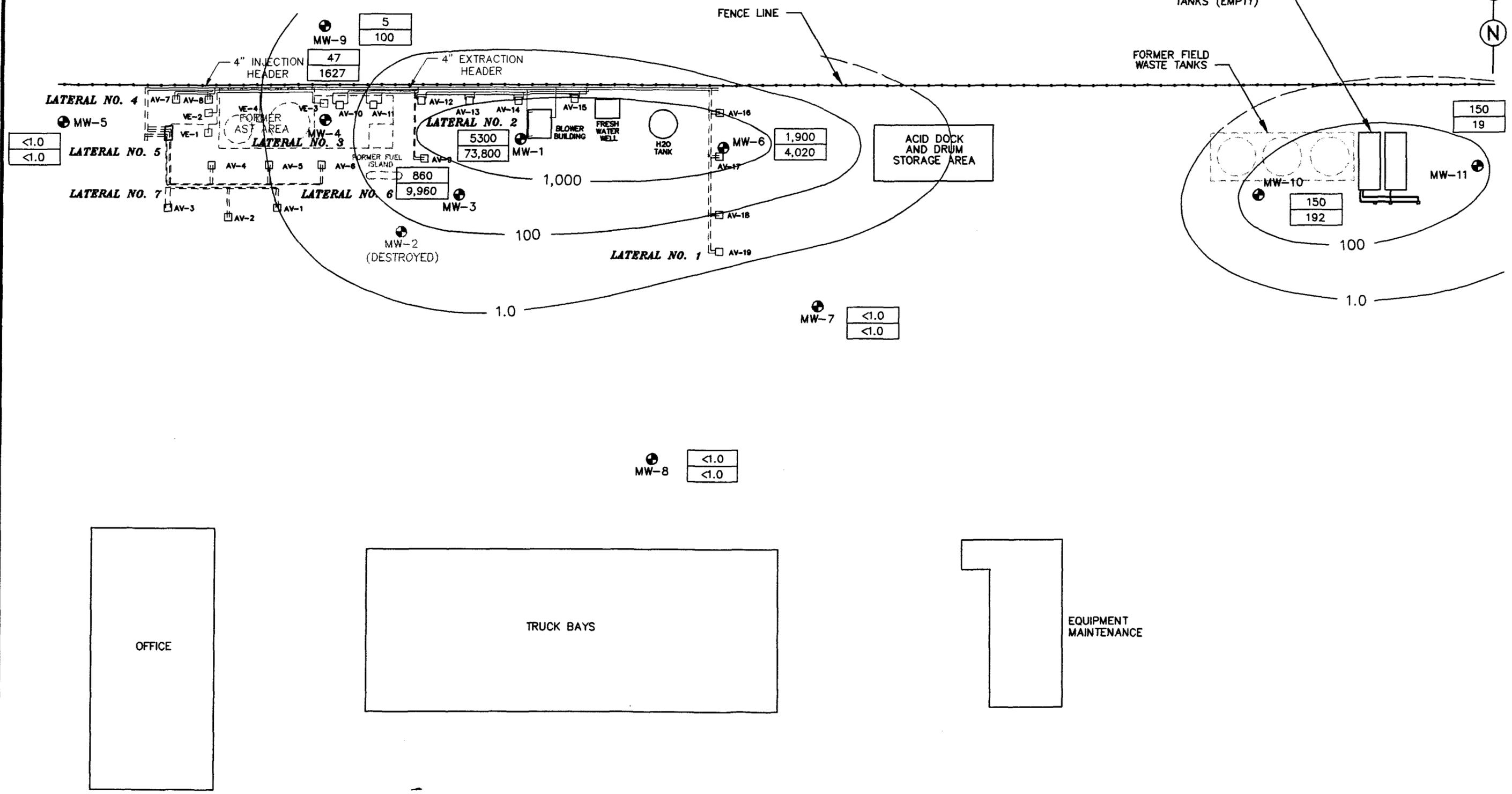
3593.24 POTENTIOMETRIC SURFACE ELEVATION, FT.

-3592.5/ POTENTIOMETRIC SURFACE CONTOUR, FT.

TITLE	POTENTIOMETRIC SURFACE MAP FOR JUNE 12, 1997
CLIENT	BJ SERVICES COMPANY, U.S.A.
SITE	HOBBS, NEW MEXICO

DATE	07/07/97
PROJECT NUMBER	2832-12
FIGURE NUMBER	2

WEATHERFORD ENTERRA



OFFICE

TRUCK BAYS

EQUIPMENT MAINTENANCE

T:\2832\BENZ0697 (1=40) 10-09-97 JEB

BROWN AND CALDWELL
HOUSTON, TEXAS
SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL

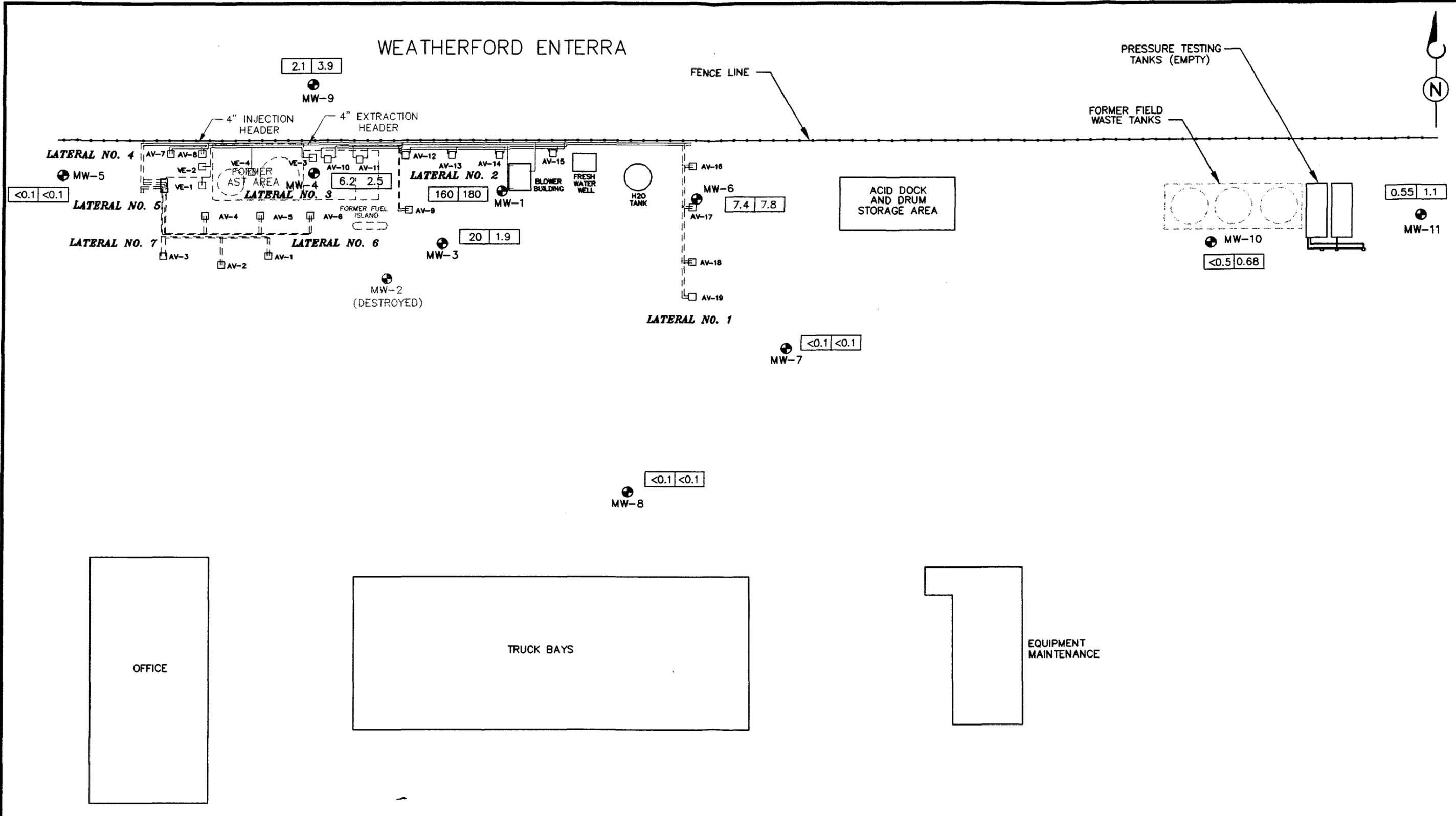
0 20 40
SCALE: 1" = 40'
DRAWN BY: JEB DATE 10/97
CHK'D BY: _____ DATE _____
APPROVED: _____ DATE _____

LEGEND
 MONITORING WELL LOCATION AND IDENTIFICATION
 BENZENE CONCENTRATION (ug/L)
 TOTAL BTEX CONCENTRATION (ug/L)
 BENZENE CONCENTRATION CONTOUR (ug/L) - JUNE 1997

TITLE: BENZENE ISOCONCENTRATION AND TOTAL BTEX DISTRIBUTION MAP FOR JUNE 12, 1997
 CLIENT: BJ SERVICES COMPANY, U.S.A.
 SITE: HOBBS, NEW MEXICO

DATE: 10/09/97
 PROJECT NUMBER: 2832-12
 FIGURE NUMBER: 3

WEATHERFORD ENTERRA



T:\2832\HYC0697 (1-40) 10-09-97 JEB

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER
APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 20 40
SCALE: 1" = 40'
DRAWN BY: JEB DATE 10/97
CHK'D BY: _____ DATE _____
APPROVED: _____ DATE _____

LEGEND
 MONITORING WELL LOCATION AND IDENTIFICATION
 11 | 1.8 TPH-G | TPH-D (mg/L)

TITLE	TOTAL PETROLEUM HYDROCARBONS DISTRIBUTION MAP FOR JUNE 12, 1997	DATE	10/09/97
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2832-12
SITE	HOBBS, NEW MEXICO	FIGURE NUMBER	4

Tables

TABLES

Table 1
Site Chronology
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
February 7, 1991	The State of New Mexico Oil Conservation Division (OCD) conducted an on-site inspection, including sampling of the on-site fresh water well.
August 6, 1991	OCD requested submittal of an investigation work plan.
September 5, 1991	Roberts/Schornick and Associates, Inc. (RSA) submitted Technical Work Plan for soil and groundwater investigation to the OCD.
November 15, 1991	The OCD approved Technical Work Plan submitted by RSA.
December 16, 1991	RSA sampled the fresh water well. Analytical results were submitted to the OCD.
February 21, 1992	Western sampled the fresh water well. Analytical results were submitted to the OCD.
July 29 - August 10, 1992	Brown and Caldwell conducted a soil and groundwater investigation according to the approved Technical Work Plan. Investigation included drilling and sampling 9 soil borings, sampling 6 hand-augured soil borings, the installation and sampling of 5 monitoring wells, and the sampling of the fresh water well.
October 12, 1992	Brown and Caldwell submitted Soil and Groundwater Investigation Report to the OCD.
December 2, 1992	The OCD requested the installation and sampling of 4 additional monitoring wells, including a monitoring well on an adjacent property.
April 13, 1993	Brown and Caldwell conducted a vapor extraction pilot test on existing groundwater monitoring wells.
April 15, 1993	Brown and Caldwell installed off-site monitoring well.
April 22, 1993	Brown and Caldwell sampled off-site monitoring well.
May 27, 1993	Brown and Caldwell submitted a letter report documenting the installation and sampling of the off-site monitoring well to the OCD.
June 2, 1993	Brown and Caldwell conducted a short-term aquifer test using the fresh water well at the facility.
June 8, 1993	USTank Management, Inc. conducted a non-volumetric tank system tightness test on the diesel and unleaded gasoline aboveground storage tanks at the facility.
June 21, 1993	ENSR Consulting and Engineering (ENSR), the environmental consultant of the adjacent property owner on which the off-site well is located, submitted a request to sample the off-site monitoring well.
July 15, 1993	ENSR split one groundwater sample, collected from the off-site monitoring well, with Brown and Caldwell.

Table 1 (Continued)
Site Chronology
BJ Services Company, U.S.A.
Hobbs, New Mexico

Date	Activity
July 30, 1993	USTank Management, Inc. submitted the tank tightness test report to Brown and Caldwell. The report indicated that both tanks and their associated piping passed.
August 16-19, 1993	Brown and Caldwell installed two additional downgradient monitoring wells. Brown and Caldwell sampled each of the existing monitoring and the newly installed monitoring wells.
January 26, 1994	Brown and Caldwell performed groundwater monitoring event; existing monitoring wells and the fresh water well were purged and sampled. Groundwater samples were analyzed for BTEX.
May 6, 1994	Remedial Action Plan (RAP) submitted to the OCD.
August 11, 1994	RAP approved by the OCD.
May 3, 1995	Brown and Caldwell conducted the May 1995 groundwater sampling event.
July 31, 1995	Brown and Caldwell conducted the July 1995 groundwater sampling event.
August 2-9, 1995	Installation of biosparging system was initiated. Nineteen combined injection/extraction wells and three vacuum extraction wells were installed.
August 14-26, 1995	Remedial Construction Services, Inc. (RCS) began construction of the biosparging system.
September 19, 1995	Began operation of the extraction portion of the biosparging system.
November 13, 1995	Began operation of the injection portion of the biosparging system.
November 14, 1995	Brown and Caldwell conducted the November 1995 groundwater sampling event.
February 23, 1996	Brown and Caldwell conducted the February 1996 groundwater sampling event.
May 31, 1996	Brown and Caldwell conducted the May 1996 groundwater sampling event.
August 23, 1996	Brown and Caldwell conducted the August 1996 groundwater sampling event.
December 2, 1996	Brown and Caldwell conducted the December 1996 groundwater sampling event.
March 12, 1997	Brown and Caldwell conducted the March 1997 groundwater sampling event.
March 14, 1997	Vapor extraction well VE-4 installed.
April 1997	Vapor extraction well VE-4 connected to the vapor extraction system.
June 12, 1997	Brown and Caldwell conducted the June 1997 groundwater sampling event.

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-1						
	3,647.53	8/10/92	53.22	0.00	3,594.31	(1)
	3,647.53	2/9/93	53.03	0.00	3,594.50	
	3,647.53	8/18/93	53.10	0.00	3,594.43	
	3,647.53	1/26/94	53.31	0.00	3,594.22	
	3,647.53	5/3/95	54.64	0.20	3,593.05	
	3,647.53	7/31/95	54.14	0.00	3,593.39	
	3,647.53	11/14/95	53.69	0.00	3,593.84	
	3,647.53	2/23/96	54.32	0.00	3,593.21	
	3,647.53	5/31/96	54.14	0.00	3,593.39	
	3,647.53	8/23/96	56.17	0.00	3,591.36	
	3,647.53	12/2/96	55.27	0.00	3,592.26	
	3,647.53	3/12/97	55.70	0.27	3,592.05	(2)
	3,647.53	6/12/97	55.08	0.02	3,592.47	
MW-2						
	3,647.59	8/10/92	52.82	0.00	3,594.77	(1)
	3,644.84	2/9/93	49.60	0.00	3,595.24	
	3,644.84	8/18/93	49.71	0.00	3,595.13	
	3,644.84	1/26/94	49.97	0.00	3,594.87	
		5/3/95				Monitor well destroyed
MW-3						
	3,647.68	8/10/92	52.99	0.00	3,594.69	(1)
	3,647.68	2/9/93	52.72	0.00	3,594.96	
	3,647.68	8/18/93	52.82	0.00	3,594.86	
	3,647.68	1/26/94	53.05	0.00	3,594.63	
	3,647.68	5/3/95	54.31	0.00	3,593.37	
	3,645.00	7/31/95	51.24	0.00	3,593.76	
	3,645.00	11/14/95	51.10	0.00	3,593.90	
	3,645.00	2/23/96	51.68	0.00	3,593.32	
	3,645.00	5/31/96	51.45	0.00	3,593.55	
	3,645.00	8/23/96	51.55	0.00	3,593.45	
	3,645.00	12/2/96	52.23	0.00	3,592.77	
	3,645.00	3/12/97	52.67	0.00	3,592.33	(2)
	3,645.00	6/12/97	52.68	0.00	3,592.32	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-4						
	3,645.28	8/10/92	50.55	0.00	3,594.73	(1)
	3,645.28	2/9/93	50.26	0.00	3,595.02	
	3,645.28	8/18/93	50.38	0.00	3,594.90	
	3,645.28	1/26/94	50.90	0.30	3,594.63	
	3,645.28	5/3/95	51.51	0.45	3,594.14	
	3,645.28	7/31/95	51.74	0.26	3,593.75	
	3,645.28	11/14/95	51.03	0.00	3,594.25	
	3,645.28	2/23/96	51.65	0.01	3,593.64	
	3,645.28	5/31/96	51.48	0.00	3,593.80	
	3,645.28	8/23/96	53.49	0.00	3,591.79	
	3,645.28	12/2/96	52.32	0.00	3,592.96	
	3,645.28	3/12/97	52.74	0.05	3,592.58	(2)
	3,645.28	6/12/97	53.08	0.44	3,592.56	
MW-5						
	3,647.72	8/10/92	52.38	0.00	3,595.34	(1)
	3,647.72	2/9/93	52.06	0.00	3,595.66	
	3,647.72	8/18/93	52.16	0.00	3,595.56	
	3,647.72	1/26/94	52.50	0.00	3,595.22	
	3,647.72	5/3/95	53.57	0.00	3,594.15	
	3,647.72	7/31/95	53.27	0.00	3,594.45	
	3,647.72	11/14/95	52.83	0.00	3,594.89	
	3,647.72	2/23/96	53.57	0.00	3,594.15	
	3,647.72	5/31/96	53.16	0.00	3,594.56	
	3,647.72	8/23/96	53.41	0.00	3,594.31	
	3,647.72	12/2/96	53.98	0.00	3,593.74	
	3,647.72	3/12/97	54.44	0.00	3,593.28	(2)
	3,647.72	6/12/97	54.48	0.00	3,593.24	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-6	3,644.74	2/9/93	50.58	0.00	3,594.16	(1)
	3,644.74	8/18/93	50.78	0.00	3,593.96	
	3,644.74	1/26/94	51.00	0.00	3,593.74	
	3,644.74	5/3/95	52.63	0.00	3,592.11	
	3,644.74	7/31/95	51.90	0.00	3,592.84	
	3,644.74	11/14/95	51.19	0.00	3,593.55	
	3,644.74	2/23/96	52.10	0.00	3,592.64	
	3,644.74	5/31/96	51.76	0.00	3,592.98	
	3,644.74	8/23/96	51.63	0.00	3,593.11	
	3,644.74	12/2/96	52.85	0.00	3,591.89	
	3,644.74	3/12/97	53.55	0.00	3,591.19	(2)
	3,644.74	6/12/97	52.08	0.00	3,592.66	
	MW-7	3,644.55	2/9/93	50.53	0.00	3,594.02
3,644.55		8/18/93	50.74	0.00	3,593.81	
3,644.55		1/26/94	51.01	0.00	3,593.54	
3,644.55		5/3/95	52.25	0.00	3,592.30	
3,644.55		7/31/95	51.92	0.00	3,592.63	
3,644.55		11/14/95	51.48	0.00	3,593.07	
3,644.55		2/23/96	52.15	0.00	3,592.40	
3,644.55		5/31/96	51.78	0.00	3,592.77	
3,644.55		8/23/96	52.02	0.00	3,592.53	
3,644.55		12/2/96	52.52	0.00	3,592.03	
3,644.55		3/12/97	52.99	0.00	3,591.56	(2)
3,644.55		6/12/97	53.08	0.00	3,591.47	

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-8	3,644.87	2/9/93	50.48	0.00	3,594.39	(1)
	3,644.87	8/18/93	50.67	0.00	3,594.20	
	3,644.87	1/26/94	50.96	0.00	3,593.91	
	3,644.87	5/3/95	52.15	0.00	3,592.72	
	3,644.87	7/31/95	51.77	0.00	3,593.10	
	3,644.87	11/14/95	51.37	0.00	3,593.50	
	3,644.87	2/23/96	52.17	0.00	3,592.70	
	3,644.87	5/31/96	51.55	0.00	3,593.32	
	3,644.87	8/23/96	51.92	0.00	3,592.95	
	3,644.87	12/2/96	52.43	0.00	3,592.44	
	3,644.87	3/12/97	52.93	0.00	3,591.94	(2)
	3,644.87	6/12/97	53.96	0.00	3,590.91	
	MW-9	3,644.78	4/22/93	49.73	0.00	3,595.05
3,644.78		7/15/93	49.65	0.00	3,595.13	
3,644.78		8/18/93	49.85	0.00	3,594.93	
3,644.78		1/26/94	50.02	0.00	3,594.76	
3,644.78		5/3/95	51.35	0.00	3,593.43	
3,644.78		7/31/95	50.97	0.00	3,593.81	
3,644.78		11/14/95	50.43	0.00	3,594.35	
3,644.78		2/23/96	51.12	0.00	3,593.66	
3,644.78		5/31/96	50.89	0.00	3,593.89	
3,644.78		8/23/96	50.98	0.00	3,593.80	
3,644.78		12/2/96	51.58	0.00	3,593.20	
3,644.78		3/12/97	52.21	0.05	3,592.61	(2)
3,644.78		6/12/97	52.10	0.00	3,592.68	PSH sheen

Table 2
 Cumulative Groundwater Elevation Data
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-10						
	3,644.47	8/18/93	51.54	0.00	3,592.93	(1)
	3,644.47	1/26/94	51.90	0.00	3,592.57	
	3,644.47	5/3/95	52.97	0.00	3,591.50	
	3,644.47	7/31/95	52.87	0.00	3,591.60	
	3,644.47	11/14/95	52.51	0.00	3,591.96	
	3,644.47	2/23/96	53.05	0.00	3,591.42	
	3,644.47	5/31/96	52.79	0.00	3,591.68	
	3,644.47	8/23/96	53.03	0.00	3,591.44	
	3,644.47	12/2/96	53.41	0.00	3,591.06	
	3,644.47	3/12/97	54.21	0.00	3,590.26	(2)
	3,644.47	6/12/97	53.99	0.00	3,590.48	
MW-11						
	3,643.78	8/18/93	51.92	0.00	3,591.86	(1)
	3,643.78	1/26/94	52.32	0.00	3,591.46	
	3,643.78	5/3/95	53.38	0.00	3,590.40	
	3,643.78	7/31/95	53.35	0.00	3,590.43	
	3,643.78	11/14/95	52.96	0.00	3,590.82	
	3,643.78	2/23/96	53.50	0.00	3,590.28	
	3,643.78	5/31/96	53.25	0.00	3,590.53	
	3,643.78	8/23/96	53.49	0.00	3,590.29	
	3,643.78	12/2/96	53.79	0.00	3,589.99	
	3,643.78	3/12/97	53.81	0.00	3,589.97	(2)
	3,643.78	6/12/97	53.96	0.00	3,589.82	

(1) Top of casing elevations and groundwater elevations of all monitor wells were relative to an arbitrary datum of 100.00 feet prior to March 1997 and have been converted to Mean Sea Level (MSL).

(2) Top of casing elevations and groundwater elevations relative to MSL after March 1997.

(3) MW-2 could not be located and is assumed destroyed after January, 1994.

Table 3
Field Screening Results for Groundwater Samples
Hobbs, New Mexico Facility
BJ Services Company, U.S.A.

Monitoring Well	Date Measured	Well Volume	pH	Conductivity (µmhos)	Temperature (°C)	Redox (mV)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)
MW-3	6/12/97	1	7.12	1,340	19.2	-54	3.80	
		2	7.12	1,350	19.2	-62	3.70	
		3	7.11	1,350	19.2	-68	3.70	0.0
MW-5	6/12/97	1	7.17	1,270	18.9	118	4.99	
		2	7.12	1,240	18.8	117	4.48	
		3	7.17	1,220	18.9	113	4.11	0.0
MW-6	6/12/97	1	7.47	1,120	19.1	136	5.83	
		2	7.34	1,230	19.4	112	5.86	
		3	7.33	1,240	19.4	109	5.01	0.0
MW-7	6/12/97	1	6.68	1,840	19.8	114	3.16	
		2	6.66	1,790	19.9	108	2.48	
		3	6.67	1,760	19.8	103	2.78	0.0
MW-8	6/12/97	1	6.96	1,940	19.0	71	2.84	
		2	6.86	1,920	19.1	84	2.68	
		3	6.84	1,910	19.1	78	2.65	0.0
MW-10	6/12/97	1	6.87	5,800	19.6	-109	0.78	
		2	6.90	5,700	19.6	-106	0.68	
		3	6.89	5,600	19.6	-111	0.58	7.0
MW-11	6/12/97	1	7.33	1,240	19.4	109	3.01	
		2	7.07	8,870	19.4	-70	2.59	
		3	7.13	8,830	19.3	-69	2.70	2.0

MW-2 could not be located and assumed destroyed after January, 1994.

NR = No Reading

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-1	8/10/92	Regular	5550	12090	2160	7370	NA	NA
	2/9/93	Regular	2100	6500	1300	7400	NA	NA
	8/19/93	Regular	3200	7300	1200	3700	NA	NA
	1/27/94	Regular	1930	4580	672	2390	NA	NA
	5/3/95	Regular	NSP	NSP	NSP	NSP	NA	NSP
	8/1/95	Regular	390	1300	230	800	NA	5.7
	11/15/95	Regular	880	1800	300	970	NA	6.8
	2/23/96	Regular	1500	3700	620	2200	NA	21
	5/31/96	Regular	1100	1700	380	990	NA	7.5
	8/23/96	Regular	1800	3300	570	2100	NA	17
	12/2/96	Regular	5600	9600	2100	9600	100	64
	3/12/97	Regular	5500	9700	2600	8200	22	62
	6/12/97	Regular	5300	34000	7500	27000	180	160
MW-2	8/10/92	Regular	14.9	< 4	< 4	< 4	NA	NA
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	100	12	3	13	NA	NA
	1/27/94	Regular	< 1	1.2	2	2.5	NA	NA
MW-3	8/10/92	Regular	304.9	2099	6760	1586	NA	NA
	2/9/93	Regular	130	< 10	< 10	190	NA	NA
	8/19/93	Regular	560	3100	630	1900	NA	NA
	1/27/94	Regular	1070	5380	510	3120	NA	NA
	5/4/95	Regular	770	3300	470	1800	NA	NA
	8/1/95	Regular	490	2900	890	1600	NA	14
	11/15/95	Regular	250	1000	180	440	NA	2.9
	2/23/96	Regular	120	810	170	560	NA	4
	5/31/96	Regular	670	3900	1200	2300	NA	15
	8/23/96	Regular	330	2200	590	1500	NA	12
	12/2/96	Regular	220	1800	670	1000	0.89	7.4
	3/12/97	Regular	370	2000	960	1400	1.8	11
	6/12/97	Regular	860	4800	1700	2600	1.9	20

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L					
MW-4	8/10/92	Regular	2594	10360	2160	6740	NA	NA
	2/9/93	Regular	5200	15000	2200	10000	NA	NA
	8/19/93	Regular	3000	12000	< 2000	7000	NA	NA
	1/27/94	Regular	NSP	NSP	NSP	NSP	NA	NSP
	5/3/95	Regular	NSP	NSP	NSP	NSP	NA	NSP
	8/1/95	Regular	5700	17000	3500	13000	NA	120
	11/15/95	Regular	490	1600	310	1100	NA	5.2
	2/23/96	Regular	360	2800	560	2500	NA	18
	5/31/96	Regular	84	830	280	1100	NA	6.2
	8/23/96	Regular	110	1400	430	1800	NA	9.8
	12/2/96	Regular	190	2000	1800	7200	56	43
	3/12/97	Regular	220	1500	1500	4400	27	27
	6/12/97	Regular	47	270	360	950	2.5	6.2
MW-5	8/10/92	Regular	< 4	< 4	< 4	< 4	NA	NA
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/10/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	1/27/94	Regular	8.7	29.9	4	11.3	NA	NA
	5/3/95	Regular	3.7	5.3	0.92	4.6	NA	NA
	8/1/95	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	11/15/95	Regular	< 0.3	1.2	< 0.3	1.5	NA	NA
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	5/31/96	Regular	31	86	10	20	NA	NA
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-6								
	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	7000	19000	3100	7200	NA	NA
	8/19/93	Regular	8100	19000	3500	6400	NA	NA
	1/27/94	Regular	7960	20200	3830	6150	NA	NA
	5/4/95	Regular	11000	17000	2900	6000	NA	NA
	8/1/95	Regular	8300	12000	2500	5100	NA	60
	11/15/95	Regular	8900	17000	2900	5500	NA	57
	2/23/96	Regular	8100	10000	2300	4000	NA	58
	5/31/96	Regular	83	150	15	51	NA	0.57
	5/31/96	Duplicate	87	160	13	47	NA	0.52
	8/23/96	Regular	31	28	9.4	7.9	NA	0.46
	12/2/96	Regular	< 1	< 1	< 1	1.7	5.6	< 0.1
	3/12/97	Regular	12	< 5	6.8	18	12	< 0.5
	6/12/97	Regular	1900	1400	410	310	7.8	7.4
MW-7								
	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	< 2	3	< 2	< 2	NA	NA
	1/27/94	Regular	1.1	< 1	< 1	< 1	NA	NA
	5/3/95	Regular	52	3.4	0.67	2.8	NA	NA
	8/1/95	Regular	22	2.2	0.85	2.8	NA	< 0.1
	11/15/95	Regular	8.4	0.77	< 0.3	0.93	NA	< 0.1
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	2/23/96	Duplicate	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	5/31/96	Regular	29	83	10	21	NA	0.25
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-8	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	< 2	< 2	< 2	< 6	NA	NA
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA	NA
	1/27/94	Regular	< 1	< 1	< 1	< 1	NA	NA
	5/3/95	Regular	3	4.9	0.75	3.7	NA	NA
	8/1/95	Regular	3.1	1.2	0.47	1.6	NA	< 0.001
	8/1/95	Duplicate	3.6	1.5	0.51	1.5	NA	< 0.1
	11/15/95	Regular	< 0.3	0.52	< 0.3	< 0.6	NA	< 0.1
	2/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	5/31/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
	12/2/96	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	3/12/97	Regular	< 1	< 1	< 1	1.8	< 0.1	< 0.1
	6/12/97	Regular	< 1	< 1	< 1	< 1	< 0.1	< 0.1
	MW-9	4/22/93	Regular	570	380	< 50	870	NA
7/15/93		Regular	121	7.3	3	458	NA	NA
8/19/93		Regular	390	290	40	250	NA	NA
1/27/94		Regular	327	357	51.1	293	NA	NA
5/3/95		Regular	380	110	19	120	NA	NA
8/1/95		Regular	660	410	91	310	NA	6.2
11/15/95		Regular	240	24	11	140	NA	1.5
11/15/95		Duplicate	170	18	10	120	NA	1.9
2/23/96		Regular	170	18	2.3	160	NA	4.3
5/31/96		Regular	120	16	3	200	NA	NA
8/23/96		Regular	82	13	6	270	NA	4
8/23/96		Duplicate	76	14	4.8	250	NA	4.4
12/2/96		Regular	61	< 25	< 25	210	2.6	2.8
12/2/96		Duplicate	86	13	2.4	270	3.7	2.9
3/12/97		Regular	30	48	420	880	8.2	19
6/12/97	Regular	4.7	2.1	11	97	2.6	2.2	
6/12/97	Duplicate	< 5	< 5	6.6	69	5.2	1.9	

Table 4
 Cumulative Analytical Results for Groundwater Samples
 Hobbs, New Mexico Facility
 BJ Services Company, U.S.A.

Well ID	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, µg/L				milligrams per liter, mg/L	
MW-10								
	8/19/93	Regular	190	460	< 200	240	NA	NA
	1/27/94	Regular	13.4	4	5.5	33.6	NA	NA
	5/4/95	Regular	980	15	11	84	NA	NA
	8/1/95	Regular	1300	32	32	100	NA	3.6
	11/15/95	Regular	1000	24	15	36	NA	1.7
	2/23/96	Regular	810	23	27	44	NA	2.4
	5/31/96	Regular	700	24	34	28	NA	2
	8/23/96	Regular	290	3.4	6.4	13	NA	1.4
	12/2/96	Regular	280	1.3	17	8	0.94	0.97
	3/12/97	Regular	110	< 5	17	< 5	0.61	0.57
	6/12/97	Regular	150	12	30	< 5	0.68	< 0.5
MW-11								
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA	NA
	1/27/94	Regular	< 1	< 1	< 1	< 1	NA	NA
	5/4/95	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	8/1/95	Regular	44	29	5.5	13	NA	0.2
	11/15/95	Regular	190	2.8	6.2	11	NA	0.4
	2/23/96	Regular	49	1.2	0.51	4	NA	0.25
	5/31/96	Regular	300	83	12	28	NA	0.8
	8/23/96	Regular	100	1.2	0.3	4.7	NA	0.26
	12/2/96	Regular	970	< 5	6	8.1	2	1.3
	3/12/97	Regular	130	< 5	13	5.8	0.42	< 0.5
	3/12/97	Duplicate	100	< 5	10	5.1	0.43	< 0.5
	6/12/97	Regular	150	23	19	< 5	1.1	0.55

MW-2 destroyed after January, 1994 NA = Not Analysed NS = Not Sampled

NSP = Not Sampled due to Phase Separated Hydrocarbons

Table 5
Summary of Analytical Results for Air Emissions
Hobbs, New Mexico Facility
BJ Services Company, U.S.A.

Sample Number	Sample Date	parts per million by volume, ppmv						Discharge Rate, scfm	Benzene Emission Rate, lb/hr	Total BTEX Emission Rate, lb/hr	TPH Emission Rate, lb/hr
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH					
Extraction-1	9/19/95	790	1100	340	920	9700	132.47	1.24	5.94	16.31	
Effluent-1	9/20/95	990	2500	560	1600	16000	135.76	1.58	10.94	27.37	
Effluent-2	9/28/95	13	28	6	18	2533	123.56	0.02	0.11	3.89	
Effluent-4	11/7/95	15	58	12	36	1500	131.10	0.02	0.24	2.59	
Effluent111595-01	11/15/95	39	180	42	130	1870	133.33	0.06	0.77	3.21	
Effluent121995-01	12/19/95	10	45	11	33	530	129.64	0.02	0.19	0.89	
Effluent012996-01	1/29/96	12	61	17	53	1200	128.45	0.02	0.27	1.95	
Effluent032296-01	3/22/96	6	44	12	40	990	124.68	0.01	0.19	1.56	
Effluent042496-01	4/25/96	4	37	10	36	900	118.34	0.01	0.15	1.29	
Effluent053196-01	5/31/96	3.7	40	10	33	670	124.11	0.01	0.16	1.04	
Effluent082396-01	8/23/96	< 5	12	< 5	< 5	200	126.18	0.01	0.05	0.31	
Effluent120296-01	12/2/96	< 1	< 1	< 1	< 1	< 5	129.04	0.00	0.01	0.01	
Eff-31297-1	3/12/97	2.1	15	4.6	15	250	110.56	0.00	0.06	0.33	
Effluent070297-01	7/2/97	< 1	6.3	2.4	8.6	65	109.90	0.00	0.03	0.08	

Emission rates reported for 12/02/96 sampling event were calculated using the detection limits. The actual emissions are Benzene <0.001 lb/hr, BTEX: <0.01 lb/hr and TPH: <0.01 lb/hr.
 Page 1 of 1
 Table printed: 7/18/97

Appendices



APPENDIX A
GROUNDWATER SAMPLING FORMS

Groundwater Sampling Field Data Sheet

Project Number: 2832

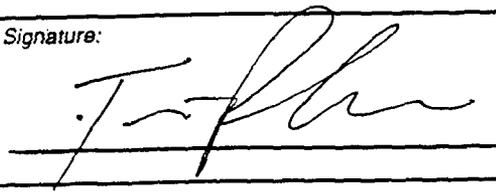
Task Number: 12

Date: 6/12/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Submersible pump</u>	Equipment Calibration - Time
Total Depth of Well from TOC <u>64.42</u> feet	Sample Equipment <u>Disposable bailer</u>	pH <u>7.10 = 7.01</u> at <u>20</u> °C
Static Water from TOC <u>55.08</u> feet		pH <u>4.05 = 4.01</u> at <u>20</u> °C
Product Level from TOC <u>55.10</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600XL Flow cell</u> <u>(pH, SC, OR, DO, Temp)</u> <u>HACH KITS Fe, DO</u>	<u>9.93 = 10.01</u> @ <u>20</u> °C
Length of Water Column <u>9.34</u> feet		Conductivity <u>10.04</u> ⇒
Well Volume <u>1.49</u> gal		Conductance Standard: <u>10.0</u> µmhos/cm at 25° C
Screened Interval (from GS) <u>-</u> feet		Measured Value: <u>10.0</u> µmhos/cm at 25° C
		Dissolved Oxygen <u>78.5 %</u> ⇒
		DO Meter Calibrated to: <u>100%</u> µmhos/cm

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0931	1	1.5						
0936	2	1.5	(no readings due to PSH)					
0941	3	1.5						

Geochemical Parameters	Comments:
Ferrous iron: <u>φ</u> mg/L	<u>6/12/97 Sample @ 1155</u>
Dissolved Oxygen: <u>φ</u> mg/L	
Nitrate: <u>-</u> mg/L	
Sulfate: <u>-</u> mg/L	

PPE Worn: <u>gloves, glasses</u>	Sampler's Signature: 
Disposition of Purge Water: <u>dwm</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

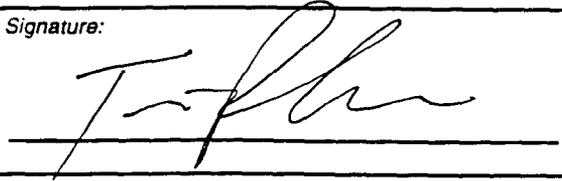
Task Number: 12

Date: 6/11/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Submersible pump</u>	Equipment Calibration - Time
Total Depth of Well from TOC <u>64.31</u> feet	Sample Equipment <u>Disposable bailer</u>	pH <u>7.10</u> = <u>7.01</u> at <u>20</u> °C
Static Water from TOC <u>52.68</u> feet		pH <u>4.05</u> = <u>4.01</u> at <u>20</u> °C
Product Level from TOC <u>-</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600XL Flow cell (pH, SC, Ra, DO, Temp)</u> <u>HACH KITS Fe, DO</u>	<u>9.93</u> = <u>10.01</u> @ <u>20</u> °C
Length of Water Column <u>11.63</u> feet		Conductivity <u>10.04</u> ⇒ Conductance Standard: <u>10.0</u> µmhos/cm at 25° C
Well Volume <u>1.89</u> gal	Screened Interval (from GS) <u>-</u> feet	Measured Value: <u>10.0</u> µmhos/cm at 25° C
DO Meter Calibrated to: <u>100%</u> mg/L		

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1729	P	-	7.21	19.5	1.33	-65	4.0	clear
1735	1	2	7.12	19.2	1.34	-54	3.8	"
1739	2	2	7.12	19.2	1.35	-62	3.7	"
1743	3	2	7.11	19.2	1.35	-68	3.7	"

Geochemical Parameters	Comments:
Ferrous Iron: <u>φ</u> mg/L	<u>6/12/97 Sample @ 1058</u>
Dissolved Oxygen: <u>3.0</u> mg/L	
Nitrate: <u>-</u> mg/L	
Sulfate: <u>-</u> mg/L	

PPE Worn: <u>gloves, glasses</u>	Sampler's Signature: 
Disposition of Purge Water: <u>drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

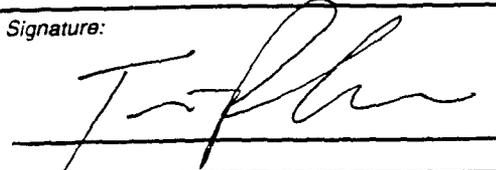
Task Number: 12

Date: 6/12/97

Casing Diameter 2 inches	Purge Equipment Submersible pump	Equipment Calibration - Time	
Total Depth of Well from TOC 61.43 feet		pH 7.10 = 7.01 at 20 °C	
Static Water from TOC 53.08 feet	Sample Equipment Disposable bailer	pH 4.05 = 4.01 at 20 °C	
Product Level from TOC 52.64 feet		9.93 = 10.01 @ 20 °C	
Length of Water Column 8.35 feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) YSI 600XL Flow cell (pH, SC, OR, DO, Temp) HACH KITS Fe, DO	Conductivity 10.04 ⇒	
Well Volume 1.36 gal		Conductance Standard: 10.0 µmhos/cm at 25° C	
Screened Interval (from GS) -		Measured Value: 10.0 µmhos/cm at 25° C	
		Dissolved Oxygen 78.5 % ⇒	
		DO Meter Calibrated to: 100%	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0957	1	1.5						
1003	2	1.5	(NO Readings due to PSH)					
1008	3	1.5						

Geochemical Parameters	Comments:
Ferrous Iron: 6.0 mg/L	6/12/97 Sample @ 1205
Dissolved Oxygen: ϕ mg/L	
Nitrate: - mg/L	
Sulfate: - mg/L	

PPE Worn: gloves, glasses	Sampler's Signature: 
Disposition of Purge Water: down	

Groundwater Sampling Field Data Sheet

Project Number: 2832

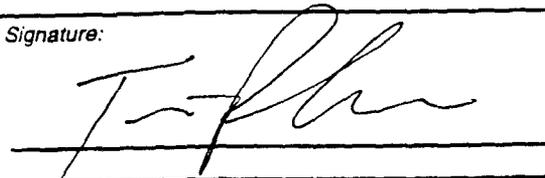
Task Number: 12

Date: 6/11/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Submersible pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>64.60</u> feet		pH <u>7.10</u> = <u>7.01</u> at <u>20</u> °C	
Static Water from TOC <u>54.48</u> feet	Sample Equipment <u>Disposable bailer</u>	pH <u>4.05</u> = <u>4.01</u> at <u>20</u> °C	
Product Level from TOC <u>—</u> feet		<u>9.93</u> = <u>10.01</u> @ <u>20</u> °C	
Length of Water Column <u>9.8</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600XL Flow cell</u> <u>(pH, SC, RE, DO, Temp)</u> <u>HACH KITS Fe, DO</u>	Conductivity <u>10.04</u> ⇒	
Well Volume <u>1.59</u> gal		Conductance Standard: <u>10.0</u> μmhos/cm at 25° C	
Screened Interval (from GS) <u>—</u> feet		Measured Value: <u>10.0</u> μmhos/cm at 25° C	
		Dissolved Oxygen <u>78.5 %</u> ⇒	
		DO Meter Calibrated to: <u>100%</u> mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1649	P	—	7.5	19.6	1.31	114	6.67	clear
1652	1	1.5	7.17	18.9	1.27	118	4.99	"
1653	2	1.5	7.12	18.8	1.24	117	4.98	"
1656	3	1.5	7.17	18.9	1.22	113	4.11	"

Geochemical Parameters	Comments:
Ferrous Iron: <u>4</u> mg/L	<u>6/12/97 Sample @ 1040</u>
Dissolved Oxygen: <u>4.0</u> mg/L	
Nitrate: <u>—</u> mg/L	
Sulfate: <u>—</u> mg/L	

PPE Worn: <u>gloves, glasses</u>	Sampler's Signature: 
Disposition of Purge Water: <u>drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

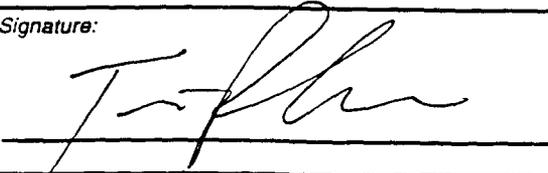
Task Number: 12

Date: 6/12/97

Casing Diameter 2 inches	Purge Equipment Submersible pump	Equipment Calibration - Time pH 7.10 = 7.01 at 20 °C
Total Depth of Well from TOC 60.17 feet	Sample Equipment Disposable bailer	pH 4.05 = 4.01 at 20 °C 9.93 = 10.01 @ 20 °C
Static Water from TOC 52.08 feet		Conductivity 10.04 ⇒ Conductance Standard: 10.0 µmhos/cm at 25° C
Product Level from TOC — feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) YSI 600XL Flow cell (pH, SC, RE, DO, Temp) HACH KITS Fe, DO	Measured Value: 10.0 µmhos/cm at 25° C
Length of Water Column 8.09 feet		Dissolved Oxygen 78.5 % ⇒
Well Volume 1.32 gal		DO Meter Calibrated to: 100%
Screened Interval (from GS) — feet		

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0658	P	—	8.33	18.3	0.653	105	8.3	Clear
0707	1	1.5	7.47	19.1	1.12	136	5.83	"
0712	2	1.5	7.34	19.4	1.23	112	5.86	"
0720	3	1.5	7.33	19.4	1.24	109	5.01	"

Geochemical Parameters	Comments:
Ferrous Iron: ϕ mg/L	6/12/97 Sample @ 1050
Dissolved Oxygen: 6.0 mg/L	
Nitrate: — mg/L	
Sulfate: — mg/L	

PPE Worn: gloves, glasses	Sampler's Signature: 
Disposition of Purge Water: dum	

Groundwater Sampling Field Data Sheet

Project Number: 2832

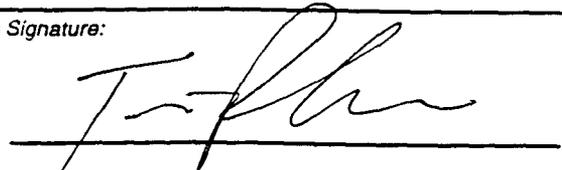
Task Number: 12

Date: 6/11/97

Casing Diameter 2 inches	Purge Equipment Submersible pump	Equipment Calibration - Time pH 7.10 = 7.01 at 20 °C
Total Depth of Well from TOC 61.46 feet	Sample Equipment Disposable bailer	pH 4.05 = 4.01 at 20 °C
Static Water from TOC 53.08 feet		pH 9.93 = 10.01 @ 20 °C
Product Level from TOC — feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) YSI 600XL Flow cell (pH, SC, Ra, DO, Temp) HACH KITS Fe, DO	Conductivity 10.04 ⇒
Length of Water Column 8.38 feet		Conductance Standard: 10.0 μmhos/cm at 25° C
Well Volume 1.36 gal		Measured Value: 10.0 μmhos/cm at 25° C
Screened Interval (from GS) — feet		Dissolved Oxygen 78.5 % ⇒ DO Meter Calibrated to: 100% mg/L

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1617	P	—	6.87	21.6	1.89	109	4.99	clear
1621	1	1.5	6.68	19.8	1.84	114	3.16	"
1625	2	1.5	6.66	19.9	1.79	108	2.48	cloudy
1630	3	1.5	6.67	19.8	1.76	103	2.78	"

Geochemical Parameters	Comments:
Ferrous Iron: φ mg/L	6/12 sample @ 1030
Dissolved Oxygen: 2.5 mg/L	
Nitrate: — mg/L	
Sulfate: — mg/L	

PPE Worn: gloves, glasses	Sampler's Signature: 
Disposition of Purge Water: down	

Groundwater Sampling Field Data Sheet

Project Number: 2832

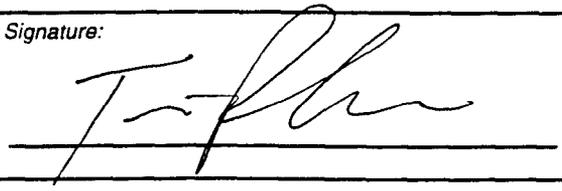
Task Number: 12

Date: 6/11/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>Submersible pump</u>	Equipment Calibration - Time pH <u>7.10 = 7.01</u> at <u>20</u> °C
Total Depth of Well from TOC <u>67.52</u> feet	Sample Equipment <u>Disposable bailer</u>	pH <u>4.05 = 4.01</u> at <u>20</u> °C
Static Water from TOC <u>53.96</u> feet		pH <u>9.93 = 10.01 @ 20 °C</u>
Product Level from TOC <u>—</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600XL Flow cell (pH, SC, Re, DO, Temp)</u> <u>HACH KITS Fe, DO</u>	Conductivity Standard: <u>10.0</u> µmhos/cm at 25° C
Length of Water Column <u>8.50</u> feet		Measured Value: <u>10.0</u> µmhos/cm at 25° C
Well Volume <u>1.40</u> gal	Screened Interval (from GS) <u>—</u> feet	Dissolved Oxygen <u>78.5 %</u> ⇒ DO Meter Calibrated to: <u>100%</u> -mgt

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
1548	P	<u>+</u>	7.52	20.9	2.03	52	4.65	clear
1551	1	1.5	6.96	19.0	1.94	71	2.84	"
1554	2	1.5	6.86	19.1	1.92	84	2.68	"
1557	3	1.5	6.84	19.1	1.91	78	2.65	"

Geochemical Parameters	Comments:
Ferrous Iron: <u>φ</u> mg/L	<u>Sample @ 6/12 1022</u>
Dissolved Oxygen: <u>3.0</u> mg/L	
Nitrate: <u>—</u> mg/L	
Sulfate: <u>—</u> mg/L	

PPE Worn: <u>gloves, glasses</u>	Sampler's Signature: 
Disposition of Purge Water: <u>drum</u>	

Groundwater Sampling Field Data Sheet

Project Number: 2832

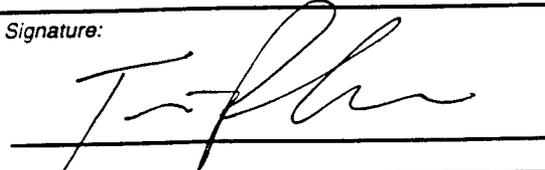
Task Number: 12

Date: 6/12/97

Casing Diameter 2 inches	Purge Equipment Submersible pump	Equipment Calibration - Time pH 7.10 = 7.01 at 20 °C
Total Depth of Well from TOC 60.27 feet	Sample Equipment Disposable bailer	pH 4.05 = 4.01 at 20 °C
Static Water from TOC 52.10 feet		pH 9.93 = 10.01 @ 20 °C
Product Level from TOC SHEARL feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) YSI 600XL Flow cell (pH, SC, Ra, DO, Temp) HACH KITS Fe, DO	Conductivity 10.04 ⇒ Conductance Standard: 10.0 µmhos/cm at 25 °C
Length of Water Column 8.17 feet		Measured Value: 10.0 µmhos/cm at 25 °C
Well Volume 1.38 gal		Dissolved Oxygen 78.5 % ⇒ DO Meter Calibrated to: 100%
Screened Interval (from GS) feet		

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0845	1	1.5						
0850	2	1.5	(no readings due to PSH)					
0855	3	1.5						

Geochemical Parameters	Comments:
Ferrous Iron: NA mg/L	6/12/97 Sample @ 1133
Dissolved Oxygen: NA mg/L	
Nitrate: — mg/L	
Sulfate: — mg/L	

PPE Worn: gloves, glasses	Sampler's Signature: 
Disposition of Purge Water: dwm	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 12

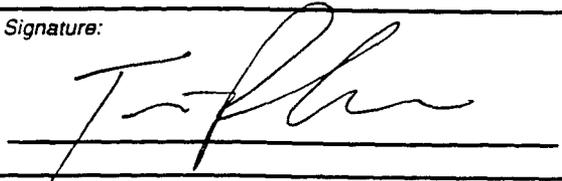
Date: 6/12/97

Casing Diameter 2 inches	Purge Equipment Submersible pump	Equipment Calibration - Time pH 7.10 = 7.01 at 20 °C
Total Depth of Well from TOC feet	Sample Equipment Disposable bailer	pH 4.05 = 4.01 at 20 °C 9.93 = 10.01 @ 20 °C
Static Water from TOC feet		Conductivity 10.04 ⇒ Conductance Standard: 10.0 μmhos/cm at 25° C
Product Level from TOC feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) YSI 600XL Flow cell (pH, SC, Ra, DO, Temp) HACH KITS Fe, DO	Measured Value: 10.0 μmhos/cm at 25° C
Length of Water Column feet		Dissolved Oxygen 78.5% ⇒ DO Meter Calibrated to: 100% mg/L
Well Volume gal		
Screened Interval (from GS) feet		

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description

DUPLICATE @
MW-9

Geochemical Parameters	Comments:
Ferrous Iron: NA mg/L	Sample @ 1133
Dissolved Oxygen: NA mg/L	
Nitrate: — mg/L	
Sulfate: — mg/L	

PPE Worn: gloves, glasses	Sampler's Signature: 
Disposition of Purge Water: drum	

Groundwater Sampling Field Data Sheet

Project Number: 2832

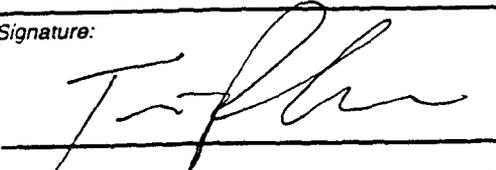
Task Number: 12

Date: 6/12/97

Casing Diameter 2 inches	Purge Equipment Submersible pump	Equipment Calibration - Time	
Total Depth of Well from TOC 63.60 feet		pH 7.10 = 7.01 at 20 °C	
Static Water from TOC 53.99 feet	Sample Equipment Disposable bailer	pH 4.05 = 4.01 at 20 °C	
Product Level from TOC — feet		9.93 = 10.01 @ 20 °C	
Length of Water Column 9.51 feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) YSI 600XL Flow cell (pH, SC, RD, DO, Temp) HACH KITS Fe, DO	Conductivity 10.04 ⇒	
Well Volume 1.50 gal		Conductance Standard: 10.0 µmhos/cm at 25° C	
Screened Interval (from GS) feet		Measured Value: 10.0 µmhos/cm at 25° C	
		Dissolved Oxygen 78.5 % ⇒	
		DO Meter Calibrated to: 100% -mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0814	P	—	6.92	19.2	5.4	-87	0.70	clear
0819	1	1.5	6.87	19.6	5.8	-109	0.78	"
0823	2	1.5	6.90	19.6	5.7	-106	0.68	"
0827	3	1.5	6.89	19.6	5.6	-111	0.58	"

Geochemical Parameters	Comments:
Ferrous Iron: 7.0 mg/L	6/12/97 sample @ 1118
Dissolved Oxygen: 1.0 mg/L	
Nitrate: — mg/L	
Sulfate: — mg/L	

PPE Worn: gloves, glasses	Sampler's Signature: 
Disposition of Purge Water: drum	

Groundwater Sampling Field Data Sheet

Project Number: 2832

Task Number: 17

Date: 6/12/97

Casing Diameter <u>2</u> inches	Purge Equipment <u>sub. pump</u>	Equipment Calibration - Time	
Total Depth of Well from TOC <u>59.78</u> feet		pH <u>7.10</u> = <u>7.01</u> at <u>20</u> °C	
Static Water from TOC <u>53.96</u> feet	Sample Equipment <u>disp. bawler</u>	pH <u>9.43</u> = <u>10.01</u> at <u>20</u> °C	
Product Level from TOC <u>—</u> feet		<u>4.05</u> = <u>4.01</u> @ <u>20</u> °C	
Length of Water Column <u>5.82</u> feet	Analytical Equipment (pH, DO, Redox, filtration, etc.) <u>YSI 600XL Flow Cell</u>	Conductivity	
Well Volume <u>0.94</u> gal		Conductance Standard: <u>10.0</u> µmhos/cm at 25° C	
Screened Interval (from GS) <u>—</u> feet		Measured Value: <u>10.04</u> µmhos/cm at 25° C	
		Dissolved Oxygen <u>78.5</u> ⇒ DO Meter Calibrated to: <u>100%</u> mg/L	

Time	Well Volume	Gallons Removed	pH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
0742	P	—	7.33	19.4	1.24	109	5.01	clear
0747	1	1	7.33	19.4	1.24	109	3.01	cloudy
0752	2	1	7.07	19.4	8.87	-70	2.59	"
0755	3	1	7.13	19.3	8.83	-69	2.70	"

Geochemical Parameters	Comments:
Ferrous Iron: <u>2.0</u> mg/L	<u>6/12/97 sample MW-11 @ 1107</u>
Dissolved Oxygen: <u>2.0</u> mg/L	
Nitrate: <u>—</u> mg/L	
Sulfate: <u>—</u> mg/L	

PPE Worn: <u>gloves, glasses</u>	Sampler's Signature: <u>[Signature]</u>
Disposition of Purge Water: <u>down</u>	

B



APPENDIX B

LABORATORY ANALYTICAL REPORT FOR GROUNDWATER SAMPLES

File 2831.12



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

June 26, 1997

Mr. Rick Rexroad
Brown and Caldwell
1415 Louisiana
Houston, TX 77002

The following report contains analytical results for samples received at Southern Petroleum Laboratories (SPL) on June 13, 1997. The samples were assigned to Certificate of Analysis No(s).9706643 and analyzed for the parameters specified on the chain of custody.

There were no analytical problems encountered with this group of samples and all quality control data was within acceptance limits.

If you have any questions or comments pertaining to this data report, please do not hesitate to contact me. Please reference the above Certificate of Analysis Number(s) during any inquiries.

Again, SPL is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

Southern Petroleum Laboratories


Bernadette A. Fini
Project Manager



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

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate of Analysis Number: 97-06-643

Approved for Release by:


Bernadette A. Fini, Project Manager

6-26-97
Date:

Greg Grandits
Laboratory Director

Idelis Williams
Quality Assurance Officer

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory.



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

Certificate of Analysis No. H9-9706643-01

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-8

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 10:22:00
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 97
 4-Bromofluorobenzene 97
 Method 8020A ***
 Analyzed by: JN
 Date: 06/24/97

Petroleum Hydrocarbons - Gasoline ND 0.1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 100
 4-Bromofluorobenzene 90
 Modified 8015A - Gasoline***
 Analyzed by: JN
 Date: 06/24/97

Total Petroleum Hydrocarbons-Diesel ND 0.1 P mg/L

Surrogate % Recovery
 n-Pentacosane 58
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 06/19/97 03:54:00

ND - Not detected. (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. H9-9706643-01

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-8

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 10:22:00
 DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00		06/18/97		

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.

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

Certificate of Analysis No. H9-9706643-02

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-7

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 10:30:00
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 97
 4-Bromofluorobenzene 100
 Method 8020A ***
 Analyzed by: JN
 Date: 06/24/97

Petroleum Hydrocarbons - Gasoline ND 0.1 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 100
 4-Bromofluorobenzene 90
 Modified 8015A - Gasoline***
 Analyzed by: JN
 Date: 06/24/97

Total Petroleum Hydrocarbons-Diesel ND 0.1 P mg/L

Surrogate % Recovery
 n-Pentacosane 66
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 06/19/97 04:41:00

ND - Not detected. (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. H9-9706643-02

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-7

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 10:30:00
 DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA		DETECTION LIMIT	UNITS
	RESULTS			
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00	06/18/97			

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. H9-9706643-03

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-5

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 06/12/97 10:40:00
DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00		06/18/97		

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. H9-9706643-04

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-6

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 06/12/97 10:50:00
DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00		06/18/97		

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. H9-9706643-05

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-3

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 10:58:00
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	860	100 P	µg/L
TOLUENE	4800	100 P	µg/L
ETHYLBENZENE	1700	100 P	µg/L
TOTAL XYLENE	2600	100 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	9960		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 97
 4-Bromofluorobenzene 103

Method 8020A ***
 Analyzed by: JN
 Date: 06/24/97

Petroleum Hydrocarbons - Gasoline 20 10 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 107
 4-Bromofluorobenzene 100

Modified 8015A - Gasoline***
 Analyzed by: JN
 Date: 06/24/97

Total Petroleum Hydrocarbons-Diesel 1.9 0.55 P mg/L

Surrogate % Recovery
 n-Pentacosane 74

Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 06/19/97 01:33:00

(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.



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

Certificate of Analysis No. H9-9706643-05

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-3

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 10:58:00
 DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00		06/18/97		

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. H9-9706643-06

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-11

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 11:07:00
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	150	5.0 P	µg/L
TOLUENE	23	5.0 P	µg/L
ETHYLBENZENE	19	5.0 P	µg/L
TOTAL XYLENE	ND	5.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	192		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 100
 4-Bromofluorobenzene 100
 Method 8020A ***
 Analyzed by: JN
 Date: 06/24/97

Petroleum Hydrocarbons - Gasoline 0.55 0.5 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 107
 4-Bromofluorobenzene 100
 Modified 8015A - Gasoline***
 Analyzed by: JN
 Date: 06/24/97

Total Petroleum Hydrocarbons-Diesel 1.1 0.1 P mg/L

Surrogate % Recovery
 n-Pentacosane 60
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 06/19/97 08:33:00

(P) - Practical Quantitation Limit ND - Not detected.

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. H9-9706643-06

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-11

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 06/12/97 11:07:00
DATE RECEIVED: 06/13/97

ANALYTICAL DATA				
PARAMETER	RESULTS	DETECTION LIMIT	UNITS	
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00	06/18/97			

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. H9-9706643-07

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-10

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 06/12/97 11:18:00
DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00		06/18/97		

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. H9-9706643-08

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-9

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 06/12/97 11:33:00
DATE RECEIVED: 06/13/97

ANALYTICAL DATA

Table with 5 columns: PARAMETER, RESULTS, DETECTION LIMIT, UNITS. Rows include BENZENE, TOLUENE, ETHYLBENZENE, TOTAL XYLENE, TOTAL VOLATILE AROMATIC HYDROCARBONS.

Surrogate % Recovery
1,4-Difluorobenzene 110
4-Bromofluorobenzene 157MI
Method 8020A ***
Analyzed by: LJ
Date: 06/24/97

Petroleum Hydrocarbons - Gasoline 2.2 1 P mg/L

Surrogate % Recovery
1,4-Difluorobenzene 103
4-Bromofluorobenzene 103
Modified 8015A - Gasoline***
Analyzed by: JN
Date: 06/24/97

Total Petroleum Hydrocarbons-Diesel 2.6 0.1 P mg/L

Surrogate % Recovery
n-Pentacosane 96
Modified 8015A - Diesel ***
Analyzed by: RR
Date: 06/19/97 09:19:00

(P) - Practical Quantitation Limit MI - Matrix interference.

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. H9-9706643-08

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-9

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 06/12/97 11:33:00
DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00	06/18/97		

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. H9-9706643-09

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-4

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 12:05:00
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	47	5.0 P	µg/L
TOLUENE	270	5.0 P	µg/L
ETHYLBENZENE	360	5.0 P	µg/L
TOTAL XYLENE	950	5.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	1627		µg/L

Surrogate

% Recovery

1,4-Difluorobenzene 93
 4-Bromofluorobenzene 120

Method 8020A ***

Analyzed by: LJ

Date: 06/24/97

Petroleum Hydrocarbons - Gasoline 6.2 0.5 P mg/L

Surrogate

% Recovery

1,4-Difluorobenzene 107
 4-Bromofluorobenzene 140

Modified 8015A - Gasoline***

Analyzed by: LJ

Date: 06/24/97

Total Petroleum Hydrocarbons-Diesel 2.5 0.1 P mg/L

Surrogate

% Recovery

n-Pentacosane 90

Modified 8015A - Diesel ***

Analyzed by: RR

Date: 06/19/97 10:06:00

(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. H9-9706643-09

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-4

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 12:05:00
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA			
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00	06/18/97		

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. H9-9706643-10

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-1

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 11:55:00
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	5300	250 P	µg/L
TOLUENE	34000	250 P	µg/L
ETHYLBENZENE	7500	250 P	µg/L
TOTAL XYLENE	27000	250 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	73800		µg/L

Surrogate % Recovery
 1,4-Difluorobenzene 96
 4-Bromofluorobenzene 107
 Method 8020A ***
 Analyzed by: LJ
 Date: 06/24/97

Petroleum Hydrocarbons - Gasoline 160 20 P mg/L

Surrogate % Recovery
 1,4-Difluorobenzene 101
 4-Bromofluorobenzene 116
 Modified 8015A - Gasoline***
 Analyzed by: LJ
 Date: 06/24/97

Total Petroleum Hydrocarbons-Diesel 180 11 P mg/L

Surrogate % Recovery
 n-Pentacosane 52
 Modified 8015A - Diesel ***
 Analyzed by: RR
 Date: 06/20/97 10:32:00

(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. H9-9706643-10

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-1

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97 11:55:00
 DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA		DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00	RESULTS	06/18/97		

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. H9-9706643-11

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-2832

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA				
PARAMETER	RESULTS	DETECTION LIMIT	UNITS	
BENZENE	ND	5.0 P	µg/L	
TOLUENE	ND	5.0 P	µg/L	
ETHYLBENZENE	6.6	5.0 P	µg/L	
TOTAL XYLENE	69	5.0 P	µg/L	
TOTAL VOLATILE AROMATIC HYDROCARBONS	75.6		µg/L	
Surrogate		% Recovery		
1,4-Difluorobenzene		93		
4-Bromofluorobenzene		107		
Method 8020A ***				
Analyzed by: JN				
Date: 06/24/97				
Petroleum Hydrocarbons - Gasoline	1.9	0.5 P	mg/L	
Surrogate		% Recovery		
1,4-Difluorobenzene		107		
4-Bromofluorobenzene		113		
Modified 8015A - Gasoline***				
Analyzed by: JN				
Date: 06/24/97				
Total Petroleum Hydrocarbons-Diesel	5.2	0.11 P	mg/L	
Surrogate		% Recovery		
n-Pentacosane		120		
Modified 8015A - Diesel ***				
Analyzed by: RR				
Date: 06/19/97 10:52:00				

ND - Not detected. (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. H9-9706643-11

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
SITE: Hobbs, NM
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-2832

PROJECT NO: 2832.12
MATRIX: WATER
DATE SAMPLED: 06/12/97
DATE RECEIVED: 06/13/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
Liquid-liquid extraction Method 3510B *** Analyzed by: VN Date: 06/18/97 10:00:00		06/18/97		

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. H9-9706643-12

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Rick Rexroad

DATE: 06/26/97

PROJECT: Hobbs
 SITE: Hobbs, NM
 SAMPLED BY: Provided By SPL
 SAMPLE ID: Trip Blank

PROJECT NO: 2832.12
 MATRIX: WATER
 DATE SAMPLED: 06/12/97
 DATE RECEIVED: 06/13/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	100
4-Bromofluorobenzene	97
Method 8020A ***	
Analyzed by: JN	
Date: 06/24/97	

Petroleum Hydrocarbons - Gasoline	ND	0.1 P	mg/L
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Surrogate	% Recovery
1,4-Difluorobenzene	100
4-Bromofluorobenzene	83
Modified 8015A - Gasoline***	
Analyzed by: JN	
Date: 06/24/97	

ND - Not detected.

(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



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020/602

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_W970623185600

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
MTBE	ND	50	42	84.0	63 - 120
Benzene	ND	50	43	86.0	62 - 121
Toluene	ND	50	48	96.0	66 - 136
EthylBenzene	ND	50	49	98.0	70 - 136
O Xylene	ND	50	49	98.0	74 - 134
M & P Xylene	ND	100	97	97.0	77 - 140

M A T R I X 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		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
MTBE	ND	20	24	120	23	115	4.26	20	39 - 150
BENZENE	ND	20	24	120	24	120	0	25	39 - 150
TOLUENE	ND	20	24	120	24	120	0	26	56 - 134
ETHYLBENZENE	ND	20	24	120	24	120	0	38	61 - 128
O XYLENE	ND	20	23	115	23	115	0	29	40 - 130
M & P XYLENE	ND	40	47	118	47	118	0	20	43 - 152

Analyst: JN

Sequence Date: 06/23/97

SPL ID of sample spiked: 9706897-04A

Sample File ID: W_F7697.TX0

Method Blank File ID:

Blank Spike File ID: W_F7691.TX0

Matrix Spike File ID: W_F7693.TX0

Matrix Spike Duplicate File ID: W_F7694.TX0

* = Values Outside QC Range. << = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

% Recovery = $[(<1> - <2>) / <3>] \times 100$

LCS % Recovery = $(<1> / <3>) \times 100$

Relative Percent Difference = $[(<4> - <5>) / [(<4> + <5>) \times 0.5]] \times 100$

(**) = Source: SPL-Houston Historical Data (3rd Q '95)

(***) = Source: SPL-Houston Historical Data (2nd Q '95)

SAMPLES IN BATCH(SPL ID):

9706643-04A 9706643-05A 9706643-06A 9706643-07A
 9706643-11A 9706643-12A 9706697-01A 9706804-05A
 9706804-04A 9706897-04A 9706643-01A 9706643-02A
 9706643-03A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020/602

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_W970624170000

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
MTBE	ND	50	36	72.0	63 - 120
Benzene	ND	50	42	84.0	62 - 121
Toluene	ND	50	49	98.0	66 - 136
EthylBenzene	ND	50	49	98.0	70 - 136
O Xylene	ND	50	50	100	74 - 134
M & P Xylene	ND	100	99	99.0	77 - 140

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
			MTBE	ND	20	20		100	20
BENZENE	ND	20	21	105	20	100	4.88	25	39 - 150
TOLUENE	ND	20	20	100	20	100	0	26	56 - 134
ETHYLBENZENE	ND	20	20	100	20	100	0	38	61 - 128
O XYLENE	ND	20	20	100	20	100	0	29	40 - 130
M & P XYLENE	ND	40	40	100	39	97.5	2.53	20	43 - 152

Analyst: LJ
Sequence Date: 06/24/97
SPL ID of sample spiked: 9706897-05A
Sample File ID: W_F7733.TX0
Method Blank File ID:
Blank Spike File ID: W_F7726.TX0
Matrix Spike File ID: W_F7728.TX0
Matrix Spike Duplicate File ID: W_F7729.TX0

* = Values Outside QC Range. < = Data outside Method Specification limits.
NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
ND = Not Detected/Below Detection Limit
% Recovery = $[(<1> - <2>) / <3>] \times 100$
LCS % Recovery = $(<1> / <3>) \times 100$
Relative Percent Difference = $|(<4> - <5> | / [(<4> + <5>) \times 0.5] \times 100$
(**) = Source: SPL-Houston Historical Data (3rd Q '95)
(***) = Source: SPL-Houston Historical Data (2nd Q '95)

SAMPLES IN BATCH(SPL ID):
9706643-10A 9706813-01A 9706813-02A 9706813-03A
9706813-04A 9706813-05A 9706817-06A 9706817-01A
9706817-02A 9706817-05A 9706981-01A 9706A38-01A
9706A39-01A 9706897-05A 9706897-06A 9706643-08A
9706643-09A



** SPL BATCH QUALITY CONTROL REPORT **
CA LUFT

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

Matrix: Aqueous
Units: mg/L

Batch Id: HP_W970623192300

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Petroleum Hydrocarbons-Gas	ND	1.0	1.0	100	50 - 150

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
PETROLEUM HYDROCARBONS-GAS	ND	0.9	0.81	90.0	0.77	85.6	5.01	50	50 - 150

Analyst: JN
Sequence Date: 06/23/97
SPL ID of sample spiked: 9706622-01B
Sample File ID: WWF7698.TX0
Method Blank File ID:
Blank Spike File ID: WWF7692.TX0
Matrix Spike File ID: WWF7695.TX0
Matrix Spike Duplicate File ID: WWF7696.TX0

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

SAMPLES IN BATCH(SPL ID):
 9706643-02A 9706643-03A 9706643-04A 9706643-05A
 9706643-06A 9706643-07A 9706643-08A 9706643-11A
 9706643-12A 9706804-04A 9706622-01B 9706622-02B
 9706622-03B 9706643-01A



** SPL BATCH QUALITY CONTROL REPORT **
 Modified 8015 - Gasoline

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

Matrix: Aqueous
 Units: mg/L

Batch Id: HP_W970624172800

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Gasoline Petr. Hydrocarbon	ND	1.0	0.92	92.0	56 - 130

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
GASOLINE PETR. HYDROCARBON	ND	0.9	0.73	81.1	0.72	80.0	1.37	22	37 - 169

Analyst: LJ
 Sequence Date: 06/24/97
 SPL ID of sample spiked: 9706897-06A
 Sample File ID: WWF7734.TX0
 Method Blank File ID:
 Blank Spike File ID: WWF7727.TX0
 Matrix Spike File ID: WWF7730.TX0
 Matrix Spike Duplicate File ID: WWF7731.TX0

* = Values Outside QC Range. < = Data outside Method Specification limits.
 NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
 ND = Not Detected/Below Detection Limit
 $\% \text{ Recovery} = [(<1> - <2>) / <3>] \times 100$
 $\text{LCS } \% \text{ Recovery} = (<1> / <3>) \times 100$
 $\text{Relative Percent Difference} = [(<4> - <5>) / [(<4> + <5>) \times 0.5]] \times 100$
 (**) = Source: SPL-Houston Historical data (3rd Q '95)
 (***) = Source: SPL-Houston Historical Data (3rd Q '95)

SAMPLES IN BATCH(SPL ID): 9706643-09A 9706643-10A



Matrix: Aqueous
 Units: mg/L

Batch Id: HP_T970619102600

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		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(**) (Advisory)	
			Result	Recovery	Result	Recovery		RPD Max.	Recovery Range
			<1>	<4>	<1>	<5>			
DIESEL PETR. HYDROCARBONS	ND	5.0	5.24	104	5.21	104	0	43	60 - 139

Analyst: RR
 Sequence Date: 06/19/97
 Method Blank File ID:
 Sample File ID:
 Blank Spike File ID: TTF7283.TX0
 Matrix Spike File ID:
 Matrix Spike Duplicate File ID:

* = Values Outside QC Range. « = Data outside Method Specification limits.
 NC = Not Calculated (Sample exceeds spike by factor of 4 or more)
 ND = Not Detected/Below Detection Limit
 $\% \text{ Recovery} = [(<1> - <2>) / <3>] \times 100$
 $\text{Relative Percent Difference} = [(<4> - <5>) / [(<4> + <5>) \times 0.5]] \times 100$
 (**) = Source: SPL-Houston Historical Data (2nd Q '97)

SAMPLES IN BATCH(SPL ID):

9706643-01B 9706643-02B 9706643-03B 9706643-06B
 9706643-08B 9706643-09B 9706643-10B 9706774-01B
 9706666-02B 9706643-04B 9706643-05B 9706643-07B

CHAIN OF CUSTODY
AND
SAMPLE RECEIPT CHECKLIST



SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No:

9700643

11211

page of

Client Name: Brown and Caldwell
 Address/Phone: 1415 LOUISIANA STE 2500
 Client Contact: RICK RENROAD
 Project Name: Hobbs
 Project Number: 2832-12
 Project Location: Hobbs, NM
 Invoice To: BC

matrix	bottle	size	pres.	Number of Containers	Requested Analysis
W=water S=soil SL=sludge O=other:	P=plastic A=amber glass G=vial C=glass V=vial	1=1 liter 4=4oz 40=vial 8=8oz 16=16oz	1=HCl 2=HNO3 3=H2SO4 O=other:		

SAMPLE ID	DATE	TIME	comp	grab	matrix	bottle	size	pres.	Number of Containers	Requested Analysis
MW-8	6/12/97	1022		X	W	G	1.4	1	5	X BTEX 8020 X TPH-HH X TPH-DEO 8015 M
MW-7		1030								
MW-5		1040								
MW-6		1050								
MW-3		1058								
MW-11		1107								
MW-10		1118								
MW-9		1133								
MW-4		1205								
MW-1		1155								

Client/Consultant Remarks: MW-2832 (add) Analysis listed above.

laboratory remarks: TRIP BLANK (BTEX 8020 ANALYSIS) INCLUDED

Requested TAT: 24hr 72hr Standard Other

Special Reporting Requirements: Raw Data Level 3 QC Level 4 QC

Standard QC:

1. Relinquished by Sampler: _____ date _____

3. Relinquished by: _____ date _____

5. Relinquished by: _____ date _____

Requested Analysis: BTEX 8020 TPH-HH TPH-DEO 8015 M

Intact? Y N

Temp: 40 C P4

PM review (initial): _____

Special Determination: MPS 969 2868 936

Received by: Dan Jones 6/13/97 0945

Received by: _____ date _____

Received by Laboratory: _____ date _____

SPL Houston Environmental Laboratory

Sample Login Checklist

Date: <u>6/13/97</u>	Time: <u>0945</u>
----------------------	-------------------

SPL Sample ID: <div style="text-align: center; margin-top: 10px;"><u>9706643</u></div>

		<u>Yes</u>	<u>No</u>
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:	4° C	
10	Method of sample delivery to SPL:	SPL Delivery	
		Client Delivery	
		FedEx Delivery (airbill #)	<u>9692868936</u>
		Other:	
11	Method of sample disposal:	SPL Disposal	✓
		HOLD	
		Return to Client	

Name: <u>Almeida Salas</u>	Date: <u>6/13/97</u>
----------------------------	----------------------

C



APPENDIX C
LABORATORY ANALYTICAL REPORT
FOR AIR SAMPLE



July, 10 1997

Mr. Rick Rexroad
Brown and Caldwell
1415 Louisiana
Houston, TX 77002

The following report contains analytical results for samples received at Southern Petroleum Laboratories (SPL) on July 3, 1997. The samples were assigned to Certificate of Analysis No(s).9707125 and analyzed for the parameters specified on the chain of custody.

There were no analytical problems encountered with this group of samples and all quality control data was within acceptance limits.

If you have any questions or comments pertaining to this data report, please do not hesitate to contact me. Please reference the above Certificate of Analysis Number(s) during any inquiries.

Again, SPL is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

Southern Petroleum Laboratories

A handwritten signature in cursive script that reads "Bernadette A. Fini".

Bernadette A. Fini
Project Manager



SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate of Analysis Number: 97-07-125

Approved for Release by:


Bernadette A. Fini, Project Manager

7-10-97
Date:

Greg Grandits
Laboratory Director

Idelis Williams
Quality Assurance Officer

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory.



LABORATORIES Certificate of Analysis No. H9-9707125-01

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Rick Rexroad

DATE: 07/10/97

PROJECT: BJ Services
SITE: Hobbs, NM
SAMPLED BY: BJ Services
SAMPLE ID: Effluent 070297-01

PROJECT NO:
MATRIX: AIR
DATE SAMPLED: 07/02/97 14:30:00
DATE RECEIVED: 07/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	ppm
TOLUENE	6.3	1.0 P	ppm
ETHYLBENZENE	2.4	1.0 P	ppm
TOTAL XYLENE	8.6	1.0 P	ppm
TOTAL VOLATILE AROMATIC HYDROCARBONS	17.3		ppm
Method Modified 5030/8020A*** Analyzed by: LJ Date: 07/05/97			
Total Petroleum Hydrocarbons	65	5	ppm
Method Modified 8015A Air *** Analyzed by: LJ Date: 07/05/97 06:29:00			

ND - Not detected.

(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.

8880 INTERCHANGE DR.
HOUSTON, TX 77054
(713) 660-0901

500 AMBASSADOR CAFFERY PKWY.
SCOTT, LA 70583-8544
(318) 237-4SPL

459 HUGHES DRIVE
TRAVERSE CITY, MI 49684
(616) 947-5777

1511 E. ORANGETHORPE AVE.
FULLERTON, CA 92631
(714) 447-6868

QUALITY CONTROL
DOCUMENTATION



Matrix: **LABORATORIES**

Batch Id: HP_P970705110200

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		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(**) (Advisory)	
			Result	Recovery	Result	Recovery		RPD Max.	Recovery Range
			<1>	<4>	<1>	<5>			
TPHAIR	ND	200	56	28.0	51	25.5	9.35	30	20 - 150

Analyst: LJ

Sequence Date: 07/05/97

Method Blank File ID:

Sample File ID:

Blank Spike File ID: PPG7064.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range. * = Data outside Method Specification limits.

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):

9707146-01A 9707146-02A 9707125-01A 9707128-01A
9707148-01A 9707130-01A 9707131-01A



Matrix LABORATORIES

Batch Id: HP_P970705134700

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		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(**) (Advisory)	
			Result	Recovery	Result	Recovery		RPD Max.	Recovery Range
			<1>	<4>	<1>	<5>			
BENZENE	ND	20.0	12	60.0	9.6	48.0	22.2	30	37 - 117
TOLUENE	ND	20.0	11	54.0	9.3	45.5	17.1	30	25 - 113
ETHYLBENZENE	ND	20.0	8.8	44.0	8.0	40.0	9.52	30	25 - 106
O XYLENE	ND	20.0	8.6	42.5	7.9	39.0	8.59	30	15 - 109
M & P XYLENE	ND	20.0	8.9	44.5	7.9	39.5	11.9	30	12 - 114

Analyst: LJ

Sequence Date: 07/05/97

Method Blank File ID:

Sample File ID:

Blank Spike File ID: P_G7064.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

* = Values Outside QC Range. « = Data outside Method Specification limits.

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: Tempo. Limits & SPL-Houston Hist. Data(1st Qtr'97)

SAMPLES IN BATCH(SPL ID): 9707131-01A 9707125-01A 9707128-01A 9707130-01A

CHAIN OF CUSTODY
AND
SAMPLE RECEIPT CHECKLIST

SPL Houston Environmental Laboratory

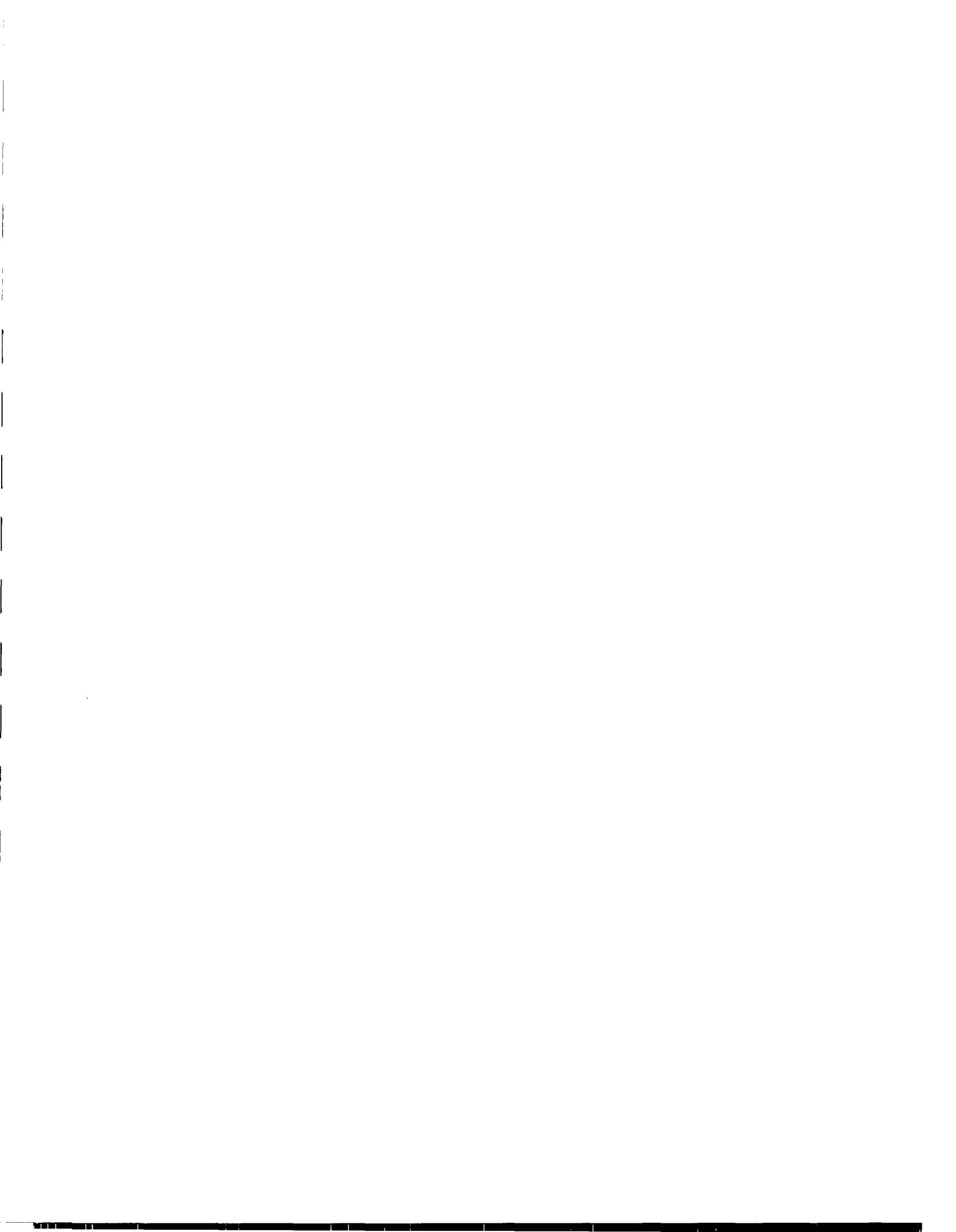
Sample Login Checklist

Date: 7/3/97	Time: 1000
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SPL Sample ID: <div style="text-align: center; font-size: 1.2em; margin-top: 10px;">9707125</div>
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		<u>Yes</u>	<u>No</u>
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:		C
10	Method of sample delivery to SPL:	SPL Delivery	
		Client Delivery	
		FedEx Delivery (airbill #)	4995776170
		Other:	
11	Method of sample disposal:	SPL Disposal	
		HOLD	
		Return to Client	

Name: <i>Alvina Salas</i>	Date: 7/3/97
---	--



B R O W N A N D C A L D W E L L

**FINAL
SEPTEMBER 1997 GROUNDWATER
SAMPLING REPORT**

ARTESIA, NEW MEXICO

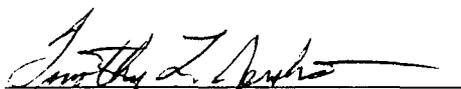
**BJ SERVICES COMPANY, U.S.A.
APRIL 8, 1998**

**FINAL
SEPTEMBER 1997 GROUNDWATER SAMPLING REPORT
ARTESIA, NEW MEXICO
BJ SERVICES COMPANY, U.S.A.**

Prepared for

BJ Services Company, U.S.A.
8701 New Trials Drive
The Woodlands, Texas 77381

BC Project Number: 2988-09



Timothy L. Jenkins
Associate Engineer

April 8, 1998

Brown and Caldwell
1415 Louisiana, Suite 2500
Houston, Texas 77002 - (713) 759-0999

"This report was prepared in accordance with the standards of the environmental consulting industry at the time it was prepared. It should not be relied upon by parties other than those for whom it was prepared, and then only to the extent of the scope of work which was authorized. This report does not guarantee that no additional environmental contamination beyond that described in this report exists at this site."

Contents



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2.0	GROUNDWATER SAMPLING AND ANALYSES	2
2.1	Groundwater Measurements and Flow Direction	2
2.2	Monitoring Well Purging and Sampling.....	2
2.3	Results of Groundwater Sample Analyses.....	3
3.0	CONCLUSIONS AND RECOMMENDATIONS.....	4
3.1	Conclusions.....	4
3.2	Recommendations.....	4

DISTRIBUTION AND QA/QC REVIEWER'S SIGNATURE

FIGURES

- 1 Site Location Map
- 2 Site Plan
- 3 Monitor Well Locations
- 4 Groundwater Gradient Map - September 1, 1997

TABLES

- 1 Groundwater Elevation – September 1, 1997
- 2 Groundwater Sampling – September 2, 1997 - Analytical Results
- 3 Cumulative Analytical Results – Groundwater Sampling - April 1993 through September 1997

APPENDICES

- A Laboratory Analytical Reports

1.0 INTRODUCTION

Brown and Caldwell conducted a soil and groundwater assessment at the BJ Services Company, U.S.A. (BJ Services) district facility in Artesia, New Mexico from September 1-2, 1997. The BJ Services Artesia District Facility is located in Eddy County, in the SE/4, Section 32, Township 16 South, Range 26 East. The facility address is 2401 Sivley, Artesia, New Mexico, 88210. A site location map and site plan are attached as Figures 1 and 2, respectively.

This groundwater sampling event was conducted at the request of the New Mexico Oil Conservation Division, and was performed in conjunction with demolition activities and a site assessment for the former acid dock area (Acid Dock). The monitor wells sampled during this event were installed under the supervision of Brown and Caldwell in April 1993.

This report documents and presents the results of the September 1997 groundwater sampling event. The September 1997 event is the fourth round of sampling in the monitoring program that was initiated at this site in April 1993.

2.0 GROUNDWATER SAMPLING AND ANALYSES

Beginning on September 1, 1997, Brown and Caldwell purged and sampled the four groundwater monitoring wells located at the BJ Services' Artesia District Facility. This section describes the activities conducted during this sampling event.

2.1 Groundwater Measurements and Flow Direction

A monitoring well location map for the wells sampled during the September 1997 groundwater sampling event is presented as Figure 3. Prior to well purging, static water levels were measured in all monitoring wells. Groundwater levels were measured to the nearest 0.01 foot with an electronic groundwater level meter and recorded. Groundwater elevation data for September 1, 1997 is presented in Table 1.

A groundwater gradient map constructed from data obtained on September 1, 1997 is presented as Figure 4. Groundwater elevation data indicates that the groundwater flow is generally to the east in the area near the former Acid Dock.

2.2 Monitoring Well Purging and Sampling

Each of the four monitor wells was purged on September 1, 1997. At each well location, a designated bailer was used for both purging and sampling. The wells were purged by hand, removing at least three well volumes. Purge water was placed in drums and set aside for proper management.

Groundwater samples were collected on September 2, 1997 after allowing the water level in each well to recover overnight. The disposable polyethylene bailers, one designated per well, were decontaminated with deionized water prior to sampling. Sampled groundwater was transferred into laboratory-supplied glass containers, labeled, and immediately placed on ice in an insulated cooler

for shipment. At the conclusion of sampling, the samples were delivered to the analytical laboratory and were accompanied by completed chain-of-custody documentation. Laboratory reports are included in Appendix A. Purge water and excess water generated by equipment cleaning operations were placed in labeled drums located within the barricaded area near the acid dock excavation for future treatment/disposal by BJ Services.

2.3 Results of Groundwater Sample Analyses

Groundwater samples collected during this sampling event were analyzed for benzene, toluene ethylbenzene, and xylenes (BTEX) and semivolatiles by EPA Methods 8020 and 8270, respectively.

Samples from monitor wells MW-2, MW-3, and MW-4 displayed concentrations of volatiles and semivolatiles below detection limits for each method. The sample from MW-1 displayed detectable concentrations of several volatile and semivolatile constituents. The total BTEX concentration for the groundwater sample from monitor well MW-1 was 0.719 milligrams per liter (mg/L). Groundwater results for the September 1997 sampling event are summarized in Table 2.

2.4 Demolition of MW-1 during Soil Excavation Activities

Monitor well MW-1 was demolished during the recent remediation activities performed in the former acid dock area. The portion of the well present below the excavation was plugged in place and sealed with bentonite. Currently, there are no plans to replace this well.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

The groundwater analytical results for the September 1997 sampling event indicate that the only chemical detected at a concentration in excess of the New Mexico Water Quality Control Commission (NMWQCC) groundwater standards was naphthalene, which was detected in monitor well MW-1 at a concentration of 0.032 mg/L, versus the NMWQCC groundwater standard of 0.030 mg/L.

To reduce the potential for further groundwater impact, the acid dock was removed and the residual impacted soils were excavated. These soils may have acted as a source for the observed volatile and semivolatile concentrations in previous groundwater sampling events, as shown in Table 3. The excavated soils were disposed off site, and the excavation backfilled with clean imported fill and graded.

Based on the information contained herein, Brown and Caldwell concludes the following:

- Groundwater flow is east-northeast, which indicates flow onto the property from an adjacent railroad easement (see Figure 4).
- Groundwater sampling indicated non-detectable concentrations of BTEX and semivolatiles in monitor well MW-3, which is downgradient of the former Acid Dock.

3.2 Recommendations

Based on the findings of the September 1997 groundwater sampling event, the following activities are recommended:

- Purge and sample the monitor well downgradient of the former Acid Dock area, MW-3, in September 1998 as directed by NMOCD, and analyze the sample for BTEX (Method 8020) and semivolatiles (Method 8270).

- If the sample to be collected from MW-3 in September 1998 displays no impact by BTEX or semivolatiles in excess of NMWQCC Standards, Brown and Caldwell recommends that existing monitor wells MW-2, MW-3, and MW-4 be plugged and abandoned, and that no further remedial action be required at the former acid dock. If the MW-3 sample to be collected in September 1998 displays concentrations of constituents above the NMWQCC standards, additional sampling of MW-3 or replacement of MW-1 may be required.

DISTRIBUTION

Final
September 1997 Groundwater Sampling Report
Artesia, New Mexico
BJ Services Company, U.S.A.

April 8, 1998

1 copy to: New Mexico Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87505

Attention: Mr. Mark Ashley

1 copy to: New Mexico Oil Conservation Division
811 South 1st Street
Artesia, New Mexico 88211

Attention: Mr. Tim W. Gum

1 copy to: BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas 77381

Attention: Ms. Jo Ann Cobb

1 copy to: BJ Services Company, U.S.A.
2401 Sivley
Artesia, New Mexico 88210

Attention: Mr. Mike Wiggins

1 copy to: Brown and Caldwell
File

QUALITY CONTROL REVIEWER:



Robert N. Jennings, P.E.
Vice President

TLJ:uak

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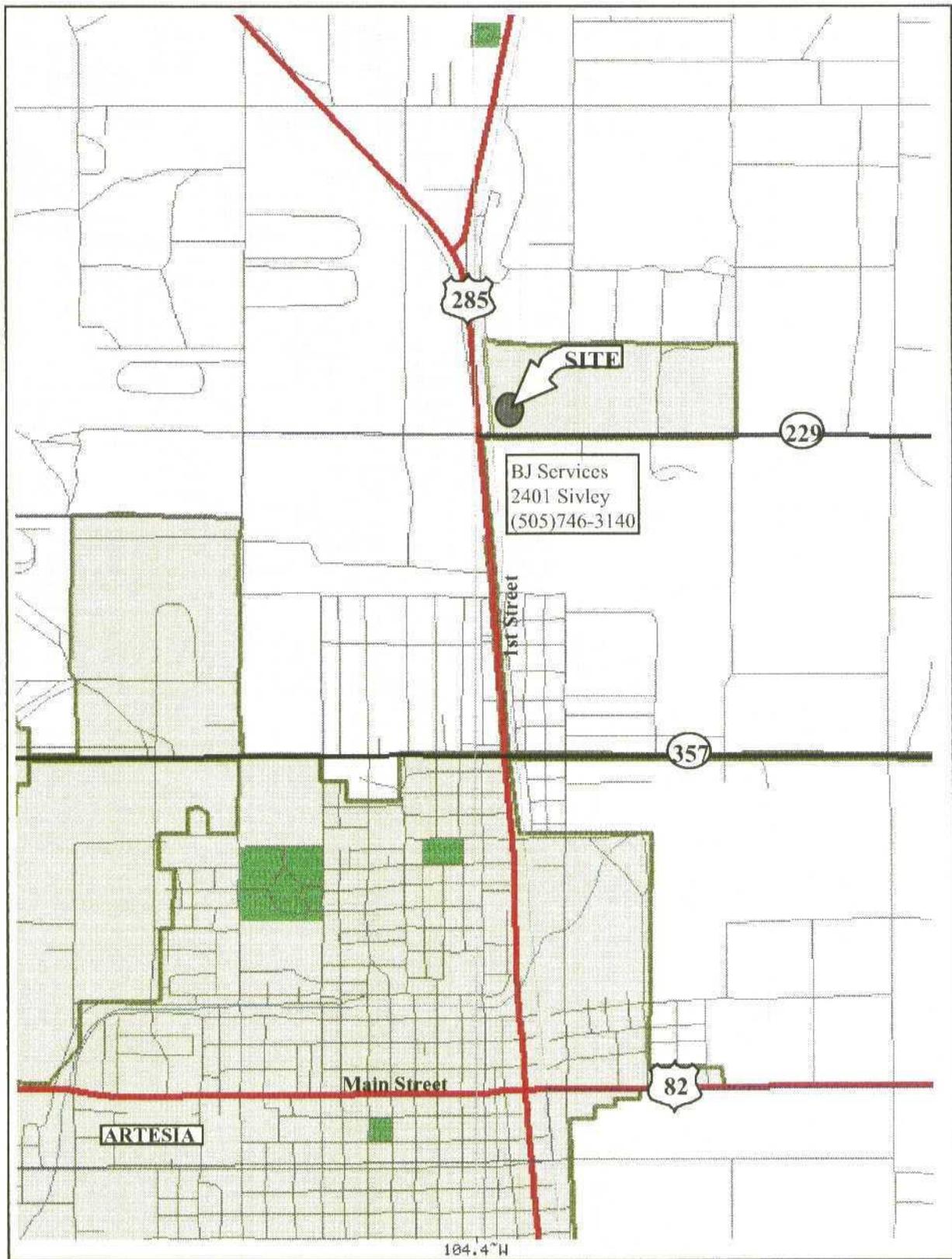
Figures

1

FIGURES

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Use or disclosure of data contained on this sheet is subject to the restriction specified at the beginning of this document.



**BROWN AND
CALDWELL**
HOUSTON, TEXAS



TITLE

SITE LOCATION MAP

DATE

09/22/97

CLIENT

BJ SERVICES COMPANY, U.S.A.

PROJECT NO.

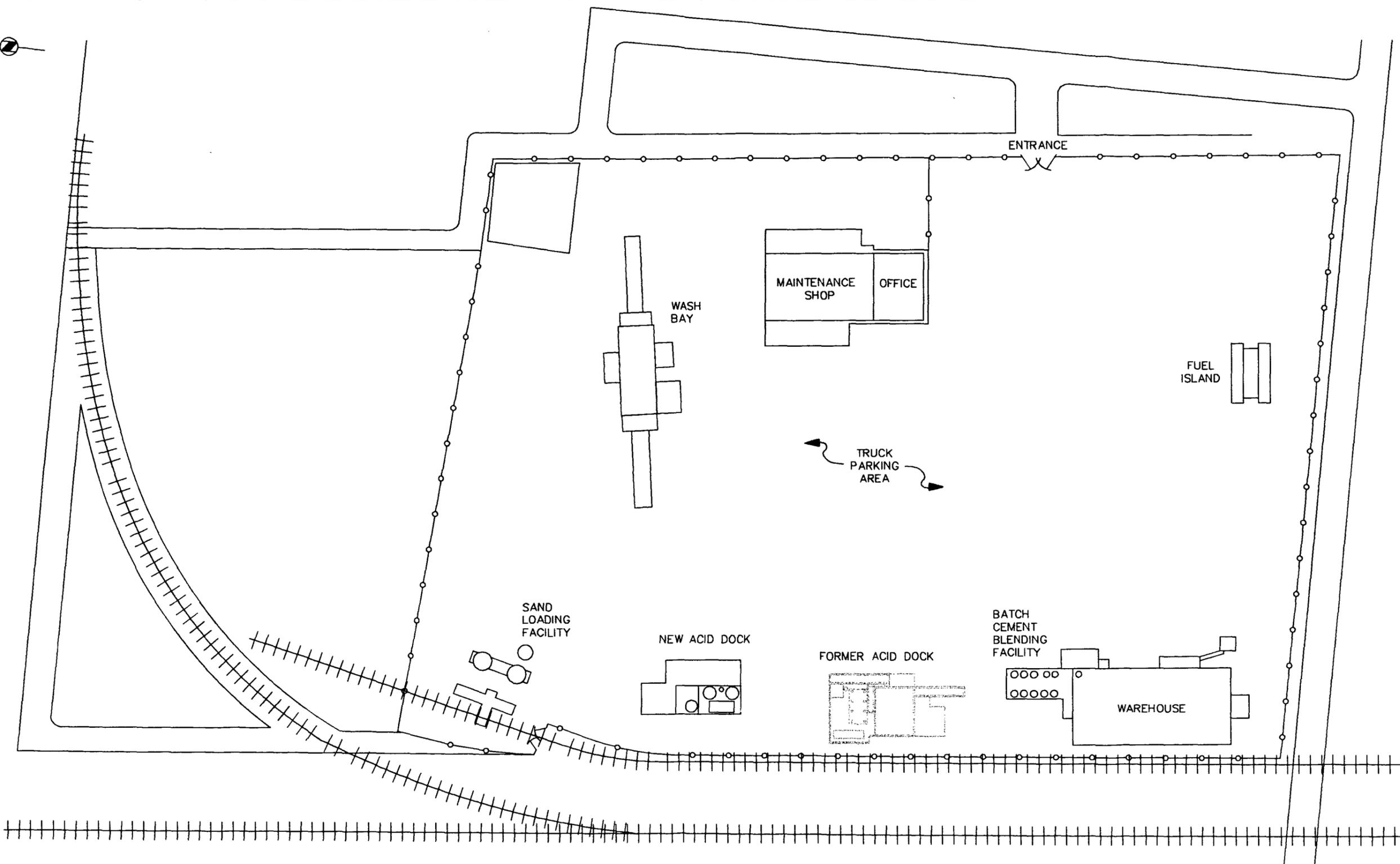
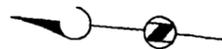
2988-09

SITE LOCATION

ARTESIA, NEW MEXICO

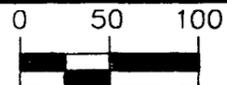
FIGURE NO.

I



T:\2988\F2988004 01-19-98 JR

BROWN AND CALDWELL
HOUSTON, TEXAS



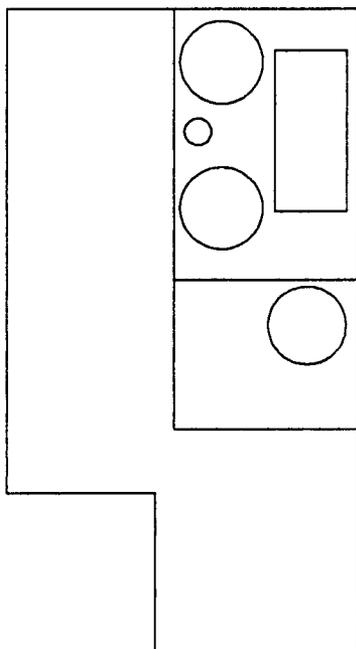
SCALE: 1" = 100'
DRAWN BY: JR DATE 1/98
CHK'D BY: DATE
APPROVED: DATE

SUBMITTED: DATE: PROJECT MANAGER
APPROVED: DATE: BROWN AND CALDWELL

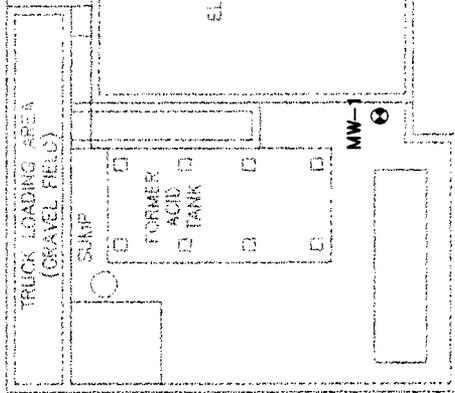
TITLE	SITE PLAN	DATE	01/19/98
CLIENT	BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER	2988.09
SITE	ARTESIA, NEW MEXICO	FIGURE NUMBER	2



NEW ACID DOCK

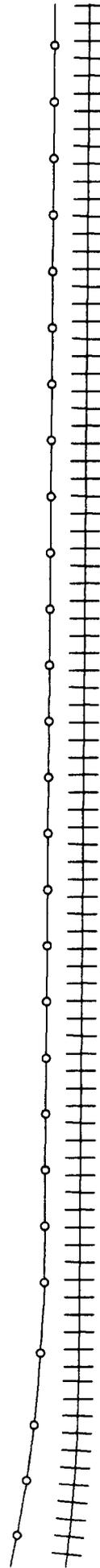


MW-3
FORMER ACID DOCK

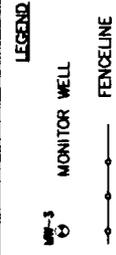


MW-2

MW-4



BROWN AND CALDWELL
HOUSTON, TEXAS
SUBMITTED: PROJECT MANAGER DATE: _____
APPROVED: BROWN AND CALDWELL DATE: _____



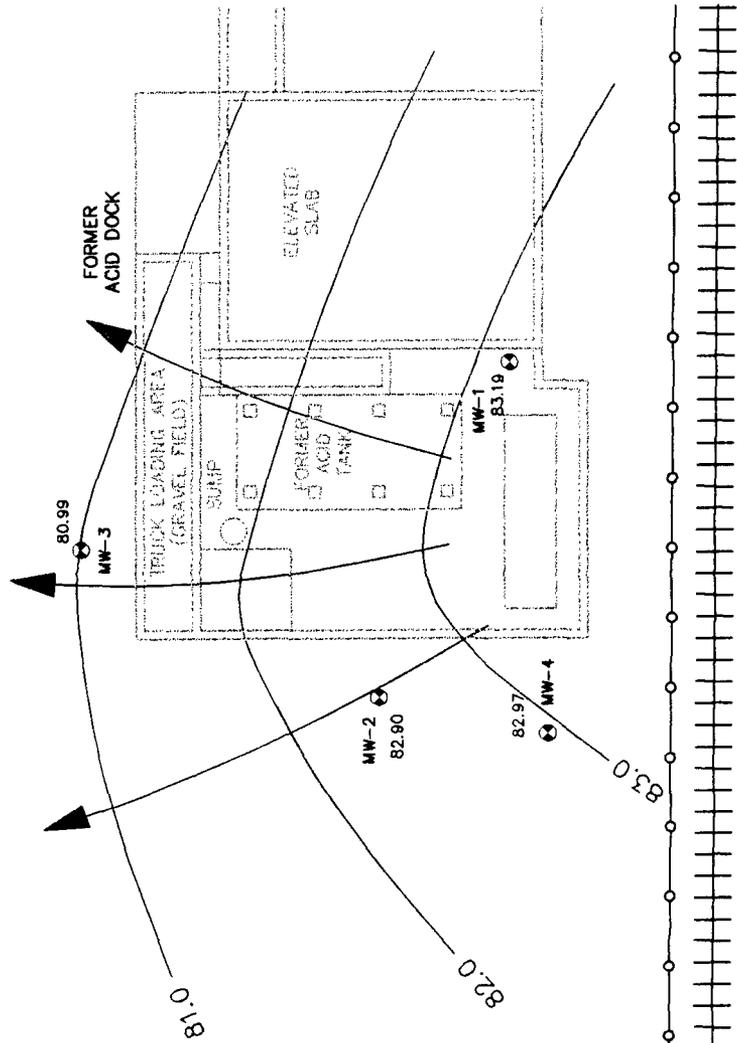
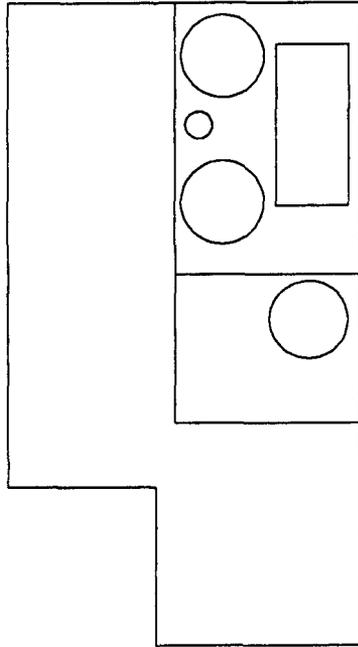
0 15 30
SCALE 1" = 30'
DRAWN BY: JR DATE 1/98
CHK'D BY: _____ DATE _____
APPROVED: _____ DATE _____

TITLE: MONITOR WELL LOCATIONS
CLIENT: BJ SERVICES COMPANY, U.S.A.
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 01/20/98
PROJECT NUMBER: 2988.09
FIGURE NUMBER: 3



NEW ACID DOCK



BROWN AND CALDWELL
 HOUSTON, TEXAS

SUBMITTED: PROJECT MANAGER DATE: _____
 APPROVED: BROWN AND CALDWELL DATE: _____

LEGEND

MW-3 MONITOR WELL

83.0 GROUNDWATER ELEVATION

GROUNDWATER FLOW DIRECTION

FENCELINE

0 15 30

SCALE 1" = 30'

DRAWN BY: JR DATE 1/28

CHK'D BY: DATE

APPROVED: DATE

TITLE GROUNDWATER GRADIENT MAP
 SEPTEMBER 1, 1997

CLIENT BJ SERVICES COMPANY, U.S.A.

SITE LOCATION ARTESIA, NEW MEXICO

DATE 01/20/98
 PROJECT NUMBER 2988.09
 FIGURE NUMBER 4

Tables

TABLES

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Use or disclosure of data contained on this sheet is subject to the restriction specified at the beginning of this document.

Table 1
Groundwater Elevation- September 1, 1997
BJ Services Company, U.S.A.
Artesia, New Mexico

Monitor Well	Top of Casing (Relative Elevation)	Depth to Water (feet)	Groundwater Elevation ⁽¹⁾
MW-1	95.82	12.63	83.19
MW-2	96.40	13.50	82.90
MW-3	96.09	15.10	80.99
MW-4	96.07	13.10	82.97

(1) Elevation of Well casings was established relative to nearby drum storage slab, which was assigned an arbitrary elevation of 100 feet.

Table 2
Groundwater Sampling - September 2, 1997
Analytical Results
BJ Services Company, U.S.A.
Artesia, New Mexico

MONITOR WELL	MW-1	MW-2	MW-3	MW-4	Field Blank	NMWQCC ^(a) Groundwater Standards
VOLATILES by Method 8020 (mg/L)						
Benzene	<0.0050	<0.0010	<0.0050	<0.0010	<0.0010	0.01
Toluene	0.470	<0.0010	<0.0050	<0.0010	<0.0010	0.75
Ethylbenzene	0.059	<0.0010	<0.0050	<0.0010	<0.0010	0.75
Total Xylenes	0.190	<0.0010	<0.0050	<0.0010	<0.0010	0.62
SEMIVOLATILES by Method 8270 (mg/L) ^(b)						
Dibenzofuran	0.012	<0.005	<0.005	<0.005	<0.005	NL
2-Methylnaphthalene	0.024	<0.005	<0.005	<0.005	<0.005	NL
4-Methyphenol	0.059	<0.005	<0.005	<0.005	<0.005	NL
Naphthalene	0.032	<0.005	<0.005	<0.005	<0.005	0.03 ^(c)

^(a) NMWQCC = New Mexico Water Quality Control Commission

^(b) Chemicals with concentrations below Practical Quantitation Limit (PQL) are not listed in this table

^(c) Value is for PAHs: total naphthalene plus monomethylnaphthalenes.

Table 3
Cumulative Analytical Results
Groundwater Sampling – April 1993 through September 1997
BJ Services Company, U.S.A.
Artesia, New Mexico

Monitor Well	MW-1	MW-2	MW-3	MW-4	Field Blank	NMWQCC ^(a) Groundwater Standards
VOLATILES by Method 8020 (mg/L)						
Benzene						0.01
April 21, 1993	0.0041	<0.0005	<0.0005	<0.0005	NA	
July 18, 1993	0.0033	<0.0005	0.00067	<0.0005	NA	
January 28, 1994	0.0018	<0.0010	<0.0010	<0.001	NA	
September 2, 1997	<0.0050	<0.0010	<0.0050	<0.0010	<0.0010	
Toluene						0.75
April 21, 1993	<0.0005	<0.0005	<0.0005	0.0017	NA	
July 18, 1993	<0.0005	<0.0005	<0.0005	<0.0005	NA	
January 28, 1994	0.0010	0.0026	0.0011	0.0297	NA	
September 2, 1997	0.470	<0.0010	<0.0050	<0.0010	<0.0010	
Ethylbenzene						0.75
April 21, 1993	<0.0005	<0.0005	<0.0005	<0.0005	NA	
July 18, 1993	<0.0005	<0.0005	<0.0005	<0.0005	NA	
January 28, 1994	0.0045	<0.0010	<0.0010	0.0064	NA	
September 2, 1997	0.059	<0.0010	<0.0050	<0.0010	<0.0010	
Total Xylenes						0.62
April 21, 1993	0.032	<0.0010	<0.0010	<0.0010	NA	
July 18, 1993	<0.0010	<0.0010	<0.0010	<0.0010	NA	
January 28, 1994	0.0026	0.0020	<0.0010	0.0091	NA	
September 2, 1997	0.19	<0.0010	<0.0050	<0.0010	<0.0010	
SEMIVOLATILES by Method 8270 (mg/L)^(b)						
Dibenzofuran						NL
September 2, 1997	0.012	<0.005	<0.005	<0.005	<0.005	
2-Methylnaphthalene						NL
April 21, 1993	NA	NA	NA	NA	NA	
July 18, 1993	0.030	<0.0050	<0.0050	<0.0050	NA	
January 28, 1994	NA	NA	NA	NA	NA	
September 2, 1997	0.024	<0.005	<0.005	<0.005	<0.005	
4-Methyphenol						NL
September 2, 1997	0.059	<0.005	<0.005	<0.005	<0.005	
Naphthalene						0.03 ^(c)
April 21, 1993	NA	NA	NA	NA	NA	
July 18, 1993	<0.0050	<0.0050	<0.0050	<0.0050	NA	
January 28, 1994	<0.0060	<0.0060	<0.0060	<0.0060	NA	
September 2, 1997	0.032	<0.005	<0.005	<0.005	<0.005	

- (a) NMWQCC = New Mexico Water Quality Control Commission.
(b) Chemicals with concentrations below Practical Quantitation Limit (PQL) are not listed in this table.
(c) Value is for PAHs: total naphthalene plus monomethylnaphthalenes.

A



APPENDIX A

Laboratory Analytical Reports

W:\bjserv\2988\048r.doc

Use or disclosure of data contained on this sheet is subject to the restriction specified at the beginning of this document.



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

September 12, 1997

Mr. Tim Jenkins
BROWN AND CALDWELL
1415 Louisiana
Houston, TX 77002

The following report contains analytical results for samples received at Southern Petroleum Laboratories (SPL) on September 3, 1997. The samples were assigned to Certificate of Analysis No.(s) 9709069 and analyzed for all parameters as listed on the chain of custody.

There were no analytical problems encountered with this group of samples and all quality control data was within acceptance limits.

If you have any questions or comments pertaining to this data report, please do not hesitate to contact me. Please reference the above Certificate of Analysis No. during any inquiries.

Again, SPL is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

Southern Petroleum Laboratories


Bernadette A. Fini
Project Manager



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

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate of Analysis Number: 97-09-069

Approved for Release by:


Bernadette A. Fini, Project Manager

9-12-97
Date:

Greg Grandits
Laboratory Director

Idelis Williams
Quality Assurance Officer

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory.



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

Certificate of Analysis No. H9-9709069-01

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
 SITE: Artesia, New Mexico
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-1

PROJECT NO: 2988-09
 MATRIX: WATER
 DATE SAMPLED: 09/02/97 13:20:00
 DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	5.0 P	µg/L
TOLUENE	470	5.0 P	µg/L
ETHYLBENZENE	59	5.0 P	µg/L
TOTAL XYLENE	190	5.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	719		µg/L

Surrogate

% Recovery

1,4-Difluorobenzene 100
 4-Bromofluorobenzene 67

Method 8020A ***
 Analyzed by: fab
 Date: 09/05/97

Liquid-liquid extraction SEMIVOLATILES 09/04/97
 Method 3520B ***
 Analyzed by: PC
 Date: 09/04/97 08:00:00

ND - Not detected.

(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. H9-9709069-01

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Tim Jenkins

09/12/97

PROJECT: BJ-Artesia
SITE: Artesia, New Mexico
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-1

PROJECT NO: 2988-09
MATRIX: WATER
DATE SAMPLED: 09/02/97 13:20:00
DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Acenaphthene	ND	10	ug/L
Acenaphthylene	ND	10	ug/L
Aniline	ND	10	ug/L
Anthracene	ND	10	ug/L
Benzo (a) Anthracene	ND	10	ug/L
Benzo (b) Fluoranthene	ND	10	ug/L
Benzo (k) Fluoranthene	ND	10	ug/L
Benzo (a) Pyrene	ND	10	ug/L
Benzoic Acid	ND	50	ug/L
Benzo (g, h, i) Perylene	ND	10	ug/L
Benzyl alcohol	ND	10	ug/L
4-Bromophenylphenyl ether	ND	10	ug/L
Butylbenzylphthalate	ND	10	ug/L
di-n-Butyl phthalate	ND	10	ug/L
Carbazole	ND	10	ug/L
4-Chloroaniline	ND	10	ug/L
bis (2-Chloroethoxy) Methane	ND	10	ug/L
bis (2-Chloroethyl) Ether	ND	10	ug/L
bis (2-Chloroisopropyl) Ether	ND	10	ug/L
4-Chloro-3-Methylphenol	ND	10	ug/L
2-Chloronaphthalene	ND	10	ug/L
2-Chlorophenol	ND	10	ug/L
4-Chlorophenylphenyl ether	ND	10	ug/L
Chrysene	ND	10	ug/L
Dibenz (a, h) Anthracene	ND	10	ug/L
Dibenzofuran	12	10	ug/L
1,2-Dichlorobenzene	ND	10	ug/L
1,3-Dichlorobenzene	ND	10	ug/L
1,4-Dichlorobenzene	ND	10	ug/L
3,3'-Dichlorobenzidine	ND	20	ug/L
2,4-Dichlorophenol	ND	10	ug/L
Diethylphthalate	ND	10	ug/L
2,4-Dimethylphenol	ND	10	ug/L
Dimethyl Phthalate	ND	10	ug/L
4,6-Dinitro-2-Methylphenol	ND	50	ug/L
2,4-Dinitrophenol	ND	50	ug/L
2,4-Dinitrotoluene	ND	10	ug/L
2,6-Dinitrotoluene	ND	10	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)

**HOUSTON LABORATORY**

8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054

PHONE (713)660-0901

Certificate of Analysis No. H9-9709069-01

Brown and Caldwell

SAMPLE ID: MW-1

PARAMETER	ANALYTICAL DATA (continued)		UNITS
	RESULTS	PQL*	
1,2-Diphenylhydrazine	ND	10	ug/L
bis(2-Ethylhexyl) Phthalate	ND	10	ug/L
Fluoranthene	ND	10	ug/L
Fluorene	ND	10	ug/L
Hexachlorobenzene	ND	10	ug/L
Hexachlorobutadiene	ND	10	ug/L
Hexachloroethane	ND	10	ug/L
Hexachlorocyclopentadiene	ND	10	ug/L
Indeno(1,2,3-cd) Pyrene	ND	10	ug/L
Isophorone	ND	10	ug/L
2-Methylnaphthalene	24	10	ug/L
2-Methylphenol	ND	10	ug/L
4-Methylphenol	59	10	ug/L
Naphthalene	32	10	ug/L
2-Nitroaniline	ND	50	ug/L
3-Nitroaniline	ND	50	ug/L
4-Nitroaniline	ND	50	ug/L
Nitrobenzene	ND	10	ug/L
2-Nitrophenol	ND	10	ug/L
4-Nitrophenol	ND	50	ug/L
N-Nitrosodiphenylamine	ND	10	ug/L
N-Nitroso-Di-n-Propylamine	ND	10	ug/L
Di-n-Octyl Phthalate	ND	10	ug/L
Pentachlorophenol	ND	50	ug/L
Phenanthrene	ND	10	ug/L
Phenol	ND	10	ug/L
Pyrene	ND	10	ug/L
Pyridine	ND	10	ug/L
1,2,4-Trichlorobenzene	ND	10	ug/L
2,4,5-Trichlorophenol	ND	20	ug/L
2,4,6-Trichlorophenol	ND	10	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-01

Brown and Caldwell

SAMPLE ID: MW-1

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	76	35	114
2-Fluorobiphenyl	50 ug/L	81	43	116
Terphenyl-d14	50 ug/L	62	33	141
Phenol-d5	75 ug/L	17	10	110
2-Fluorophenol	75 ug/L	23	21	110
2,4,6-Tribromophenol	75 ug/L	96	10	123

ANALYZED BY: LH

DATE/TIME: 09/06/97 02:38:00

EXTRACTED BY: PC

DATE/TIME: 09/04/97 08:00:00

METHOD: 8270, Semivolatile Organics - Water

NOTES: * - Practical Quantitation Limit

ND - Not Detected

NA - Not Analyzed

COMMENTS:

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. H9-9709069-02

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
 SITE: Artesia, New Mexico
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-2

PROJECT NO: 2988-09
 MATRIX: WATER
 DATE SAMPLED: 09/02/97 14:00:00
 DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	103
4-Bromofluorobenzene	63

Method 8020A ***
 Analyzed by: fab
 Date: 09/04/97

Liquid-liquid extraction SEMIVOLATILES 09/04/97
 Method 3520B ***
 Analyzed by: PC
 Date: 09/04/97 08:00:00

ND - Not detected.

(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. H9-9709069-02

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Tim Jenkins

09/12/97

PROJECT: BJ-Artesia
SITE: Artesia, New Mexico
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-2

PROJECT NO: 2988-09
MATRIX: WATER
DATE SAMPLED: 09/02/97 14:00:00
DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Acenaphthene	ND	5	ug/L
Acenaphthylene	ND	5	ug/L
Aniline	ND	5	ug/L
Anthracene	ND	5	ug/L
Benzo(a)Anthracene	ND	5	ug/L
Benzo(b)Fluoranthene	ND	5	ug/L
Benzo(k)Fluoranthene	ND	5	ug/L
Benzo(a)Pyrene	ND	5	ug/L
Benzoic Acid	ND	25	ug/L
Benzo(g,h,i)Perylene	ND	5	ug/L
Benzyl alcohol	ND	5	ug/L
4-Bromophenylphenyl ether	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
di-n-Butyl phthalate	ND	5	ug/L
Carbazole	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
bis(2-Chloroethoxy)Methane	ND	5	ug/L
bis(2-Chloroethyl)Ether	ND	5	ug/L
bis(2-Chloroisopropyl)Ether	ND	5	ug/L
4-Chloro-3-Methylphenol	ND	5	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
4-Chlorophenylphenyl ether	ND	5	ug/L
Chrysene	ND	5	ug/L
Dibenz(a,h)Anthracene	ND	5	ug/L
Dibenzofuran	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
2,4-Dichlorophenol	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Dimethyl Phthalate	ND	5	ug/L
4,6-Dinitro-2-Methylphenol	ND	25	ug/L
2,4-Dinitrophenol	ND	25	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
2,6-Dinitrotoluene	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-02

Brown and Caldwell

SAMPLE ID: MW-2

PARAMETER	ANALYTICAL DATA (continued)		UNITS
	RESULTS	PQL*	
1,2-Diphenylhydrazine	ND	5	ug/L
bis(2-Ethylhexyl) Phthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Fluorene	ND	5	ug/L
Hexachlorobenzene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
Hexachloroethane	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
Indeno(1,2,3-cd) Pyrene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
Naphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
3-Nitroaniline	ND	25	ug/L
4-Nitroaniline	ND	25	ug/L
Nitrobenzene	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
4-Nitrophenol	ND	25	ug/L
N-Nitrosodiphenylamine	ND	5	ug/L
N-Nitroso-Di-n-Propylamine	ND	5	ug/L
Di-n-Octyl Phthalate	ND	5	ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Phenol	ND	5	ug/L
Pyrene	ND	5	ug/L
Pyridine	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-02

Brown and Caldwell

SAMPLE ID: MW-2

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	65	35	114
2-Fluorobiphenyl	50 ug/L	66	43	116
Terphenyl-d14	50 ug/L	96	33	141
Phenol-d5	75 ug/L	15	10	110
2-Fluorophenol	75 ug/L	24	21	110
2,4,6-Tribromophenol	75 ug/L	94	10	123

ANALYZED BY: LH

DATE/TIME: 09/06/97 01:37:00

EXTRACTED BY: PC

DATE/TIME: 09/04/97 08:00:00

METHOD: 8270, Semivolatile Organics - Water

NOTES: * - Practical Quantitation Limit

ND - Not Detected

NA - Not Analyzed

COMMENTS:

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. H9-9709069-03

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
 SITE: Artesia, New Mexico
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-3

PROJECT NO: 2988-09
 MATRIX: WATER
 DATE SAMPLED: 09/02/97 14:20:00
 DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	5.0 P	µg/L
TOLUENE	ND	5.0 P	µg/L
ETHYLBENZENE	ND	5.0 P	µg/L
TOTAL XYLENE	ND	5.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	107
4-Bromofluorobenzene	63

Method 8020A ***
 Analyzed by: fab
 Date: 09/04/97

Liquid-liquid extraction SEMIVOLATILES 09/04/97
 Method 3520B ***
 Analyzed by: PC
 Date: 09/04/97 08:00:00

ND - Not detected. (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. H9-9709069-03

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Tim Jenkins

09/12/97

PROJECT: BJ-Artesia
SITE: Artesia, New Mexico
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-3

PROJECT NO: 2988-09
MATRIX: WATER
DATE SAMPLED: 09/02/97 14:20:00
DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Acenaphthene	ND	5	ug/L
Acenaphthylene	ND	5	ug/L
Aniline	ND	5	ug/L
Anthracene	ND	5	ug/L
Benzo (a) Anthracene	ND	5	ug/L
Benzo (b) Fluoranthene	ND	5	ug/L
Benzo (k) Fluoranthene	ND	5	ug/L
Benzo (a) Pyrene	ND	5	ug/L
Benzoic Acid	ND	25	ug/L
Benzo (g, h, i) Perylene	ND	5	ug/L
Benzyl alcohol	ND	5	ug/L
4-Bromophenylphenyl ether	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
di-n-Butyl phthalate	ND	5	ug/L
Carbazole	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
bis (2-Chloroethoxy) Methane	ND	5	ug/L
bis (2-Chloroethyl) Ether	ND	5	ug/L
bis (2-Chloroisopropyl) Ether	ND	5	ug/L
4-Chloro-3-Methylphenol	ND	5	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
4-Chlorophenylphenyl ether	ND	5	ug/L
Chrysene	ND	5	ug/L
Dibenz (a, h) Anthracene	ND	5	ug/L
Dibenzofuran	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
2,4-Dichlorophenol	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Dimethyl Phthalate	ND	5	ug/L
4,6-Dinitro-2-Methylphenol	ND	25	ug/L
2,4-Dinitrophenol	ND	25	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
2,6-Dinitrotoluene	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-03

Brown and Caldwell

SAMPLE ID: MW-3

PARAMETER	ANALYTICAL DATA (continued)		UNITS
	RESULTS	PQL*	
1,2-Diphenylhydrazine	ND	5	ug/L
bis(2-Ethylhexyl) Phthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Fluorene	ND	5	ug/L
Hexachlorobenzene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
Hexachloroethane	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
Indeno (1,2,3-cd) Pyrene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
Naphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
3-Nitroaniline	ND	25	ug/L
4-Nitroaniline	ND	25	ug/L
Nitrobenzene	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
4-Nitrophenol	ND	25	ug/L
N-Nitrosodiphenylamine	ND	5	ug/L
N-Nitroso-Di-n-Propylamine	ND	5	ug/L
Di-n-Octyl Phthalate	ND	5	ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Phenol	ND	5	ug/L
Pyrene	ND	5	ug/L
Pyridine	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-03

Brown and Caldwell

SAMPLE ID: MW-3

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	62	35	114
2-Fluorobiphenyl	50 ug/L	72	43	116
Terphenyl-d14	50 ug/L	82	33	141
Phenol-d5	75 ug/L	14	10	110
2-Fluorophenol	75 ug/L	22	21	110
2,4,6-Tribromophenol	75 ug/L	91	10	123

ANALYZED BY: LH

DATE/TIME: 09/06/97 02:08:00

EXTRACTED BY: PC

DATE/TIME: 09/04/97 08:00:00

METHOD: 8270, Semivolatile Organics - Water

NOTES: * - Practical Quantitation Limit

ND - Not Detected

NA - Not Analyzed

COMMENTS:

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. H9-9709069-04

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
 SITE: Artesia, New Mexico
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: MW-4

PROJECT NO: 2988-09
 MATRIX: WATER
 DATE SAMPLED: 09/02/97 13:40:00
 DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	103
4-Bromofluorobenzene	63

Method 8020A ***
 Analyzed by: fab
 Date: 09/04/97

Liquid-liquid extraction SEMIVOLATILES 09/04/97
 Method 3520B ***
 Analyzed by: PC
 Date: 09/04/97 08:00:00

ND - Not detected.

(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. H9-9709069-04

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Tim Jenkins

09/12/97

PROJECT: BJ-Artesia
SITE: Artesia, New Mexico
SAMPLED BY: Brown & Caldwell
SAMPLE ID: MW-4

PROJECT NO: 2988-09
MATRIX: WATER
DATE SAMPLED: 09/02/97 13:40:00
DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Acenaphthene	ND	5	ug/L
Acenaphthylene	ND	5	ug/L
Aniline	ND	5	ug/L
Anthracene	ND	5	ug/L
Benzo (a) Anthracene	ND	5	ug/L
Benzo (b) Fluoranthene	ND	5	ug/L
Benzo (k) Fluoranthene	ND	5	ug/L
Benzo (a) Pyrene	ND	5	ug/L
Benzoic Acid	ND	25	ug/L
Benzo (g, h, i) Perylene	ND	5	ug/L
Benzyl alcohol	ND	5	ug/L
4-Bromophenylphenyl ether	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
di-n-Butyl phthalate	ND	5	ug/L
Carbazole	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
bis (2-Chloroethoxy) Methane	ND	5	ug/L
bis (2-Chloroethyl) Ether	ND	5	ug/L
bis (2-Chloroisopropyl) Ether	ND	5	ug/L
4-Chloro-3-Methylphenol	ND	5	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
4-Chlorophenylphenyl ether	ND	5	ug/L
Chrysene	ND	5	ug/L
Dibenz (a, h) Anthracene	ND	5	ug/L
Dibenzofuran	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
2,4-Dichlorophenol	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Dimethyl Phthalate	ND	5	ug/L
4,6-Dinitro-2-Methylphenol	ND	25	ug/L
2,4-Dinitrophenol	ND	25	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
2,6-Dinitrotoluene	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-04

Brown and Caldwell

SAMPLE ID: MW-4

PARAMETER	ANALYTICAL DATA (continued)		UNITS
	RESULTS	PQL*	
1,2-Diphenylhydrazine	ND	5	ug/L
bis(2-Ethylhexyl) Phthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Fluorene	ND	5	ug/L
Hexachlorobenzene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
Hexachloroethane	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
Indeno (1,2,3-cd) Pyrene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
Naphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
3-Nitroaniline	ND	25	ug/L
4-Nitroaniline	ND	25	ug/L
Nitrobenzene	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
4-Nitrophenol	ND	25	ug/L
N-Nitrosodiphenylamine	ND	5	ug/L
N-Nitroso-Di-n-Propylamine	ND	5	ug/L
Di-n-Octyl Phthalate	ND	5	ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Phenol	ND	5	ug/L
Pyrene	ND	5	ug/L
Pyridine	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-04

Brown and Caldwell

SAMPLE ID: MW-4

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	84	35	114
2-Fluorobiphenyl	50 ug/L	90	43	116
Terphenyl-d14	50 ug/L	100	33	141
Phenol-d5	75 ug/L	19	10	110
2-Fluorophenol	75 ug/L	30	21	110
2,4,6-Tribromophenol	75 ug/L	98	10	123

ANALYZED BY: LH

DATE/TIME: 09/06/97 00:36:00

EXTRACTED BY: PC

DATE/TIME: 09/04/97 08:00:00

METHOD: 8270, Semivolatile Organics - Water

NOTES: * - Practical Quantitation Limit

ND - Not Detected

NA - Not Analyzed

COMMENTS:

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. H9-9709069-05

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
 SITE: Artesia, New Mexico
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: FB-MW1

PROJECT NO: 2988-09
 MATRIX: WATER
 DATE SAMPLED: 09/02/97 14:10:00
 DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/L
TOLUENE	ND	1.0 P	µg/L
ETHYLBENZENE	ND	1.0 P	µg/L
TOTAL XYLENE	ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	103
4-Bromofluorobenzene	63
Method 8020A ***	
Analyzed by: fab	
Date: 09/04/97	

Liquid-liquid extraction SEMIVOLATILES 09/04/97
 Method 3520B ***
 Analyzed by: PC
 Date: 09/04/97 08:00:00

ND - Not detected.

(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. H9-9709069-05

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Tim Jenkins

09/12/97

PROJECT: BJ-Artesia
SITE: Artesia, New Mexico
SAMPLED BY: Brown & Caldwell
SAMPLE ID: FB-MW1

PROJECT NO: 2988-09
MATRIX: WATER
DATE SAMPLED: 09/02/97 14:10:00
DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Acenaphthene	ND	5	ug/L
Acenaphthylene	ND	5	ug/L
Aniline	ND	5	ug/L
Anthracene	ND	5	ug/L
Benzo(a)Anthracene	ND	5	ug/L
Benzo(b)Fluoranthene	ND	5	ug/L
Benzo(k)Fluoranthene	ND	5	ug/L
Benzo(a)Pyrene	ND	5	ug/L
Benzoic Acid	ND	25	ug/L
Benzo(g,h,i)Perylene	ND	5	ug/L
Benzyl alcohol	ND	5	ug/L
4-Bromophenylphenyl ether	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
di-n-Butyl phthalate	ND	5	ug/L
Carbazole	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
bis(2-Chloroethoxy)Methane	ND	5	ug/L
bis(2-Chloroethyl)Ether	ND	5	ug/L
bis(2-Chloroisopropyl)Ether	ND	5	ug/L
4-Chloro-3-Methylphenol	ND	5	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
4-Chlorophenylphenyl ether	ND	5	ug/L
Chrysene	ND	5	ug/L
Dibenz(a,h)Anthracene	ND	5	ug/L
Dibenzofuran	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
2,4-Dichlorophenol	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Dimethyl Phthalate	ND	5	ug/L
4,6-Dinitro-2-Methylphenol	ND	25	ug/L
2,4-Dinitrophenol	ND	25	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
2,6-Dinitrotoluene	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-05

Brown and Caldwell

SAMPLE ID: FB-MW1

PARAMETER	ANALYTICAL DATA (continued)		UNITS
	RESULTS	PQL*	
1,2-Diphenylhydrazine	ND	5	ug/L
bis(2-Ethylhexyl) Phthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Fluorene	ND	5	ug/L
Hexachlorobenzene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
Hexachloroethane	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
Indeno(1,2,3-cd) Pyrene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
Naphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
3-Nitroaniline	ND	25	ug/L
4-Nitroaniline	ND	25	ug/L
Nitrobenzene	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
4-Nitrophenol	ND	25	ug/L
N-Nitrosodiphenylamine	ND	5	ug/L
N-Nitroso-Di-n-Propylamine	ND	5	ug/L
Di-n-Octyl Phthalate	ND	5	ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Phenol	ND	5	ug/L
Pyrene	ND	5	ug/L
Pyridine	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L

METHOD: 8270, Semivolatile Organics - Water
(continued on next page)



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

Certificate of Analysis No. H9-9709069-05

Brown and Caldwell

SAMPLE ID: FB-MW1

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	88	35	114
2-Fluorobiphenyl	50 ug/L	94	43	116
Terphenyl-d14	50 ug/L	106	33	141
Phenol-d5	75 ug/L	20	10	110
2-Fluorophenol	75 ug/L	32	21	110
2,4,6-Tribromophenol	75 ug/L	96	10	123

ANALYZED BY: LH

DATE/TIME: 09/06/97 01:07:00

EXTRACTED BY: PC

DATE/TIME: 09/04/97 08:00:00

METHOD: 8270, Semivolatile Organics - Water

NOTES: * - Practical Quantitation Limit

ND - Not Detected

NA - Not Analyzed

COMMENTS:

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. H9-9709069-06

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
 SITE: Artesia, New Mexico
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: SE-CONF-SDWL

PROJECT NO: 2988-09
 MATRIX: SOIL
 DATE SAMPLED: 09/01/97
 DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	5.0 P	µg/Kg
TOLUENE	ND	5.0 P	µg/Kg
ETHYLBENZENE	ND	5.0 P	µg/Kg
TOTAL XYLENE	ND	5.0 P	µg/Kg
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/Kg

Surrogate % Recovery
 1,4-Difluorobenzene 100
 4-Bromofluorobenzene 100
 Method 8020A ***
 Analyzed by: MF
 Date: 09/09/97

Total Petroleum Hydrocarbons-Diesel ND 8.0 P mg/Kg

Surrogate % Recovery
 n-Pentacosane 95
 Modified 8015A***
 Analyzed by: RR
 Date: 09/09/97 12:08:00

Sonication Extraction 09/05/97
 Method 3550A ***
 Analyzed by: DL
 Date: 09/05/97 07:00:00

ND - Not detected.

(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. H9-9709069-08

Brown and Caldwell
 1415 Louisiana
 Houston, TX 77002
 ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
 SITE: Artesia, New Mexico
 SAMPLED BY: Brown & Caldwell
 SAMPLE ID: NW-CONF-TOE

PROJECT NO: 2988-09
 MATRIX: SOIL
 DATE SAMPLED: 09/02/97 15:00:00
 DATE RECEIVED: 09/03/97

ANALYTICAL DATA

PARAMETER	RESULTS	DETECTION LIMIT	UNITS
BENZENE	ND	1.0 P	µg/Kg
TOLUENE	ND	1.0 P	µg/Kg
ETHYLBENZENE	ND	1.0 P	µg/Kg
TOTAL XYLENE	ND	1.0 P	µg/Kg
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		µg/Kg

Surrogate	% Recovery
1,4-Difluorobenzene	97
4-Bromofluorobenzene	100

Method 8020A ***
 Analyzed by: MF
 Date: 09/08/97

Total Petroleum Hydrocarbons-Diesel ND 8.0 P mg/Kg

Surrogate	% Recovery
n-Pentacosane	91

Modified 8015A***
 Analyzed by: RR
 Date: 09/09/97 01:27:00

Sonication Extraction 09/05/97
 Method 3550A ***
 Analyzed by: DL
 Date: 09/05/97 07:00:00

ND - Not detected. (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. H9-9709069-09

Brown and Caldwell
1415 Louisiana
Houston, TX 77002
ATTN: Tim Jenkins

DATE: 09/12/97

PROJECT: BJ-Artesia
SITE: Artesia, New Mexico
SAMPLED BY: Provided By SPL
SAMPLE ID: Trip Blank

PROJECT NO: 2988-09
MATRIX: WATER
DATE SAMPLED: 09/02/97
DATE RECEIVED: 09/03/97

PARAMETER	ANALYTICAL DATA	RESULTS	DETECTION LIMIT	UNITS
BENZENE		ND	1.0 P	µg/L
TOLUENE		ND	1.0 P	µg/L
ETHYLBENZENE		ND	1.0 P	µg/L
TOTAL XYLENE		ND	1.0 P	µg/L
TOTAL VOLATILE AROMATIC HYDROCARBONS		ND		µg/L

Surrogate	% Recovery
1,4-Difluorobenzene	103
4-Bromofluorobenzene	63

Method 8020A ***
Analyzed by: fab
Date: 09/04/97

ND - Not detected.

(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

3C
WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: SPL

Contract:

Lab Code:

Case No.: 9709091

SAS No.:

SDG No.:

Matrix Spike - EPA Sample No.: well 307

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
Phenol	89	0	26	29	12-110
2-Chlorophenol	89	0	55	62	27-123
1,4-Dichlorobenzene	60	0	43	72	36- 97
N-Nitroso-di-n-prop. (1)	60	0	39	65	41-116
1,2,4-Trichlorobenzene	60	0	49	82	39- 98
4-Chloro-3-methylphenol	89	0	78	88	23- 97
Acenaphthene	60	0	53	88	46-118
4-Nitrophenol	89	0	50	56	30-150
2,4-Dinitrotoluene	60	0	58	97	50-150
Pentachlorophenol	89	5	83	88	9-103
Pyrene	60	0	57	95	26-127

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	REC.
Phenol	89	28	31	7	42	12-110
2-Chlorophenol	89	59	66	6	40	27-123
1,4-Dichlorobenzene	60	44	73	1	28	36- 97
N-Nitroso-di-n-prop. (1)	60	41	68	5	38	41-116
1,2,4-Trichlorobenzene	60	51	85	4	28	39- 98
4-Chloro-3-methylphenol	89	84	94	7	42	23- 97
Acenaphthene	60	55	92	4	31	46-118
4-Nitrophenol	89	53	60	7	50	30-150
2,4-Dinitrotoluene	60	61	102	5	50	50-150
Pentachlorophenol	89	89	94	7	50	9-103
Pyrene	60	60	100	5	31	26-127

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 11 outside limits

Spike Recovery: 0 out of 22 outside limits

SPL Houston Labs

RECOVERY REPORT

Client Name:
 Sample Matrix: LIQUID
 Lab Smp Id: LCS
 Level: LOW
 Data Type: MS DATA
 SpikeList File: 8270w.spk
 Method File: /chem/h.i/h970904.b/h8270wQ.m
 Misc Info: E247F1/H247B03/H247CC1

Client SDG: h970904
 Fraction: SV
 Operator: LH
 SampleType: MS
 Quant Type: ISTD

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
5 Phenol	75	21	28.62	12-110
9 2-Chlorophenol	75	48	63.86	27-123
12 1,4-Dichlorobenzen	50	35	69.48	36-97
21 N-Nitroso-di-n-pro	50	37	74.57	41-116
31 1,2,4-Trichloroben	50	39	78.04	39-98
36 4-Chloro-3-methylp	75	59	78.71	23-97
49 Acenaphthene	50	41	82.99	46-118
51 4-Nitrophenol	75	33	44.30	30-150
53 2,4-Dinitrotoluene	50	47	94.94	50-150
64 Pentachlorophenol	75	54	71.89	9-103
71 Pyrene	50	58	115.02	26-127

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
\$ 23 Nitrobenzene-d5	50	37	74.76	35-114
\$ 41 2-Fluorobiphenyl	50	40	80.76	43-116
\$ 72 Terphenyl-d14	50	53	105.47	33-141
\$ 3 2-Fluorophenol	75	30	39.54	21-110
\$ 4 Phenol-d5	75	22	28.91	10-110
\$ 61 2,4,6-Tribromophen	75	66	87.82	10-123



SPL Blank QC Report

Matrix: Aqueous
Sample ID: BLANK
Batch: E970904042249

Reported on: 09/11/97 10:50
Analyzed on: 09/04/97 19:43
Analyst: LH

METHOD 8270 BLANK H247B03

Compound	Result	Detection Limit	Units
Pyridine	ND	5	ug/L
Phenol	ND	5	ug/L
Aniline	ND	5	ug/L
bis(2-Chloroethyl) ether	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
Benzyl alcohol	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
bis(2-chloroisopropyl) ethe	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
N-Nitroso-di-n-propylamine	ND	5	ug/L
Hexachloroethane	ND	5	ug/L
Nitrobenzene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Benzoic acid	ND	25	ug/L
bis(2-Chloroethoxy) methane	ND	5	ug/L
2,4-Dichlorophenol	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
Naphthalene	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
4-Chloro-3-methylphenol	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
Dimethylphthalate	ND	5	ug/L
2,6-Dinitrotoluene	ND	5	ug/L

Notes

ND - Not detected.



SPL Blank QC Report

page 2

Matrix: Aqueous
Sample ID: BLANK
Batch: E970904042249

Reported on: 09/11/97 10:50
Analyzed on: 09/04/97 19:43
Analyst: LH

METHOD 8270 BLANK H247B03

Compound	Result	Detection Limit	Units
Acenaphthylene	ND	5	ug/L
3-Nitroaniline	ND	25	ug/L
Acenaphthene	ND	5	ug/L
2,4-Dinitrophenol	ND	25	ug/L
4-Nitrophenol	ND	25	ug/L
Dibenzofuran	ND	5	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
4-Chlorophenyl-phenylether	ND	5	ug/L
Fluorene	ND	5	ug/L
4-Nitroaniline	ND	25	ug/L
4,6-Dinitro-2-methylphenol	ND	25	ug/L
n-Nitrosodiphenylamine	ND	5	ug/L
1,2-Diphenylhydrazine	ND	5	ug/L
4-Bromophenyl-phenylether	ND	5	ug/L
Hexachlorobenzene	ND	5	ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Anthracene	ND	5	ug/L
Carbazole	ND	5	ug/L
Di-n-butylphthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Pyrene	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
Benzo[a]anthracene	ND	5	ug/L
Chrysene	ND	5	ug/L
bis(2-Ethylhexyl)phthalate	ND	5	ug/L
Di-n-octylphthalate	ND	5	ug/L
Benzo[b]fluoranthene	ND	5	ug/L
Benzo[k]fluoranthene	ND	5	ug/L
Benzo[a]pyrene	ND	5	ug/L
Indeno[1,2,3-cd]pyrene	ND	5	ug/L
Dibenz[a,h]anthracene	ND	5	ug/L

Notes

ND - Not detected.



SPL Blank QC Report

Matrix: Aqueous
Sample ID: BLANK
Batch: E970904042249

Reported on: 09/11/97 10:50
Analyzed on: 09/04/97 19:43
Analyst: LH

METHOD 8270 BLANK H247B03

Compound	Result	Detection Limit	Units
Benzo[g,h,i]perylene	ND	5	ug/L

Surrogate	Result	QC Criteria	Units
2-Fluorophenol	42	21-110	% Recovery
Phenol-d5	30	10-110	% Recovery
2,4,6-Tribromophenol	84	10-123	% Recovery
Nitrobenzene-d5	79	35-114	% Recovery
2-Fluorobiphenyl	84	43-116	% Recovery
Terphenyl-d14	100	33-141	% Recovery

Samples in Batch 9709069-01 9709069-02 9709069-03 9709069-04
9709069-05

Notes

ND - Not detected.



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_R970904202400

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	50	43	86.0	62 - 121
Toluene	ND	50	43	86.0	66 - 136
EthylBenzene	ND	50	43	86.0	70 - 136
O Xylene	ND	50	44	88.0	74 - 134
M & P Xylene	ND	100	88	88.0	77 - 140

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
			BENZENE	ND	20	15			
TOLUENE	ND	20	16	80.0	15	75.0	6.45	26	56 - 134
ETHYLBENZENE	ND	20	15	75.0	14	70.0	6.90	38	61 - 128
O XYLENE	ND	20	16	80.0	15	75.0	6.45	29	40 - 130
M & P XYLENE	ND	40	31	77.5	30	75.0	3.28	20	43 - 152

Analyst: fab

Sequence Date: 09/04/97

SPL ID of sample spiked: 9709096-02A

Sample File ID: R_I7111.TX0

Method Blank File ID:

Blank Spike File ID: R_I7106.TX0

Matrix Spike File ID: R_I7107.TX0

Matrix Spike Duplicate File ID: R_I7108.TX0

* = Values Outside QC Range. * = Data outside Method Specification limits.

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: SPL-Houston Historical Data (3rd Q '95)

(***) = Source: SPL-Houston Historical Data (4th Q '94)

SAMPLES IN BATCH(SPL ID):

9709095-01A 9709095-02A 9709095-03A 9709095-04A
 9709095-05A 9709110-01A 9709095-06A 9709118-23A
 9709085-04A 9709085-05A 9709085-06A 9709069-01A
 9709086-02A 9709086-03A 9709086-01A 9709095-07A
 9709096-02A 9709096-01A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Aqueous
Units: µg/L

Batch Id: HP_R970904010100

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	50	45	90.0	62 - 121
Toluene	ND	50	47	94.0	66 - 136
EthylBenzene	ND	50	46	92.0	70 - 136
O Xylene	ND	50	47	94.0	74 - 134
M & P Xylene	ND	100	93	93.0	77 - 140

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	ND	20	18	90.0	18	90.0	0	25	39 - 150
TOLUENE	ND	20	19	95.0	19	95.0	0	26	56 - 134
ETHYLBENZENE	ND	20	19	95.0	18	90.0	5.41	38	61 - 128
O XYLENE	ND	20	19	95.0	18	90.0	5.41	29	40 - 130
M & P XYLENE	ND	40	39	97.5	37	92.5	5.26	20	43 - 152

Analyst: fab

Sequence Date: 09/04/97

SPL ID of sample spiked: 9708C74-10A

Sample File ID: R_I7082.TX0

Method Blank File ID:

Blank Spike File ID: R_I7078.TX0

Matrix Spike File ID: R_I7091.TX0

Matrix Spike Duplicate File ID: R_I7092.TX0

* = Values Outside QC Range. * = Data outside Method Specification limits.

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: SPL-Houston Historical Data (3rd Q '95)

(***) = Source: SPL-Houston Historical Data (4th Q '94)

SAMPLES IN BATCH(SPL ID):

9708C95-01A	9708C74-01A	9708C74-03A	9709069-09A
9709069-02A	9709069-04A	9709069-05A	9709069-03A
9709085-03A	9708C74-14A	9708C74-13A	9708C74-09A
9708C74-10A	9708C74-11A	9708C74-12A	9708A44-02A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Soil
Units: µg/Kg

Batch Id: VARD970909091600

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	100	90	90.0	66 - 123
Toluene	ND	100	90	90.0	74 - 125
EthylBenzene	ND	100	90	90.0	84 - 125
O Xylene	ND	100	90	90.0	76 - 137
M & P Xylene	ND	200	180	90.0	81 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	ND	100.0	96	96.0	100	100	4.08	33	47 - 143
TOLUENE	36	100.0	120	84.0	120	84.0	0	35	46 - 148
ETHYLBENZENE	ND	100.0	86	86.0	90	90.0	4.55	40	32 - 151
O XYLENE	2.5	100.0	81	78.5	84	81.5	3.75	24	35 - 143
M & P XYLENE	1.7	200.0	170	84.2	180	89.2	5.77	38	25 - 139

Analyst: MF

Sequence Date: 09/09/97

SPL ID of sample spiked: 9709079-07A

Sample File ID: D_I7255.TX0

Method Blank File ID:

Blank Spike File ID: D_I7258.TX0

Matrix Spike File ID: D_I7252.TX0

Matrix Spike Duplicate File ID: D_I7253.TX0

* = Values Outside QC Range. * = Data outside Method Specification limits.

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: SPL-Houston Historical Data (4th Q '95)

(***) = Source: SPL-Houston Historical Data (4th Q '95)

SAMPLES IN BATCH(SPL ID):

9709079-01A 9709079-04A 9709079-05A 9709079-02A
 9709079-03A 9709079-06A 9709377-01A 9709377-02A
 9709118-02A 9709386-01A 9709386-04A 9709386-02A
 9709378-01A 9709118-22A 9709079-07A 9709069-06A
 9708C76-03A



** SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020***

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

Matrix: Soil
Units: µg/Kg

Batch Id: VARD970908001010

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Benzene	ND	50	41	82.0	66 - 123
Toluene	ND	50	41	82.0	74 - 125
EthylBenzene	ND	50	43	86.0	84 - 125
O Xylene	ND	50	43	86.0	76 - 137
M & P Xylene	ND	100	86	86.0	81 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
BENZENE	ND	20.0	15	75.0	16.5	82.5	9.52	33	47 - 143
TOLUENE	ND	20.0	15	75.0	16.6	83.0	10.1	35	46 - 148
ETHYLBENZENE	ND	20.0	15	75.0	15.7	78.5	4.56	40	32 - 151
O XYLENE	ND	20.0	15	75.0	16.0	80.0	6.45	24	35 - 143
M & P XYLENE	2.2	40.0	29	67.0	32.2	75.0	11.3	38	25 - 139

Analyst: HS

Sequence Date: 09/08/97

SPL ID of sample spiked: 9709089-03A

Sample File ID: D_I7197.TX0

Method Blank File ID:

Blank Spike File ID: D_I7193.TX0

Matrix Spike File ID: D_I7194.TX0

Matrix Spike Duplicate File ID: D_I7212.TX0

* = Values Outside QC Range. * = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

% Recovery = $[(<1> - <2>) / <3>] \times 100$

LCS % Recovery = $(<1> / <3>) \times 100$

Relative Percent Difference = $[(<4> - <5>) / [(<4> + <5>) \times 0.5]] \times 100$

(**) = Source: SPL-Houston Historical Data (4th Q '95)

(***) = Source: SPL-Houston Historical Data (4th Q '95)

SAMPLES IN BATCH(SPL ID):

9709069-07A 9709069-08A 9709118-06A 9709144-01A
9709089-03A 9709240-18A 9709089-07A 9709118-03A



** SPL BATCH QUALITY CONTROL REPORT **
Mod. 8015 - Diesel

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

Matrix: Soil
Units: mg/Kg

Batch Id: HPV970908192300

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike		QC Limits(**) (Mandatory) % Recovery Range
			Result <1>	Recovery %	
Diesel	ND	167	140	83.8	82 - 128

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results <2>	Spike Added <3>	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative % Difference	QC Limits(***) (Advisory)	
			Result <1>	Recovery <4>	Result <1>	Recovery <5>		RPD Max.	Recovery Range
DIESEL	ND	167	138	82.6	141	84.4	2.16	11	32 - 162

Analyst: RR

Sequence Date: 09/08/97

SPL ID of sample spiked: 9709069-08B

Sample File ID: VVI7013.TX0

Method Blank File ID:

Blank Spike File ID: VVI7006.TX0

Matrix Spike File ID: VVI7015.TX0

Matrix Spike Duplicate File ID: VVI7014.TX0

* = Values Outside QC Range. * = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

% Recovery = $[(<1> - <2>) / <3>] \times 100$

LCS % Recovery = $(<1> / <3>) \times 100$

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

(**) = Source: SPL-Houston Historical Data (3rd Q '95)

(***) = Source: SPL-Houston Historical Data (1st Q '94)

SAMPLES IN BATCH(SPL ID):

9709069-08B 9709084-01B 9709069-06B 9709069-07B

CHAIN OF CUSTODY
AND
SAMPLE RECEIPT CHECKLIST



SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 0709069 page 1 of 1

Client Name: **BT SERVICES/BROWN & CALDWELL**
 Address/Phone: **1415 LOUISIANA**
 Client Contact: **TIM JENKINS**
 Project Name: **BT-ARRESTA**
 Project Number: **2988-09**
 Project Location: **ARRESTA, NM**
 Invoice To: **BC**

Requested Analysis: **TPH-DX 8020**
PMH 8270
BTEX 8020
BTEX-8020

SAMPLE ID	DATE	TIME	comp	grab	matrix	bottle	size	pres.	Number of Containers
MW-1	9/2/97	1320			W	AV, 40	1(V)	1(HCl 2=HNO3 3=H2SO4 0=other)	X
MW-2	9/2/97	1400			W	AV, 40	1(V)		X
MW-3	9/2/97	1420			W	AV, 40	1(V)		X
MW-4	9/2/97	1340			W	AV, 40	1(V)		X
FB-MW1	9/2/97	1410			W	AV, 40	1(V)		X
SE-CONF-SPWL	9/1/97		✓		S	G	8	-	2
SE-CONF-FLR	9/1/97		✓		S	G	8	-	2
SE-CONF-TOE	9/2/97	1500	✓		S	G	8	-	2

Client/Consultant Remarks: Laboratory remarks: Intact? Y N Temp: 4°C

Requested TAT: 24hr 72hr Standard Other

Special Reporting Requirements: Fax Results Raw Data Level 4 QC Level 3 QC Standard QC

1. Relinquished by Sampler: *[Signature]* date: 9/2/97 time: 1600

3. Relinquished by: *[Signature]* date: 9/3/97 time: 1000

5. Relinquished by: _____ date: _____ time: _____

2. Received by: **FED-EX**

4. Received by: *[Signature]*

6. Received by Laboratory: *[Signature]*

SPL Houston Environmental Laboratory

Sample Login Checklist

Date: 9/3/97	Time: 1410
---	---

SPL Sample ID:

9709069

		Yes	No
1	Chain-of-Custody (COC) form is present.	<input checked="" type="checkbox"/>	
2	COC is properly completed.	<input checked="" type="checkbox"/>	
3	If no, Non-Conformance Worksheet has been completed.		
4	Custody seals are present on the shipping container.	<input checked="" type="checkbox"/>	
5	If yes, custody seals are intact.	<input checked="" type="checkbox"/>	
6	All samples are tagged or labeled.	<input checked="" type="checkbox"/>	
7	If no, Non-Conformance Worksheet has been completed.		
8	Sample containers arrived intact	<input checked="" type="checkbox"/>	
9	Temperature of samples upon arrival:		4 C
10	Method of sample delivery to SPL:	SPL Delivery	
		Client Delivery	
		FedEx Delivery (airbill #)	499 5764664
		Other:	
11	Method of sample disposal:	SPL Disposal <input checked="" type="checkbox"/>	
		HOLD	
		Return to Client	

Name: Ruben Estela	Date: 9/3/97
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