GW - 72

MONITORING REPORTS

DATE: 1999

BROWN AND CALDWELL

Suite 2500, 1415 Louisiana, Houston, TX 77002
(713) 759-0999 • (713) 308-3886

TRANSMITTAL MEMORANDUM

To:	Date: February 3, 2000	Job No: 12832
Mr. Wayne Price State of New Mexico Energy, Minerals, and Natural Resources Dept. Oil Conservation Division 2040 Pacheco St., State Land Office Bldg. Santa Fe, New Mexico 87505	Subject: Hobbs, New Mexico Facility	
	Contract No.:	
	Equipment No:	
	Spec. Ref:	
	Submittal No:	

WE ARE SENDING:
☒ Attached ☐ Under separate cover via **Certified Mail** the following items:
☐ Shop Drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☒ Other: Groundwater Sampling Report

THESE ARE TRANSMITTED AS CHECKED BELOW:
- ☐ Second submittal
- ☒ For your use
- ☐ For approval
- ☐ For review and comment
- ☐ With submittal review action noted

SUBMITTAL REVIEW ACTIONS:
- ☐ No exceptions taken
- ☐ Make revisions
- ☐ Amend and resubmit
- ☐ Rejected--see Remarks
- ☐ None

Copies	Date	No.	Description
1	1/31/00		December 1999 Groundwater Sampling Report, BJ Services Company, U.S.A., Hobbs, New Mexico

REMARKS:

RECEIVED
FEB 08 2000
Environmental Bureau
Oil Conservation Division

cc: Chris Williams, State of New Mexico
Jo Ann Cobb, BJ Services Company, U.S.A.
Brown and Caldwell Project File
Transmittal File w/o attachments
Client File w/o attachments

Richard Rexroad

Richard Rexroad

If enclosures are not as noted, kindly notify us at once

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BROWN AND CALDWELL

DECEMBER 1999 GROUNDWATER SAMPLING REPORT HOBBS, NEW MEXICO FACILITY

BJ SERVICES COMPANY, U.S.A.

JANUARY 31, 2000

DECEMBER 1999 GROUNDWATER SAMPLING REPORT
HOBBS, NEW MEXICO FACILITY
BJ SERVICES COMPANY, U.S.A.

Prepared for

BJ Services Company, U.S.A.
11211 FM 2920
Tomball, Texas 77375

BC Project Number: 12832.015

Richard L. Rexroad, P.G.
Principal Geologist

January 31, 2000

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

Contents

CONTENTS

1.0 INTRODUCTION 1

2.0 FIELD ACTIVITIES AND RESULTS 2
2.1 Groundwater Measurements and Sampling 2
2.4 Results of Groundwater Analyses 3
2.5 Natural Attenuation Evaluation 5

3.0 REMEDIATION SYSTEM 8
3.1 System Installation and Effectiveness 8
3.2 Air Emissions 10

4.0 CONCLUSIONS AND RECOMMENDATIONS 13
4.1 Conclusions 13
4.2 Recommendations 13

DISTRIBUTION AND QA/QC REVIEWER'S SIGNATURE

FIGURES

1 Site Map
2 Groundwater Elevation Map for December 9, 1999
3 Benzene Isoconcentration and Total BTEX Distribution Map for December 9, 1999
4 Total Petroleum Hydrocarbons Distribution Map for December 9, 1999
5 Dissolved Benzene Mass vs. Time: West Plume

TABLES

1 Site Chronology
2 Cumulative Groundwater Elevation Data
3 December 9, 1999 Field Screening Results for Groundwater Samples
4 Cumulative Analytical Results for Groundwater Samples
5 Current and Historical Nitrate, Sulfate, and Dissolved Methane Data for Monitor Wells MW-5, MW-10, MW-11A, MW-12, MW-12D, and OW-4
6 Summary of Analytical Results for Air Emissions

CONTENTS (Continued)

APPENDICES

A Groundwater Sampling Forms
B Laboratory Analytical Report for Groundwater Samples

1.0 INTRODUCTION

Brown and Caldwell conducted field activities associated with the December 1999 quarterly groundwater sampling event at the BJ Services Company, U.S.A. (BJ Services) facility located at 2708 West County Road in Hobbs, New Mexico on December 9, 1999. Groundwater samples were analyzed for the quarterly monitoring constituents specified in by the New Mexico Oil Conservation Division (NMOCD) in NMOCD Permit GW-072. Samples from selected wells were also analyzed for dissolved methane/ethylene/ethane, sulfate, and nitrate to evaluate the potential for natural attenuation of hydrocarbons at the facility. This report presents a description of the groundwater sampling field activities, a summary of the analytical results, and an evaluation of remedial technologies being applied at the facility.

The facility formerly operated an above-grade on-site fueling system. A layout of the facility is shown in Figure 1. Subsurface impact near the former diesel fueling system was first detected by the NMOCD during an on-site inspection on February 7, 1991. The fueling system was taken out of operation in July 1995. The NMOCD has required a quarterly groundwater monitoring program to assess the concentration of hydrocarbon constituents in groundwater as a result of the diesel fuel release. BJ Services removed three field waste tanks at the facility on March 6-7, 1997. The ongoing monitoring of groundwater conditions at the site is being performed to address both the former fuel island and the former field waste tanks areas of the facility, as directed by NMOCD in correspondence dated January 21, 1999.

A biosparging system was activated in November 1995 to remediate soil and groundwater at the facility. Expansions of the biosparging system were performed in March/April 1997 and February/March 1998. A site chronology detailing the history of the former fueling system and the former field waste tanks area, the soil and groundwater remediation system, and previous sampling events is presented in Table 1.

2.0 FIELD ACTIVITIES AND RESULTS

On December 9, 1999, Brown and Caldwell purged and sampled 10 of the 13 existing groundwater monitor wells at and adjacent to the BJ Services Hobbs facility to determine concentrations of dissolved-phase hydrocarbons in groundwater. Monitor wells MW-1, MW-8, and MW-9 were not sampled during the December 1999 sampling event because benzene had not been detected in groundwater samples from these wells for at least four quarterly sampling events preceding the December 1999 groundwater sampling event. All monitor wells at and adjacent to the BJ Services Hobbs facility will be sampled during the upcoming March 2000 groundwater sampling event at the facility. The locations of the monitor wells at the facility are shown in the site map presented as Figure 1. The following subsections describe the field activities conducted by Brown and Caldwell at the facility in December 1999 and present the results of the groundwater analyses.

2.1 Groundwater Measurements and Sampling

Groundwater level measurements were obtained from the monitor wells prior to purging and sampling the wells. Groundwater levels were measured with an oil/water interface probe and recorded to the nearest 0.01 foot. A cumulative table of groundwater elevation data is presented in Table 2. The groundwater elevation data indicates that the general groundwater flow direction is to the east, with a hydraulic gradient of approximately 0.006 foot/foot (ft/ft). A potentiometric surface map is presented in Figure 2.

Groundwater samples were collected after purging of the wells with a submersible pump was completed. Field parameter measurements for pH, conductivity, oxidation-reduction (redox) potential, dissolved oxygen, and temperature were typically collected during and upon completion of well purging. In addition to using these parameters as indicators of stability of produced groundwater, they are also important for evaluating the potential for natural attenuation of dissolved-phase hydrocarbons at the facility. Ferrous iron and alkalinity were measured in selected wells upon conclusion of purging activities to further assist in assessment of natural attenuation

potential. Turbidity of groundwater was also typically measured upon conclusion of purging activities.

The field parameter readings were recorded in the groundwater sampling forms included in Appendix A. Field readings for the groundwater sampling event are presented in Table 3.

Groundwater samples were collected after completion of purging operations, typically through the submersible pump discharge. Monitor wells MW-7, MW-10, and MW-12 were pumped dry during purging operations, so samples were collected from these wells with decontaminated PVC bailers. 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.

Field measurement equipment was decontaminated prior to and after each usage. Decontamination procedures consisted of washing with fresh water and a non-phosphate detergent, then rinsing with deionized water. Purge water was discharged to the on-site water reclamation system for re-use by BJ Services.

2.2 Results of Groundwater Analyses

Groundwater samples collected during this sampling event were analyzed for diesel- and gasoline-range total petroleum hydrocarbons (TPH-D and TPH-G) by EPA Method 8015 Modified and for benzene, toluene, ethylbenzene, and xylene (BTEX) by EPA Method 8021B. The laboratory analytical reports and chain-of-custody records for the groundwater samples collected during the December 1999 field activities are included in Appendix B.

Current and cumulative analytical results for BTEX, TPH-D, and TPH-G are presented in Table 4. Six monitor wells (MW-5, MW-10, MW-11A, MW-12, MW-12D and OW-4) were sampled for

methane/ethylene/ethane, nitrate, and sulfate to evaluate natural attenuation processes. The results of these analyses are presented in Table 5.

BTEX constituent concentrations in excess of applicable laboratory detection limits were reported in only four of the 10 groundwater samples collected during this sampling event. Benzene concentrations were below the New Mexico Water Quality Control Commission (WQCC) standard of 0.01 milligrams per liter (mg/L) in all monitor wells except MW-10, MW-12, and MW-13. Figure 3 presents a benzene isoconcentration and total BTEX distribution map for the December 1999 sampling event.

Benzene concentrations in monitor wells MW-1, MW-3, and MW-4, which are located near the former source area, have decreased since the modification of the biosparging system in February/March 1998. Benzene was not detected in any of these wells during the September 1999 or December 1999 sampling events. Benzene concentrations in a nearby off-site monitor well, MW-9, have not exceeded 0.01 mg/L since March 1997. Benzene has not been detected in monitor wells MW-1 or MW-9 since September 1998. Benzene has not been detected in monitor wells MW-3 and MW-4 since June 1999 and March 1999, respectively.

The vertical decrease in benzene concentration from 0.064 mg/L in monitor well MW-12 (screened at a depth of 50 feet to 65 feet bgs) to less than 0.001 mg/L in monitor well MW-12D (screened at a depth of 77.5 feet to 87.5 feet bgs) suggests that benzene impact to groundwater, where present, is limited vertically to the uppermost portion of the aquifer. Similar vertical gradients in benzene concentrations at the MW-12/MW-12D location have been observed during each groundwater sampling event since the installation of monitor well MW-12D prior to the June/July 1999 sampling event at the facility. There have been no detections of BTEX constituents, TPH-D, or TPH-G throughout the monitoring history of monitor well MW-12D.

Benzene was detected at a concentration of 1.5 mg/L in a groundwater sample collected from monitor well MW-13 on July 2, 1999. Adjustments to the biosparging system were made on

July 14, 1999 to increase air flow to biosparging system Lateral No. 1, located in the eastern portion of the plume associated with the former fueling system (i.e., the western plume).

These adjustments resulted in decreases in the concentration of benzene in monitor well MW-13 from 1.5 mg/L on July 2, 1999 to 0.860 mg/L on September 14, 1999 and to 0.430 mg/L on December 9, 1999. Similarly, total BTEX concentration in monitor well MW-13 decreased 2.331 mg/L on July 2, 1999 to 0.8969 mg/L on December 9, 1999.

A total petroleum hydrocarbon distribution map for the December 1999 sampling event is presented in Figure 4.

2.3 Natural Attenuation Evaluation

Natural attenuation is planned to be the primary remediation mechanism for the dissolved-phase hydrocarbon plume located in the area of the former field waste tanks (see Figure 1).

The primary evidence of natural attenuation is plume behavior. Natural attenuation of hydrocarbons is occurring at a rate greater than hydrocarbon loading from the source area when a hydrocarbon plume is decreasing in size or concentration. Conversely, increases in size or hydrocarbon concentrations of a plume indicate that rates of hydrocarbon loading exceed the natural attenuation capacity in the area.

The former field waste tanks in the eastern portion of the facility were removed in March 1997. Concentrations of total dissolved-phase BTEX stabilized following removal of the field waste tanks and have not exceeded 100 mg/L in any of the wells in the area of the former field waste tanks since September 1998. Occasional increases in total BTEX concentrations between quarterly sampling events have been observed in monitor wells MW-10 and MW-12 since March 1997. These increases may be attributed to sporadic loading rates from the vadose zone in excess of the natural attenuation rate of the area.

Secondary evidence of natural attenuation can be obtained by the collection and evaluation of data relating to the concentrations of indigenous electron acceptors such as dissolved oxygen, nitrate, sulfate, and carbon dioxide. The following lines of geochemical evidence suggest that intrinsic bioremediation (an important natural attenuation mechanism) of dissolved-phase hydrocarbons is occurring in the area of the former field waste tanks:

1. Dissolved oxygen may be utilized during intrinsic bioremediation. Dissolved oxygen concentrations should therefore be depressed in areas where intrinsic bioremediation is occurring.

   December 1999 dissolved oxygen data for the eastern plume (i.e., in the former field waste tanks area) is incomplete and inconclusive due to the low groundwater yield from hydrocarbon-impacted monitor wells MW-10 and MW-12 during this sampling event. Historic evidence submitted to the NMOCD in previous quarterly groundwater monitoring reports for the facility has indicated that dissolved oxygen concentrations are typically depressed in monitor wells MW-10 and MW-12 relative to monitor well MW-11A (which is located at the fringe of the eastern plume and which displays lower to non-detectable hydrocarbon concentrations) and to background monitor wells at the facility.

   The dissolved oxygen concentration measured in monitor well MW-13, which contains the highest hydrocarbon concentrations observed in the western plume, is depressed relative to dissolved oxygen concentrations observed in other monitor wells located in the vicinity of the western plume and relative to the background monitor well at the facility.

   Dissolved oxygen concentrations measured at the facility during this and previous sampling events therefore suggest that natural attenuation of hydrocarbons is occurring at the facility.

2. Nitrate may be utilized as an electron acceptor during intrinsic bioremediation after dissolved oxygen is depleted. Therefore, nitrate concentrations may be depressed in areas where intrinsic bioremediation is occurring.

   Nitrate concentrations were measured at less than 0.1 mg/L in monitor wells MW-11A, MW-12, and MW-12D and at 0.49 mg/L in monitor well MW-10 during the December 1999 sampling event. These concentrations are less than the background nitrate concentration of 4.2 mg/L measured in monitor well MW-5 (see Table 5). The low nitrate concentrations in monitor wells MW-10, MW-11A, MW-12, and MW-12D suggest that natural attenuation of hydrocarbons is occurring in the former field waste tanks area of the facility.

No BTEX constituents were detected in downgradient well OW-4. The nitrate concentration of 3.4 mg/L in OW-4 is comparable to the nitrate concentration of 4.2 mg/L observed in background in well MW-5. The combination of a non-detectable BTEX concentration and a near-background nitrate concentration in downgradient well OW-4 supports the contention that the low nitrate concentrations observed in monitor wells MW-10, MW-11A, MW-12, and MW-12D reflect natural attenuation of hydrocarbons in the former field waste tanks area rather than a simple eastward decrease in nitrate content of groundwater at the facility.

3. Redox is a measure of chemical energy in groundwater. Redox in background well MW-5 was measured at 137.5 millivolts (mV), as shown in Table 3. Redox values in the vicinity of former field waste tanks area wells MW-10, MW-11A, MW-12, and MW-12D ranged from –61.4 mV to –155.2 mV. The negative redox values in the former field waste tank area monitor wells suggest that electron acceptors other than dissolved oxygen and nitrate (e.g., carbon dioxide) are being utilized in these areas.

4. Methane is a reaction product generated during utilization of carbon dioxide as an electron acceptor, and its concentration should therefore increase in areas where depletion of electron acceptors such as dissolved oxygen and nitrate has occurred.

   The concentration of methane is elevated in former field waste tanks area monitor wells MW-10, MW-11A, and MW-12 relative to the methane concentrations in background well MW-5 and downgradient well OW-4 (see Table 5), suggesting that utilization of carbon dioxide as an electron acceptor during natural attenuation processes may be occurring in the area of the former field waste tanks.

The sulfate data presented in Table 5 displays no discernable trend, indicating that sulfate is not being utilized during intrinsic bioremediation. Similarly, the ferrous iron and alkalinity data presented in Table 3 are inconclusive.

In conclusion, geochemical evidence from this and previous groundwater sampling events suggests that dissolved oxygen, nitrate, and carbon dioxide are acting as electron acceptors during natural attenuation processes that are ongoing at the facility. It is recommended that monitoring for natural attenuation evaluation parameters continue in the former field waste tanks area wells, downgradient well OW-4, and background well MW-5.

3.0 REMEDIATION SYSTEM

Brown and Caldwell submitted a Remedial Action Plan (RAP) to the NMOCD in May 1994. Based on the results of previous investigations conducted by Brown and Caldwell and Roberts/Schornick and Associates, Inc., Brown and Caldwell recommended the installation of a biosparging system. The biosparging system simultaneously treats volatile and semivolatile 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 and semivolatile 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 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 air also strips volatile and semivolatile contaminants.

3.1 System Installation and Effectiveness

The NMOCD approved the RAP on August 11, 1994. Installation activities for the biosparging system were conducted on August 2 through August 24, 1995. Nineteen combined injection and extraction wells, three vacuum extraction wells, one extraction blower, one injection blower, and associated piping were installed. An additional vapor extraction well, VE-4, was installed and connected to the vapor extraction system in April 1997. Five additional injection wells, AI-20 through AI-24, were installed in February 1998. Injection wells AI-20 through AI-24 were installed at locations near the center of the western plume, which is associated with the former fueling system. These injection wells were constructed such that a 10-foot screen submergence was achieved, thereby providing treatment to an expanded vertical interval of the aquifer in that area. Injection wells AI-20 through AI-24 are supplied by a separate blower than the one used to supply injection wells AI-1 through AI-19 in order to avoid short-circuiting of air to wells with less screen submergence. Three additional vapor extraction wells, VE-5 through VE-7, were also installed in

February 1998. The new injection and extraction wells were brought on-line on March 10, 1998, and operation of injection wells AI-1 through AI-19, which had been suspended on February 19, 1998, was resumed on March 24, 1998.

Benzene, TPH, and total BTEX concentrations measured in monitor well MW-1 during the September 1999 groundwater sampling event displayed a decline relative to concentrations of these parameters prior to installation of injection wells AI-20 through AI-24 in February 1998. Benzene concentrations dropped from 7.6 mg/L in December 1997 to less than 0.001 mg/L during the December 1998 through September 1999 sampling events. Total BTEX concentrations have dropped from 30.6 mg/L to non-detectable levels between December 1997 and September 1999. TPH concentrations in MW-1 decreased from 82 mg/L to non-detectable levels during this time period. Monitor well MW-1 was not sampled during the December 1999 sampling event, but will be sampled during the March 2000 sampling event.

Benzene concentrations in monitor well MW-3 have decreased from 0.240 mg/L in December 1997 to less than 0.001 mg/L in September 1999 and December 1999. Similarly, total BTEX concentrations in monitor well MW-3 have decreased from 1.930 mg/L in December 1997 to non-detectable levels in September 1999 and December 1999. TPH concentrations in monitor well MW-3 dropped from 5.89 mg/L to non-detectable levels during this time period. These decreases are attributable to increased air flow being applied to the aquifer through air injection wells AI-20 through AI-24.

In monitor well MW-4, benzene concentrations have decreased from 0.230 mg/L in December 1997 to less than 0.001 mg/L in the June 1999 through December 1999 sampling events. Total BTEX concentrations in monitor well MW-4 dropped from 4.250 mg/L to less than 0.025 mg/L over the same period, and TPH concentrations have decreased by an order of magnitude from 19.7 mg/L to less than 3 mg/L. These decreases are also attributable to the effects of the increased air flow supplied by air injection wells AI-20 through AI-24.

Similarly, the application of increased air flow to Lateral No. 1 injection wells AV-16 and AV-17 in mid-July 1999 has resulted in a substantial decrease in the concentrations of benzene and total BTEX in monitor well MW-13 between July 2, 1999 and December 9, 1999.

A graph showing the calculated dissolved-phase benzene mass in the western plume versus time is presented in Figure 5. This graph shows that the plume mass was increasing up until December 1995, when the biosparging system was installed. This increase was probably due to benzene loading to groundwater from vadose zone soils. The benzene mass then decreased steadily after installation of the biosparging system. The plume mass has continued to decrease since the system modifications were implemented in February 1998. This indicates that the system modifications have been effective in increasing benzene removal from groundwater in the center of the former western plume area.

3.2 Air Emissions

The vapors recovered during the extraction process are discharged to the atmosphere in accordance with the State of New Mexico Air Quality Regulations. Following initial 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 was not required, effluent air samples were collected and analyzed voluntarily on a quarterly basis through July 1997. 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 demonstrated a substantial reduction in hydrocarbon vapor concentrations and emissions rates between November 1995 and July 1997. Total BTEX concentrations decreased from 391 parts per million by volume (ppmv) in November 1995 to 17.3 ppmv in July 1997. The corresponding BTEX emissions decreased from 0.77 pound per hour (lb/hour) to 0.03 lb/hour. TPH concentrations decreased from 1,870 ppmv in November 1995 to 65 ppmv in July 1997. The

corresponding TPH - volatile organic compound (VOC) emissions rate 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, use of a field monitoring instrument utilizing a flame ionization detector (FID) to measure the VOC concentration in the vapors commenced in September 1997. The VOC measurements collected using the FID correspond to TPH concentrations previously determined in the analytical laboratory. The VOC concentration measured using the FID during the December 1999 sampling event was 5.9 ppmv.

The TPH concentration of 5.9 ppmv measured during the December 1999 sampling event is substantially less than the 1500 ppmv TPH discharge rate calculated for the March 24, 1998 groundwater sampling event. The TPH discharge rate of 5.9 ppmv in December 1999 is comparable to TPH concentrations measured during the time period from August 1996 through December 1997, prior to the system modifications performed in February/March 1998. The increased TPH concentration observed in the March 1998 event relative to the time period from August 1997 through December 1997 is believed to be a result of the addition of air injection wells AI-20 through AI-24 to the biosparging system and associated adjustments to air injection rates. Discharge rates have returned to more typical levels during the period from June 1998 through December 1999.

The VOC emissions rate calculated for the December 1999 groundwater sampling event was 0.003 lb/hour, which is less than the regulatory limit of 10 lb/hour for VOCs. The December 1999 VOC emissions rate is typical of VOC emissions rates during the time period of August 1996 through December 1997, and represents a substantial drop from the 1.91 lb/hour VOC emissions rate calculated for the March 1998 sampling event. Discharge rates have varied between 0.003 lb/hour and 0.33 lb/hour during the time period of June 1998 through December 1999.

A cumulative summary of analytical results for air emissions monitoring is included in Table 6. These results are based on both laboratory and field analyses.

The initial increase in mass transfer rates after the February/March 1998 system modification is indicative of increased stripping of hydrocarbons within soil and groundwater from pathways that were not in contact with injected air prior to the system modification. The subsequent decrease in mass transfer, in concert with plume mass calculations shown in Figure 5, indicate that the overall contaminant mass has been reduced by operation of the biosparging system.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on information obtained during the December 1999 groundwater sampling event at the BJ Services Hobbs, New Mexico facility.

4.1 Conclusions

- Groundwater flow was to the east at a hydraulic gradient of 0.006 ft/ft.
- Dissolved benzene, BTEX, and TPH concentrations in monitor wells located near the center of the former fueling system source area are below applicable standards.
- Benzene concentrations in all monitor wells at the facility except MW-10, MW-12, and MW-13 are less than the New Mexico WQCC standard of 0.01 mg/L for benzene.
- Increases in air flow rates to biosparge injection wells AI-16 and AI-17 have resulted in substantially decreased benzene and total BTEX concentrations in monitor well MW-13 between July 2, 1999 and December 9, 1999.
- No BTEX or TPH constituents have been detected in monitor well MW-12D, which is screened at a depth of approximately 20 to 30 feet below the top of the uppermost aquifer at the facility. Comparison of this data to BTEX and TPH concentrations in adjacent monitor well MW-12, which is screened in the uppermost portion of the aquifer, suggests that hydrocarbon impact to groundwater, where present at the facility, is limited to the uppermost portion of the aquifer.
- Natural attenuation processes appear to be occurring in the vicinity of the former field waste tanks that were removed in March 1997.

4.2 Recommendations

- Maintain the increased air injection rate to wells AV-16 and AV-17 in the easternmost lateral of the biosparging system in order to exert optimal remedial pressure in the recalcitrant eastern area of the west plume.
- Continue the quarterly groundwater sampling program and the operation and maintenance of the biosparging system.

- Discontinue sampling and analysis of monitor well MW-12D following annual sampling of all wells at the facility for the complete suite of WQCC groundwater parameters in March 2000.

- Continue monitoring for natural attenuation parameters in monitor wells MW-5, MW-10, MW-11A, MW-12, OW-4, and (in March 2000 only) MW-12D.

- Continue monitoring hydrocarbon emissions on a quarterly basis using a calibrated field FID.

DISTRIBUTION

December 1999 Groundwater Sampling Report
BJ Services Company, U.S.A.
Hobbs, New Mexico

January 31, 2000

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. Wayne Price

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Hobbs, New Mexico 88240

Attention: Mr. Chris Williams

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11211 FM 2920
Tomball, Texas 77375

Attention: Ms. Jo Ann Cobb

1 copy to: Brown and Caldwell, Project File

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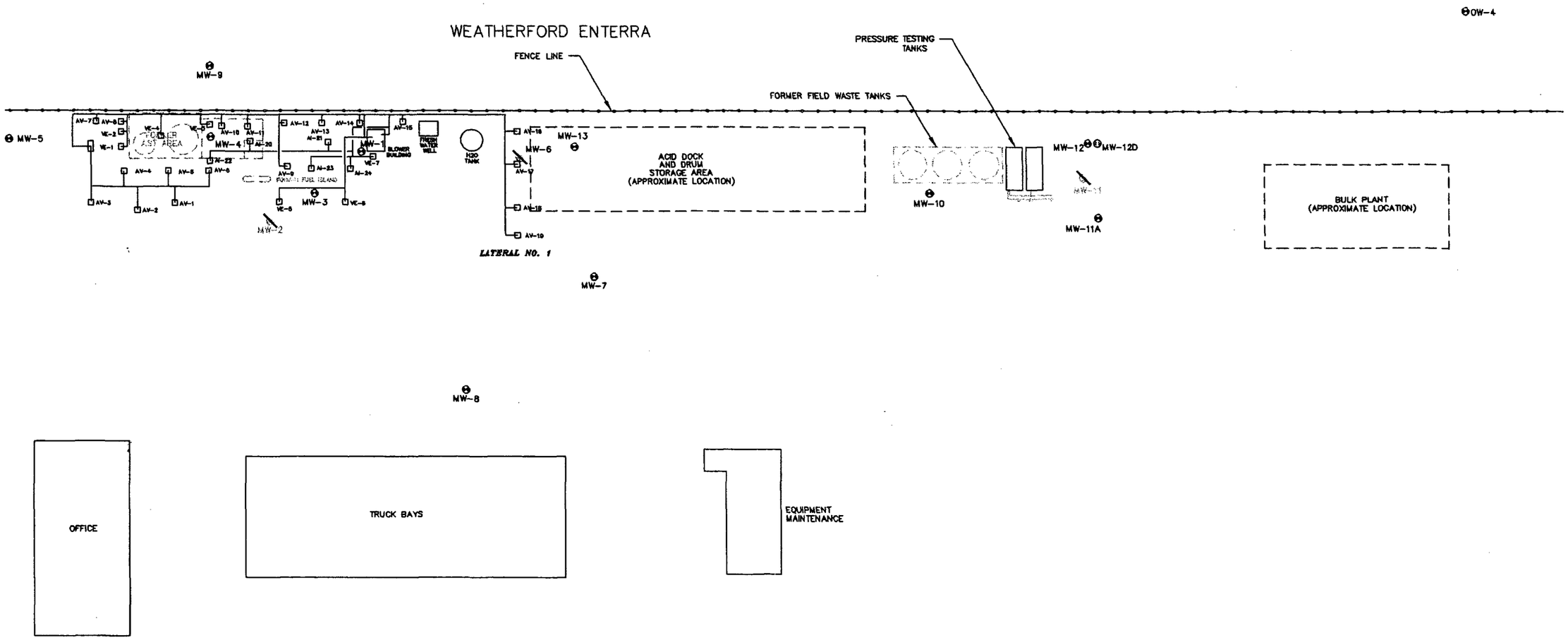
Robert N. Jennings, P.E.
Vice President

RLR/uak

Figures

FIGURES



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HOUSTON, TEXAS

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PROJECT MANAGER

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BROWN AND CALDWELL

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CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

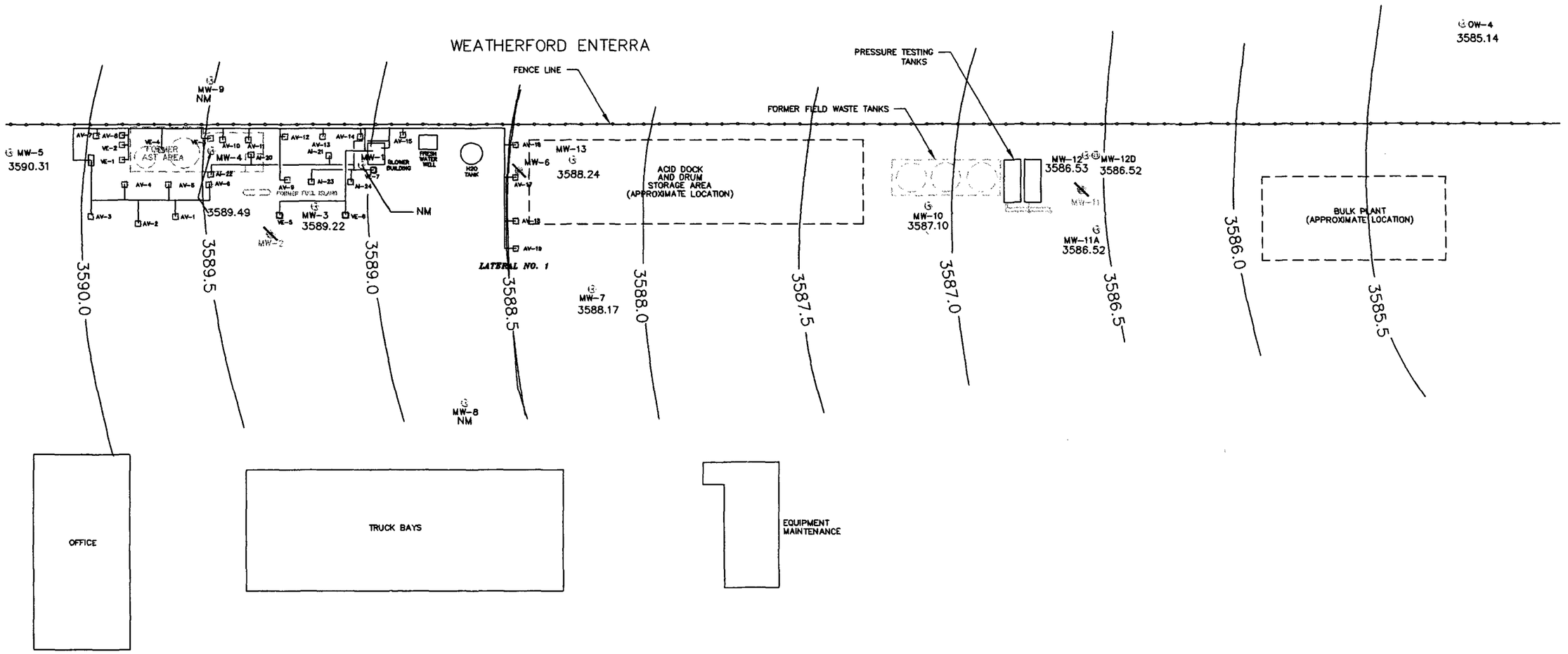
LEGEND

MW-3 EXISTING MONITOR WELL LOCATION

BIOSPARGING SYSTEM

MW-2 MONITOR WELL (PLUGGED AND ABANDONED)

TITLE: SITE MAP	DATE: 03/16/99
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 12832.021
SITE: HOBBS, NEW MEXICO	FIGURE NUMBER: 1



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BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 30 60
SCALE: 1" = 60'
DRAWN BY: ____ DATE ____
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

LEGEND

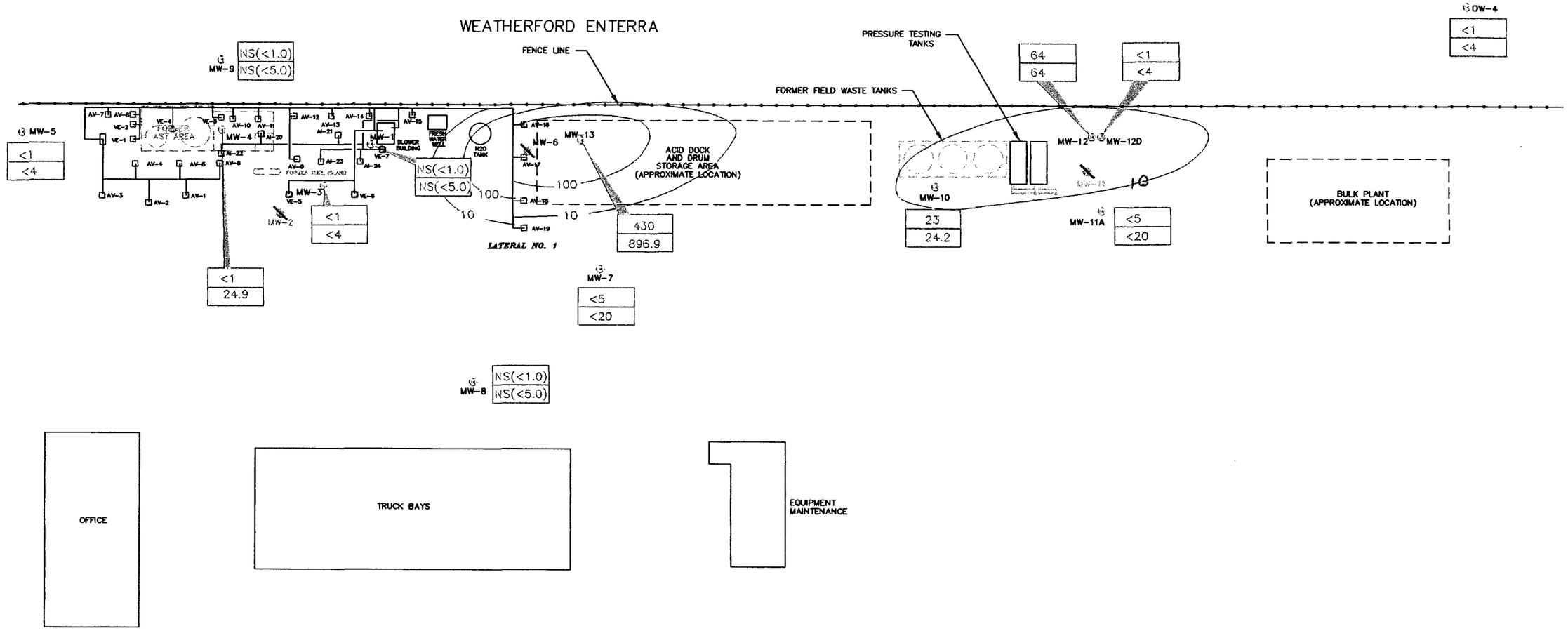
3589.30
MW-3 MONITOR WELL LOCATION WITH GROUNDWATER ELEVATION (feet AMSL)

NM = NOT MEASURED

BIOSPARGING SYSTEM

MW-2 MONITOR WELL (PLUGGED AND ABANDONED)

TITLE: GROUNDWATER ELEVATION MAP FOR DECEMBER 9, 1999	DATE: 01/10/00
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 12832.015
SITE: HOBBS, NEW MEXICO	FIGURE NUMBER: 2



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BROWN AND CALDWELL
HOUSTON, TEXAS

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0 30 60
SCALE: 1" = 60'
DRAWN BY: CEA DATE 1/00
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

LEGEND

MW-3 / MW-2 — EXISTING MONITOR WELL LOCATION; MONITOR WELL (PLUGGED AND ABANDONED)

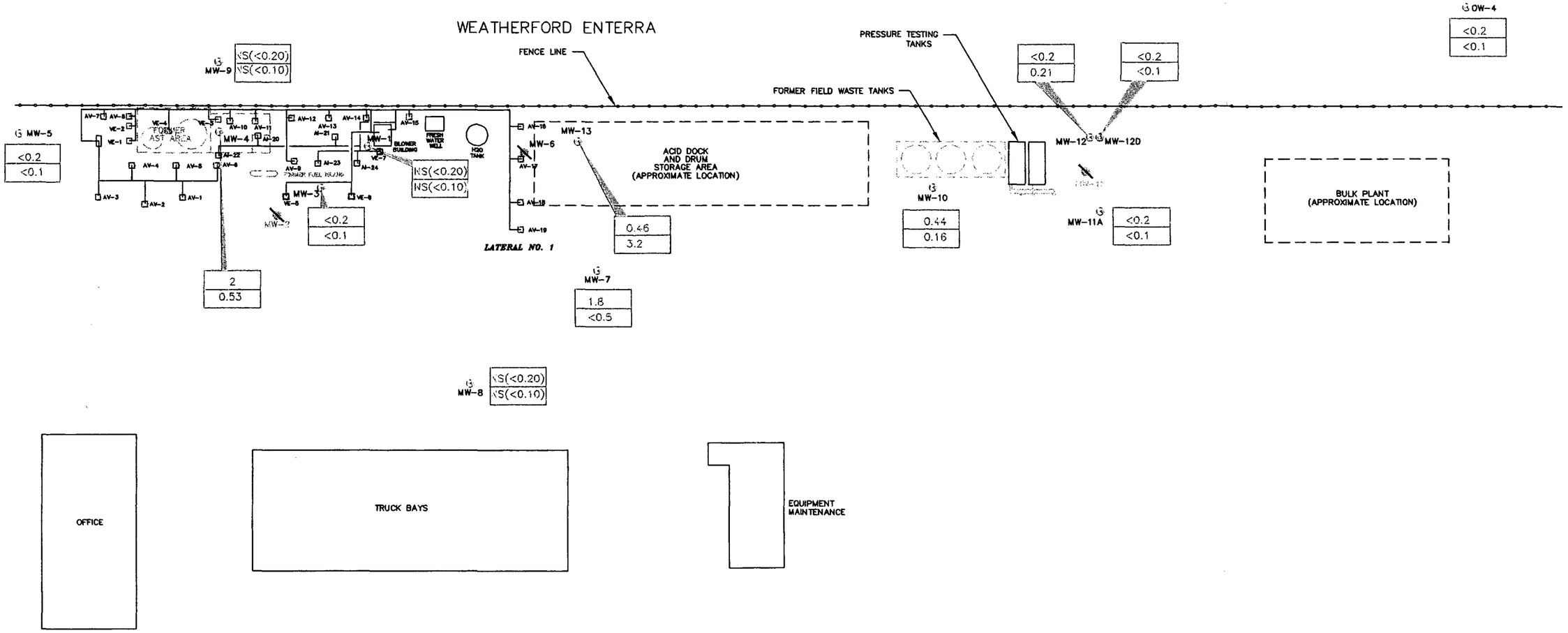
<1 / <4 — BENZENE CONCENTRATION (ug/L); TOTAL BTEX CONCENTRATION (ug/L)

BIOSPARGING SYSTEM

10 — BENZENE ISOCONCENTRATION CONTOUR (ug/L)

NS = NOT SAMPLED (SEPTEMBER 1999 DATA SHOWN)
CONTOUR INTERVAL = LOGARITHMIC

TITLE	BENZENE ISOCONCENTRATION AND TOTAL BTEX DISTRIBUTION MAP FOR DECEMBER 9, 1999
CLIENT	BJ SERVICES COMPANY, U.S.A.
SITE	HOBBS, NEW MEXICO
DATE	01/10/00
PROJECT NUMBER	12832.015
FIGURE NUMBER	3



P:\cad\jobs\12832\TPH12999.dwg 01-10-00 CEA

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 30 60
SCALE: 1" = 60'

DRAWN BY: ____ DATE ____
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

LEGEND

MW-3 EXISTING MONITOR WELL LOCATION

MW-2 MONITOR WELL (PLUGGED AND ABANDONED)

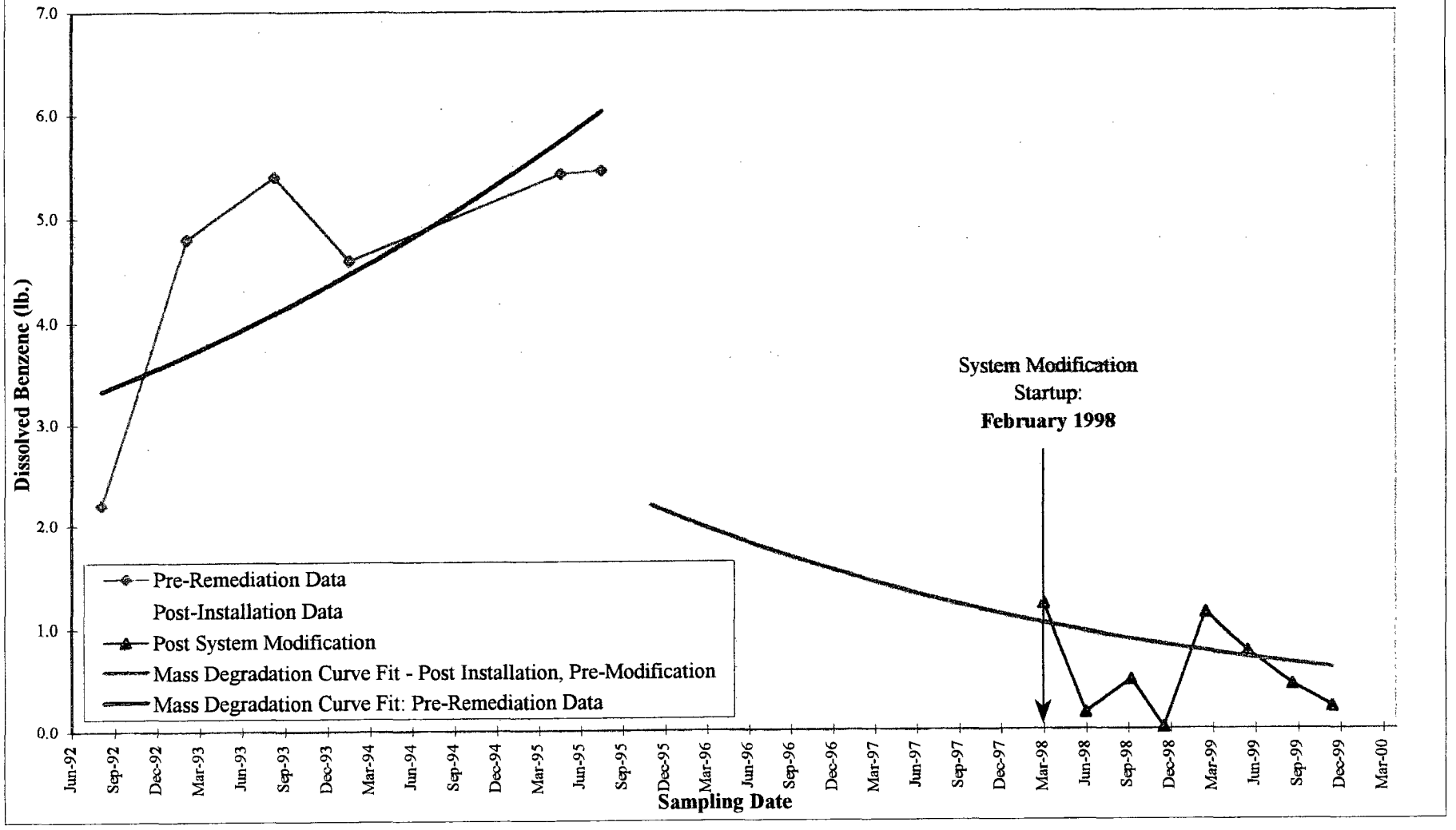
BIOSPARGING SYSTEM

NS = NOT SAMPLED (SEPTEMBER 1999 DATA SHOWN)

<0.2 – TPH-D CONCENTRATION (mg/L)
<0.1 – TPH-G CONCENTRATION (mg/L)

TITLE	TOTAL PETROLEUM HYDROCARBONS DISTRIBUTION MAP FOR DECEMBER 9, 1999
CLIENT	BJ SERVICES COMPANY, U.S.A.
SITE	HOBBS, NEW MEXICO
DATE	01/10/00
PROJECT NUMBER	12832.015
FIGURE NUMBER	4

FIGURE 5
Dissolved Benzene Mass vs. Time
West Plume
BJ Services - Hobbs, New Mexico



p:\gen\2832-hob\masscalc\09-99.xls

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 Chronology
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 6-7, 1997	BJ Services removed three field waste tank and associated hydrocarbon impacted soil.
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.
February 3-14, 1998	Air injection wells AI-20 through AI-24, vapor extraction wells VE-5 though VE-7 and monitor wells MW-11A and MW-12 were installed.
February 19, 1998	Operation of previously existing injection wells suspended in preparation for start-up of new injection wells AI-20 through AI-24.
March 10, 1998	Operation of new air injection wells AI-20 through AI-24 and new vapor extraction wells VE-5 though VE-7 commenced.
March 23-24, 1998	Brown and Caldwell conducted the March 1998 groundwater sampling event.
March 24, 1998	Operation of previously existing injection wells and vapor extraction wells resumed.
June 23, 1998	Brown and Caldwell conducted the June 1998 groundwater sampling event.
September 30, 1998	Brown and Caldwell conducted the September 1998 groundwater sampling event.
December 9-10, 1998	Brown and Caldwell conducted the December 1998 groundwater sampling event.
January 21, 1999	NMOCD requested submittal of a work plan by March 22, 1999 to

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

Date	Activity
	perform additional groundwater delineation in the area of the former field waste tanks and the former AST/MW-6 area.
March 9-10, 1999	Brown and Caldwell conducted the March 1999 groundwater sampling event.
March 19, 1999	Brown and Caldwell submitted the work plan for groundwater delineation activities that was requested on January 22, 1999 to NMOCD.
May 19, 1999	NMOCD approved the groundwater delineation work plan.
June10, 1999	Brown and Caldwell performed sampling of existing monitor wells for the June /July 1999 groundwater sampling event.
July 2, 1999	Brown and Caldwell completed plugging and abandonment of monitor wells MW-2, MW-6, and MW-11; installed and developed monitor wells MW-12D and MW-13; and sampled monitor wells MW-12D and MW-13 to complete the June/July 1999 groundwater sampling event.
July 14, 1999	Brown and Caldwell redirected air discharge from the shallow well injection system to Lateral No. 1 and optimized air flow to injection wells AI-16 and AI-17 to apply increased remedial pressure to the eastern potion of the west plume.
September 13-14, 1999	Brown and Caldwell conducted the September 1999 groundwater sampling event.
December 9, 1999	Brown and Caldwell conducted the December 1999 groundwater sampling event.

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

Monitor Well	Top-of-Casing Elevation (MSL)	Date Measured	Depth to Groundwater (feet)	Free Product Thickness (feet)	Groundwater Elevation (MSL)	Comments
MW-1	3,647.53	08/10/92	53.22	0.00	3,594.31	(1)
		02/09/93	53.03	0.00	3,594.50	
		08/18/93	53.10	0.00	3,594.43	
		01/26/94	53.31	0.00	3,594.22	
		05/03/95	54.64	0.20	3,593.05	(2)
		07/31/95	54.14	0.00	3,593.39	
		11/14/95	53.69	0.00	3,593.84	
		02/23/96	54.32	0.00	3,593.21	
		05/31/96	54.14	0.00	3,593.39	
		08/23/96	56.17	0.00	3,591.36	
		12/02/96	55.27	0.00	3,592.26	
		03/12/97	55.70	0.27	3,592.05	
		06/12/97	55.08	0.02	3,592.47	
		09/12/97	55.64	0.51	3,592.31	
		12/10/97	55.46	0.00	3,592.07	PSH Sheen
		03/24/98	55.81	0.00	3,591.72	PSH Sheen
		06/23/98	56.38	0.06	3,591.20	
		09/30/98	56.82	0.00	3,590.71	PSH Sheen
		12/09/98	57.05	0.00	3,590.48	
		03/10/99	57.45	0.00	3,590.08	
		06/10/99	58.02	0.00	3,589.51	
		07/02/99	57.90	0.00	3,589.63	
		09/14/99	58.14	0.00	3,589.39	
		12/09/99				(3)
MW-2	3,644.84	08/10/92	52.82	0.00	3,592.02	(1)
		02/09/93	49.60	0.00	3,595.24	
		08/18/93	49.71	0.00	3,595.13	
		01/26/94	49.97	0.00	3,594.87	
		05/03/95				(4),(5)
MW-3	3,645.00	08/10/92	52.99	0.00	3,592.01	(1)
		02/09/93	52.72	0.00	3,592.28	
		08/18/93	52.82	0.00	3,592.18	
		01/26/94	53.05	0.00	3,591.95	
		05/03/95	54.31	0.00	3,590.69	
		07/31/95	51.24	0.00	3,593.76	
		11/14/95	51.10	0.00	3,593.90	
		02/23/96	51.68	0.00	3,593.32	
		05/31/96	51.45	0.00	3,593.55	
		08/23/96	51.55	0.00	3,593.45	
		12/02/96	52.23	0.00	3,592.77	
		03/12/97	52.67	0.00	3,592.33	
		06/12/97	52.68	0.00	3,592.32	
		09/11/97	52.71	0.00	3,592.29	
		12/10/97	52.89	0.00	3,592.11	
		03/23/98	53.22	0.00	3,591.78	
		06/23/98	53.66	0.00	3,591.34	
		09/30/98	54.06	0.00	3,590.94	
		12/09/98	54.36	0.00	3,590.64	
		03/10/99	54.72	0.00	3,590.28	
		06/10/99	55.17	0.00	3,589.83	
		07/02/99	55.15	0.00	3,589.85	
		09/14/99	55.42	0.00	3,589.58	
		12/09/99	55.78	0.00	3,589.22	
MW-4	3,645.28	08/10/92	50.55	0.00	3,594.73	(1)
		02/09/93	50.26	0.00	3,595.02	
		08/18/93	50.38	0.00	3,594.90	
		01/26/94	50.90	0.30	3,594.63	
		05/03/95	51.51	0.45	3,594.14	
		07/31/95	51.74	0.26	3,593.75	

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

Monitor Well	Top-of-Casing Elevation (MSL)	Date Measured	Depth to Groundwater (feet)	Free Product Thickness (feet)	Groundwater Elevation (MSL)	Comments
MW-4	3,645.28	11/14/95	51.03	0.00	3,594.25	
		02/23/96	51.65	0.01	3,593.64	
		05/31/96	51.48	0.00	3,593.80	
		08/23/96	53.49	0.00	3,591.79	
		12/02/96	52.32	0.00	3,592.96	
		03/12/97	52.74	0.05	3,592.58	
		06/12/97	53.08	0.44	3,592.56	
		09/12/97	52.60	0.15	3,592.80	
		12/10/97	52.89	0.00	3,592.39	PSH Sheen
		03/24/98	53.20	0.25	3,592.29	
		06/23/98	53.82	0.22	3,591.64	
		09/30/98	53.96	0.00	3,591.32	200 ml PSH
		12/09/98	54.27	0.00	3,591.01	
		03/10/99	54.69	0.04	3,590.62	
		06/10/99	55.07	0.00	3,590.21	
		07/02/99	55.10	0.00	3,590.18	
		09/14/99	55.33	0.00	3,589.95	
		12/09/99	55.79	0.00	3,589.49	
MW-5	3,647.72	08/10/92	52.38	0.00	3,595.34	(1)
		02/09/93	52.06	0.00	3,595.66	
		08/18/93	52.16	0.00	3,595.56	
		01/26/94	52.50	0.00	3,595.22	
		05/03/95	53.57	0.00	3,594.15	
		07/31/95	53.27	0.00	3,594.45	
		11/14/95	52.83	0.00	3,594.89	
		02/23/96	53.57	0.00	3,594.15	
		05/31/96	53.16	0.00	3,594.56	
		08/23/96	53.41	0.00	3,594.31	
		12/02/96	53.98	0.00	3,593.74	
		03/12/97	54.44	0.00	3,593.28	
		06/12/97	54.48	0.00	3,593.24	
		09/12/97	54.29	0.00	3,593.43	
		12/10/97	54.66	0.00	3,593.06	
		03/23/98	55.05	0.00	3,592.67	
		06/23/98	55.44	0.00	3,592.28	
		09/30/98	55.65	0.00	3,592.07	
		12/09/98	56.00	0.00	3,591.72	
		03/09/99	56.45	0.00	3,591.27	
		06/10/99	56.91	0.00	3,590.81	
		07/02/99	56.93	0.00	3,590.79	
		09/14/99	57.12	0.00	3,590.60	
		12/09/99	57.41	0.00	3,590.31	
MW-6	3,644.74	02/09/93	50.58	0.00	3,594.16	(1)
		08/18/93	50.78	0.00	3,593.96	
		01/26/94	51.00	0.00	3,593.74	
		05/03/95	52.63	0.00	3,592.11	
		07/31/95	51.90	0.00	3,592.84	
		11/14/95	51.19	0.00	3,593.55	
		02/23/96	52.10	0.00	3,592.64	
		05/31/96	51.76	0.00	3,592.98	
		08/23/96	51.63	0.00	3,593.11	
		12/02/96	52.85	0.00	3,591.89	
		03/12/97	53.55	0.00	3,591.19	
		06/12/97	52.08	0.00	3,592.66	
		09/11/97	53.72	0.00	3,591.02	
		12/10/97	53.27	0.00	3,591.47	
		03/23/98	53.56	0.00	3,591.18	
		06/23/98	52.88	0.00	3,591.86	
		09/30/98	54.89	0.00	3,589.85	

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

Monitor Well	Top-of-Casing Elevation (MSL)	Date Measured	Depth to Groundwater (feet)	Free Product Thickness (feet)	Groundwater Elevation (MSL)	Comments
MW-6	3,644.74	12/09/98	54.57	0.00	3,590.17	
		03/10/99	55.10	0.00	3,589.64	
		07/02/99				(5),(6)
MW-7	3,644.55	02/09/93	50.53	0.00	3,594.02	(1)
		08/18/93	50.74	0.00	3,593.81	
		01/26/94	51.01	0.00	3,593.54	
		05/03/95	52.25	0.00	3,592.30	
		07/31/95	51.92	0.00	3,592.63	
		11/14/95	51.48	0.00	3,593.07	
		02/23/96	52.15	0.00	3,592.40	
		05/31/96	51.78	0.00	3,592.77	
		08/23/96	52.02	0.00	3,592.53	
		12/02/96	52.52	0.00	3,592.03	
		03/12/97	52.99	0.00	3,591.56	
		06/12/97	53.08	0.00	3,591.47	
		09/11/97	53.00	0.00	3,591.55	
		12/10/97	53.28	0.00	3,591.27	
		03/23/98	53.59	0.00	3,590.96	
		06/23/98	54.20	0.00	3,590.35	
		09/30/98	54.54	0.00	3,590.01	
		12/09/98	54.74	0.00	3,589.81	
		03/09/99	55.15	0.00	3,589.40	
		06/10/99	55.66	0.00	3,588.89	
		07/02/99	55.73	0.00	3,588.82	
		09/13/99	55.94	0.00	3,588.61	
		12/09/99	56.38	0.00	3,588.17	
MW-8	3,644.87	02/09/93	50.48	0.00	3,594.39	(1)
		08/18/93	50.67	0.00	3,594.20	
		01/26/94	50.96	0.00	3,593.91	
		05/03/95	52.15	0.00	3,592.72	
		07/31/95	51.77	0.00	3,593.10	
		11/14/95	51.37	0.00	3,593.50	
		02/23/96	52.17	0.00	3,592.70	
		05/31/96	51.55	0.00	3,593.32	
		08/23/96	51.92	0.00	3,592.95	
		12/02/96	52.43	0.00	3,592.44	
		03/12/97	52.93	0.00	3,591.94	
		06/12/97	53.96	0.00	3,590.91	
		09/11/97	52.73	0.00	3,592.14	
		12/10/97	53.15	0.00	3,591.72	
		03/23/98	53.51	0.00	3,591.36	
		06/23/98	54.01	0.00	3,590.86	
		09/30/98	54.35	0.00	3,590.52	
		12/09/98	54.60	0.00	3,590.27	
		03/09/99	55.00	0.00	3,589.87	
		06/10/99	55.56	0.00	3,589.31	
		07/02/99	55.57	0.00	3,589.30	
		09/13/99	55.72	0.00	3,589.15	
		12/09/99				(3)
MW-9	3,644.78	04/22/93	49.73	0.00	3,595.05	(1)
		07/15/93	49.65	0.00	3,595.13	
		08/18/93	49.85	0.00	3,594.93	
		01/26/94	50.02	0.00	3,594.76	
		05/03/95	51.35	0.00	3,593.43	
		07/31/95	50.97	0.00	3,593.81	
		11/14/95	50.43	0.00	3,594.35	
		02/23/96	51.12	0.00	3,593.66	
		05/31/96	50.89	0.00	3,593.89	
		08/23/96	50.98	0.00	3,593.80	

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

Monitor Well	Top-of-Casing Elevation (MSL)	Date Measured	Depth to Groundwater (feet)	Free Product Thickness (feet)	Groundwater Elevation (MSL)	Comments
MW-9	3,644.78	12/02/96	51.58	0.00	3,593.20	
		03/12/97	52.21	0.05	3,592.61	
		06/12/97	52.10	0.00	3,592.68	PSH Sheen
		09/12/97	51.95	0.00	3,592.83	PSH Sheen
		12/10/97	52.37	0.00	3,592.41	PSH Sheen
		03/23/98	52.68	0.00	3,592.10	PSH Sheen
		06/23/98	53.08	0.00	3,591.70	PSH Sheen
		09/30/98	53.39	0.01	3,591.40	PSH Sheen
		12/09/98	53.68	0.00	3,591.10	
		03/10/99	54.15	0.00	3,590.63	
		06/10/99	54.68	0.00	3,590.10	
		07/02/99	54.71	0.00	3,590.07	
		09/13/99	54.71	0.00	3,590.07	
		12/09/99				(3)
MW-10	3,644.47	08/18/93	51.54	0.00	3,592.93	(1)
		01/26/94	51.90	0.00	3,592.57	
		05/03/95	52.97	0.00	3,591.50	
		07/31/95	52.87	0.00	3,591.60	
		11/14/95	52.51	0.00	3,591.96	
		02/23/96	53.05	0.00	3,591.42	
		05/31/96	52.79	0.00	3,591.68	
		08/23/96	53.03	0.00	3,591.44	
		12/02/96	53.41	0.00	3,591.06	
		03/12/97	54.21	0.00	3,590.26	
		06/12/97	53.99	0.00	3,590.48	
		09/12/97	53.94	0.00	3,590.53	
		12/10/97	54.12	0.00	3,590.35	
		03/23/98	54.51	0.00	3,589.96	
		06/23/98	55.12	0.00	3,589.35	
		09/30/98	55.61	0.00	3,588.86	
		12/09/98	55.80	0.00	3,588.67	
		03/09/99	56.09	0.00	3,588.38	
		06/10/99	56.60	0.00	3,587.87	
		07/02/99	56.64	0.00	3,587.83	
		09/14/99	56.91	0.00	3,587.56	
		12/09/99	57.37	0.00	3,587.10	
MW-11	3,643.78	08/18/93	51.92	0.00	3,591.86	(1)
		01/26/94	52.32	0.00	3,591.46	
		05/03/95	53.38	0.00	3,590.40	
		07/31/95	53.35	0.00	3,590.43	
		11/14/95	52.96	0.00	3,590.82	
		02/23/96	53.50	0.00	3,590.28	
		05/31/96	53.25	0.00	3,590.53	
		08/23/96	53.49	0.00	3,590.29	
		12/02/96	53.79	0.00	3,589.99	
		03/12/97	53.81	0.00	3,589.97	
		06/12/97	53.96	0.00	3,589.82	
		09/12/97	52.93	0.00	3,590.85	
		12/10/97				(5),(6)
MW-11A	3,644.24	03/23/98	54.79	0.00	3,589.45	(7)
		06/23/98	55.43	0.00	3,588.81	
		09/30/98	55.96	0.00	3,588.28	
		12/09/98	56.13	0.00	3,588.11	

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

Monitor Well	Top-of-Casing Elevation (MSL)	Date Measured	Depth to Groundwater (feet)	Free Product Thickness (feet)	Groundwater Elevation (MSL)	Comments
MW-11A	3,644.24	03/10/99	56.43	0.00	3,587.81	
		06/10/99	56.94	0.00	3,587.30	
		07/02/99	57.01	0.00	3,587.23	
		09/14/99	57.36	0.00	3,586.88	
		12/09/99	57.72	0.00	3,586.52	
MW-12	3,644.29	03/23/98	54.72	0.00	3,589.57	(7)
		06/23/98	55.48	0.00	3,588.81	
		09/30/98	56.02	0.00	3,588.27	
		12/09/98	56.17	0.00	3,588.12	
		03/10/99	56.45	0.00	3,587.84	
		06/10/99	56.97	0.00	3,587.32	
		07/02/99	56.99	0.00	3,587.30	
		09/14/99	57.41	0.00	3,586.88	
		12/09/99	57.76	0.00	3,586.53	
MW-12D	3,644.38	07/02/99	57.13	0.00	3,587.25	(8)
		09/14/99	57.74	0.00	3,586.64	
		12/09/99	57.86	0.00	3,586.52	
MW-13	3,645.52	07/02/99	56.60	0.00	3,588.92	(9)
		09/14/99	56.92	0.00	3,588.60	
		12/09/99	57.28	0.00	3,588.24	
OW-4	3,644.06	07/02/99	58.18	0.00	3,585.88	(8)
		09/14/99	58.63	0.00	3,585.43	
		12/09/99	58.92	0.00	3,585.14	

(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 having measurable thickness of free product, the groundwater elevation was calculated as follows:
Groundwater Elevation = (TOC elevation)-(depth to groundwater)+[(free product thickness)x(SG of free product)]
Note: The specific gravity (SG) of the free product is 0.82.

(3) - Not measured.

(4) - Monitor well MW-2 could not be located after January 1994.

(5) - Well plugged and abandoned July 2, 1999.

(6) - Monitor well MW-11 could not be located after September 12, 1997.

(7) - TOC elevations for MW-11A and MW-12 estimated relative to TOC elevation for MW-10.

(8) - TOC elevations for MW-12D and OW-4 estimated relative to TOC elevation for MW-12.

(9) - TOC elevation for MW-13 estimated relative to TOC elevation for MW-7.

Table 3
December 9, 1999 Field Screening Results for Groundwater Samples
Hobbs, New Mexico Facility
BJ Services Company, U.S.A.

Monitor Well	Cumulative Gallons Removed	pH	Temperature (°C)	Conductivity (umhos)	Redox (mV)	Dissolved Oxygen (meter) (mg/L)	Dissolved Oxygen (Hach kit) (mg/L)	Ferrous Iron (mg/L)	Alkalinity (mg/L)	Turbidity NTUs[1]
MW-3	0	6.22	16.57	1173	-30.6	5.72	NM	NM	NM	NM
	NM	7.08	17.67	1229	8.4	3.11	NM	NM	NM	NM
	NM	7.11	17.36	1221	14.7	3.08	NM	NM	NM	NM
	NM	7.17	17.28	1224	13.4	3.10	NM	NM	NM	28
MW-4	0	5.11	15.19	1001	357.8	7.22	NM	NM	NM	NM
	NM	7.38	18.17	1110	127.4	6.02	NM	NM	NM	NM
	NM	7.40	18.28	1140	120.1	5.89	NM	NM	NM	NM
	NM	7.41	18.40	1195	111.8	5.67	6.0	NM	NM	7.2
MW-5	0	5.48	15.26	1248	279.6	7.95	NM	NM	NM	NM
	NM	7.22	17.42	1330	159.6	4.36	NM	NM	NM	NM
	NM	7.28	16.51	1296	138.7	2.80	NM	NM	NM	NM
	NM	7.28	16.47	1295	137.5	2.74	3.0	0.0	260	95
MW-7[2]	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
MW-10[3]	0	6.41	17.73	1583	-45.1	4.99	NM	NM	NM	NM
MW-11A	0	6.83	15.95	5306	-21.1	6.24	NM	NM	NM	NM
	NM	6.80	18.96	6053	-56.5	2.31	NM	NM	NM	NM
	NM	6.80	19.71	6079	-59.1	1.81	NM	NM	NM	NM
	NM	6.81	20.31	6243	-61.4	8.73	0.0	0.0	770	NM
MW-12[3]	0	7.15	17.36	1788	-62	4.40	NM	NM	NM	NM
MW-12D	0	6.93	15.78	1064	-9.5	4.64	NM	NM	NM	NM
	NM	7.54	17.47	1196	-128.5	0.75	NM	NM	NM	NM
	NM	7.59	19.37	1204	-150.2	0.48	NM	NM	NM	NM
	NM	7.58	20.25	1206	-155.2	0.43	NM	3.0	280	39
MW-13	0	4.71	16.42	2259	-12.1	4.08	NM	NM	NM	NM
	1.5	6.72	17.93	1968	-78.1	1.08	NM	NM	NM	NM
	3.0	7.13	18.22	1829	-86.8	0.96	NM	NM	NM	NM
	4.5	7.21	18.64	1821	-78.5	0.71	NM	NM	NM	343
OW-4	0	7.39	17.51	1611	34.6	7.40	NM	NM	NM	> 1000

[1] NTUs = Nephelometric turbidity units

[2] Well pumped dry after removal of less than 1 well volume.

[3] Well pumped dry after removal of well volume.

Monitor wells MW-1, MW-8, and MW-9 not sampled 12/9/99.

Monitor well MW-2 not operative after January 1994; P&A'd 7/1/99.

Monitor Well MW-6 P&A'd 7/1/99.

Monitor well MW-11 not operative after September 1997; P&A'd 7/1/99.

NM=Not Measured

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

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/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
	3/24/98	Regular	4800	7200	1200	2400	4.2	38
	6/23/98	Regular	53	680	580	1400	1.4	9.2
	09/30/98	Regular	3.2	90	280	970	2.5	3.6
	12/10/98	Regular	<1.0	1.5	17	110	1.4	0.31
	03/10/99	Regular	<1.0	<1.0	8.2	110	0.62	0.85
	03/10/99	Duplicate	<1.0	<1.0	7.9	110	0.66	0.84
	06/10/99	Regular	<1.0	1.1	<1.0	28	0.53	0.55
	06/10/99	Duplicate	<1.0	1.8	<1.0	41	0.69	0.76
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	-	NS	NS	NS	NS	NS	NS
MW-2[1]	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
	3/24/98	Regular	140	630	360	310	0.56	3.9
	6/23/98	Regular	100	720	350	490	0.40	4.9
	09/30/98	Regular	42	470	450	530	1.0	3.8
	12/10/98	Regular	13	220	160	290	1.3	0.43
	03/10/99	Regular	3.2	7.4	42	32	0.2	0.44

Table 4

Cumulative Analytical Results for Groundwater Samples

Hobbs, New Mexico Facility

BJ Services Company, U.S.A.

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
MW-4	06/10/99	Regular	1.7	3.1	<1.0	36	<0.20	0.18
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	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
	3/24/98	Regular	150	510	270	620	1.2	5.6
	6/23/98	Regular	160	890	590	1600	0.69	10
	09/30/98	Regular	80	180	370	840	2.0	3.9
	12/10/98	Regular	28	70	210	960	9.3	4.3
	12/10/98	Duplicate	26	62	180	830	3.9	4.3
	03/10/99	Regular	8	20	250	1400	13.0	13
	06/10/99	Regular	<1.0	<1.0	12	12	0.44	0.63
	09/14/99	Regular	< 1.0	< 1.0	3.3	13.1	0.35	0.17
	12/09/99	Regular	< 1	2.5	2.3	20.1	2	0.53
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
	3/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	6/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	09/30/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	12/10/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	03/09/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
	09/14/99	Regular	<1.0	<1.0	<1.0	<2.0	<0.20	<0.10
	12/09/99	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.

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
MW-6 [1]								
	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
MW-6 [1]	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
	3/23/98	Regular	3.6	< 1	4	< 1	< 0.2	< 0.1
	6/23/98	Regular	170	4.1	15	7.2	1.2	0.51
	09/30/98	Regular	1000	420	140	270	4.0	3.3
	12/10/98	Regular	7.6	6.6	1.7	5.8	2.0	< 0.1
	03/10/99	Regular	2500	930	590	1400	11.0	13
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
	3/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	6/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	09/30/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	12/10/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	03/09/99	Regular	<1.0	<1.0	<1.0	<1.0	4.7	< 0.1
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	< 0.20	< 0.1
	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	Regular	< 5	< 5	< 5	< 5	1.8	< 0.5
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

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

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
	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
	3/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	6/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	09/30/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	12/10/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	03/09/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
MW-8	12/09/99	-	NS	NS	NS	NS	NS	NS
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
	3/24/98	Regular	< 1	< 1	< 1	26	0.9	1
	6/23/98	Regular	2.4	22	10	36	< 0.2	0.25
	09/30/98	Regular	1.1	5.5	21	59	0.27	0.27
	12/10/98	Regular	< 1.0	1.9	17	79	5.1	0.25
	03/10/99	Regular	<1.0	<1.0	5.7	68	<0.2	0.22
	06/10/99	Regular	<1.0	1.8	1.8	71	<0.20	0.43
	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	-	NS	NS	NS	NS	NS	NS
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

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

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
	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
	3/23/98	Regular	36	< 5	5.9	< 5	1.6	< 0.5
	3/23/98	Duplicate	36	< 1	5.3	1.3	1.7	0.18
	6/23/98	Regular	37	< 5	< 5	< 5	2.1	< 0.5
	09/30/98	Regular	84	3.2	30	2.2	1.4	0.36
	12/10/98	Regular	29	1.0	7.0	1.0	0.86	0.18
	03/09/99	Regular	28	<5.0	5.8	<5.0	0.92	<0.5
	06/10/99	Regular	17	<1.0	<1.0	<1.0	0.30	0.16
	09/14/99	Regular	10	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	Regular	23	< 1	< 1	1.2	0.44	0.16
MW-11[1]								
	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-11A								
	3/24/98	Regular	24	5	< 5	< 5	0.28	0.14
	6/23/98	Regular	9.9	< 5	< 5	< 5	< 0.2	< 0.5
	09/30/98	Regular	9.3	3.7	2.2	7.0	<0.20	0.1
	12/10/98	Regular	1.7	<1.0	<1.0	<1.0	<0.20	<0.1
	03/10/99	Regular	<5	<5	<5	<5	0.3	<0.5
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.10
	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	Regular	< 5	< 5	< 5	< 5	< 0.2	< 0.1
MW-12								
	3/24/98	Regular	100	11	6	8	0.29	0.41
	6/23/98	Regular	88	< 5	< 5	< 5	< 0.2	< 0.5
	6/23/98	Duplicate	89	< 5	< 5	< 5	0.31	< 0.5
	09/30/98	Regular	260	3.0	1.2	7.9	<0.20	0.62
	12/10/98	Regular	160	<1.0	<1.0	1.2	0.21	0.36
	03/10/99	Regular	160	1.1	<1.0	2.9	0.38	0.45
	06/10/99	Regular	49	1.4	<1.0	<1.0	0.22	0.13

Table 4

Cumulative Analytical Results for Groundwater Samples

Hobbs, New Mexico Facility

BJ Services Company, U.S.A.

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
MW-12D	09/14/99	Regular	75	< 1.0	< 1.0	< 2.0	<0.20	0.23
	12/09/99	Regular	64	< 1	< 1	< 1	< 0.2	0.21
MW-13	07/02/99	Regular	< 5	< 5	< 5	< 5	<0.20	<0.10
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
OW-4	07/02/99	Regular	1500	23.0	750	58	2.2	5.1
	09/14/99	Regular	860	16	450	34.4	2.1	3.1
	12/09/99	Regular	430	16	410	40.9	0.46	3.2
	06/10/99	Regular	<1.0	<1.0	<1.0	4.4	<0.2	<0.10
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
	12/09/99	Regular	< 1	< 1	< 1	< 1	<0.2	<0.1

[1] Well plugged and abandoned 7/1/99

NA=Not Analyzed NS=Not Sampled

NSP=Not Sampled due to Phase Separated Hydrocarbons

Table 5
Current and Historical Nitrate, Sulfate, and Dissolved Methane Data for Monitor Wells MW-5, MW-10, MW-11A, MW-12, MW-12D, and OW-4
BJ Services Company, U.S.A.
Hobbs, New Mexico

Well	Date	Nitrate[1] (mg/L)	Sulfate[1] (mg/L)	Dissolved Methane (mg/l)
MW-5	3/23/98	3.87	190	<0.0012
	3/9/99	<0.1	195	<0.0012
	6/10/99	4.73	209	<0.0012
	9/14/99	4.3	210	<0.0012
	12/9/99	4.2	210	<0.0012
MW-10	3/23/98	0.07	320	0.91
	6/23/98	<0.1	325	0.55
	9/30/98	<0.1	204	0.81
	12/10/98	<0.1	180	0.091
	3/9/99	<0.1	142	0.035
			223[3]	
	9/14/99	<0.10	160	0.0049
	12/9/99	0.49	170	0.0039
MW-11A	3/23/98	<0.05	190	0.14
	6/23/98	<0.1	225	0.11
	9/30/98	0.4	196	0.043
	12/10/98	0.7	188	0.033
	3/10/99	<0.1	164	0.094
		<0.1[2]	227[3]	
	6/10/99	<0.1	181	0.0036
	9/13/99	0.22	250	<0.0012
	12/9/99	<0.1	290	0.0079
MW-12	3/23/98	<0.05	240	<0.0012
	6/23/98	<0.1	240	<0.0012
	9/30/98	<0.1	168	<0.0012
	12/10/98	<0.1	202	<0.0012
	3/10/99	<0.1	137	<0.0012
		<0.1[2]	193[3]	
	6/10/99	<0.1	217	<0.0012
	9/14/99	<0.10	230	<0.0012
	12/9/99	<0.1	180	<0.0012
MW-12D	7/2/99	2.1	249	0.0015
	9/14/99	<0.10	200	0.0065
	12/9/99	<0.1	210	0.0015
OW-4	6/10/99	3.96	192	<0.0012
	9/14/99	3.5	200	<0.0012
	12/9/99	3.4	200	<0.0012

1=By EPA Method 300, except as noted

2=By EPA Method 353.3

3=By EPA Method 375.4

Table 6
Summary of Analytical Results for Air Emissions
Hobbs, New Mexico Facilty
BJ Services Company, U.S.A.

Sample Number	Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	TPH	Discharge Rate, scfm	Benzene Emission Rate, lb/hr	Total BTEX Emission Rate, lb/hr	TPH Emission Rate, lb/hr
		parts per million by volume, ppmv								
Extraction-1	9/19/95	790	1100	340	920	9700	132.47	1.235	5.943	16.31
Effluent-1	9/20/95	990	2500	560	1600	16000	135.76	1.575	10.939	27.37
Effluent-2	9/28/95	13	28	6	18	2533	123.56	0.019	0.112	3.89
Effluent-4	11/7/95	15	58	12	36	1500	131.10	0.024	0.239	2.59
Effluent 111595-01	11/15/95	39	180	42	130	1870	133.33	0.062	0.773	3.21
Effluent 121995-01	12/19/95	10	45	11	33	530	129.64	0.016	0.191	0.89
Effluent 12996-01	1/29/96	12	61	17	53	1200	128.45	0.018	0.271	1.95
Effluent 032296-01	3/22/96	6	44	12	40	990	124.68	0.009	0.189	1.56
Effluent 042496-01	4/25/96	4	37	10	36	900	118.34	0.005	0.147	1.29
Effluent 053196-01	5/31/96	3.7	40	10	33	670	124.11	0.005	0.158	1.04
Effluent 082396-01	8/23/96	<5	12	<5	<5	200	126.18	0.007	0.047	0.31
Effluent 120296-01	12/2/96	<1	<1	<1	<1	<5	129.04	0.002	0.008	0.01
Eff-31297-1	3/12/97	2.1	15	4.6	15	250	110.56	0.003	0.057	0.33
Effluent 070297-01	7/2/97	<1	6.3	2.4	8.6	65	109.90	0.001	0.028	0.08
Monitor 970912 (1)	9/12/97	NA	NA	NA	NA	340	105.40	NA	NA	0.39
Eff-1-2832	12/10/97	<0.001	0.013	0.009	0.031	210	106.27	0.000	0.000	0.28
Monitor 980324 (1)	3/24/98	NA	NA	NA	NA	1500	108.97	NA	NA	1.91
Monitor 980622 (1)	6/22/98	NA	NA	NA	NA	190	108.16	NA	NA	0.24
Monitor 980930 (1)	9/30/98	NA	NA	NA	NA	200	123.74	NA	NA	0.33
Monitor 981210 (1)	12/10/98	NA	NA	NA	NA	180	111.14	NA	NA	0.24
Monitor 990310 (1)	3/10/99	NA	NA	NA	NA	80	111.14	NA	NA	0.11
Monitor 990610 (1)	6/10/99	NA	NA	NA	NA	140	73.68	NA	NA	0.12
Monitor 990914 (1)	9/14/99	NA	NA	NA	NA	12.5	116.24	NA	NA	0.02
Monitor 991209 (1)	12/9/99	NA	NA	NA	NA	5.9	42.14	NA	NA	0.003

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

NA = Not Analyzed

(1) All analysis based on field FID readings

Appendices

APPENDICES

A

APPENDIX A

Groundwater Sampling Forms

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-3

1. PROJECT INFORMATION

Project Number: 12832 Task Number: 015 Date: 12-5-99 Time: 14:50

Client: BJSVCS Personnel: OEM TECH

Project Location: Hobbs Weather: Sunny, mid

2. WELL DATA

Casing Diameter: ___ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Screen Diameter: ___ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Total Depth of Well: 62.1 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 55.78 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product: ___ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:

Length of Water Column: ___ feet Well Volume: ___ gal Screened Interval (from GS): ___

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: ___

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. ___

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. ___

Was well purged dry? ☐ Yes ☐ No Pumping Rate: ___ gal/min 3. ___

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
14:55	—	6.92	16.97	1173	-32.6	5.72	—		clear
15:57		7.08	17.67	1229	8.4	3.11	—		clear
15:02		7.11	17.36	1221	14.7	3.08	—		clear
15:05		7.17	17.28	1224	13.4	3.10	28		

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: ___

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: ___ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-3 Sample Time: 15:05 # of Containers: ___

Duplicate Sample Collected? ☐ Yes ☐ No ID: ___

Geochemical Analyses

Ferrous Iron: ___ mg/L

DO: ___ mg/L

Nitrate: ___ mg/L

Sulfate: ___ mg/L

Alkalinity: ___ mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

FORM GW-1 (Rev. 4/8/96)

Signature

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-4

1. PROJECT INFORMATION

Project Number: H032-12.582 Task Number: 015 Date: 12-8-04 Time: 15:10

Client: BJ SVCS Personnel: Dean Fergo

Project Location: Hobbs Weather: Sunny mild

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Total Depth of Well: 61.47 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 55.79 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. _____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
15:15	—	5.11	15.19	1201	357.8	7.22	—	—	cloudy
15:18		7.38	18.17	1110	127.4	6.02	—	—	clear
15:21		7.40	18.28	1140	120.1	5.89	—	—	clear
15:25		7.41	18.40	1195	111.8	5.67	7.2		clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-4 Sample Time: 15:25 # of Containers: _____

Duplicate Sample Collected? ☐ Yes ☐ No ID: _____

Geochemical Analyses

Ferrous Iron:	___	mg/L
DO:	6.0	mg/L
Nitrate:	___	mg/L
Sulfate:	___	mg/L
Alkalinity:	___	mg/L

5. COMMENTS

checked D.O. w/ A-plus

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-5

1. PROJECT INFORMATION

Project Number: 12832 Task Number: 015 Date: 12-9-99 Time: 11:50

Client: BJSVCS Personnel: Dean Teague

Project Location: Hobbs Weather: Sunny, mild

2. WELL DATA

Casing Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Screen Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Total Depth of Well: 64.65 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 57.41 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other

Length of Water Column: ____ feet Well Volume: ____ gal Screened Interval (from GS): ____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: ____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

1. ____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

2. ____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: ____ gal/min

3. ____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
12:50	—	5.48	15.26	1248	279.6	7.95	—	-	Sandy
12:54		7.22	17.42	1330	159.6	9.36	—	-	Clear
12:57		7.28	16.51	1296	138.7	2.80	—	-	Clear
13:00		7.28	16.47	1295	137.5	2.74	—	-	Clear
							95		

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: ____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: ____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-5 Sample Time: 13:05 # of Containers: 9

Duplicate Sample Collected? ☐ Yes ☐ No ID: ____

Geochemical Analyses

Ferrous Iron: 0.0 mg/L

DO: 3.0 mg/L

Nitrate: ____ mg/L

Sulfate: — mg/L

Alkalinity: 260 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

FORM GW-1 (Rev. 4/8/99 ...)

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

(WELL ID: MW-7

1. PROJECT INFORMATION

Project Number: 0832 Task Number: _____ Date: 12-8-94 Time: 11:30

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 61.5 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other _____
Depth to Static Water: 56.38 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other _____
Depth to Product: _____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Length of Water Column: 5.12 feet	Well Volume: 0.85 gal — Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☑ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☑ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☑ Field Cleaned ☐ Disposable — 1. YSI-6101

Materials: Rope/Tubing ☑ Polyethylene ☑ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☑ Disposable — 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min — 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-7 Sample Time: _____ # of Containers: _____

Duplicate Sample Collected? ☐ Yes ☒ No ID: _____

Geochemical Analyses

Ferrous Iron:	___	mg/L
DO:	___	mg/L
Nitrate:	___	mg/L
Sulfate:	___	mg/L
Alkalinity:	___	mg/L

5. COMMENTS

well dry @ 5 well volume, collected grab sample w/ bailer

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

FORM GW-1 (Rev. 4/8/92)

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-10

1. PROJECT INFORMATION

Project Number: 12631 Task Number: 15 Date: 12.9.99 Time: 15:35

Client: BP SVCS Personnel: DEAN, TEAGUE

Project Location: Hobbs Weather: sunny, mild

2. WELL DATA

Casing Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Screen Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Total Depth of Well: 62.58 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 57.37 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Length of Water Column: 5.43 feet	Well Volume: 0.9 gal Screened Interval (from GS):

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☑ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:

Materials: Pump/Bailer ☑ Stainless ☐ PVC ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☑ Field Cleaned ☐ Disposable

Materials: Rope/Tubing ☑ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☑ Disposable

Was well purged dry? ☑ Yes ☐ No Pumping Rate: 0.4 gal/min

Equipment Model(s)
1. YSI-6100
2.
3.

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
15:40	—	6.41	17.73	1583	-45.1	4.99	—	—	cloudy
15:42									
15:46									
15:50									

4. SAMPLING DATA

Method(s): ☑ Bailer, Size: 2" ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:

Materials: Pump/Bailer ☐ Stainless ☑ PVC ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☑ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☑ Other: NYLON ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☑ Disposable

Depth to Water at Time of Sampling: Field Filtered? ☐ Yes ☑ No

Sample ID: MW-10 Sample Time: # of Containers:

Duplicate Sample Collected? ☐ Yes ☐ No ID:

Geochemical Analyses

Ferrous Iron:	___	mg/L
DO:	___	mg/L
Nitrate:	___	mg/L
Sulfate:	___	mg/L
Alkalinity:	___	mg/L

5. COMMENTS

DTW @ 15:42 1 well volume

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

FORM GW-1 (Rev. 4/99)

Signature

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-11A

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date: 12-9-94 Time: 14:30

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter: 2 inches	Type: ☑ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 63.5 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 57.72 feet	From: ☑ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1._____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2._____

Was well purged dry? ☐ Yes ☐ No Pumping Rate:_____ gal/min 3._____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:_____	Comments
14:35	—	6.83	18.95	5306	-21.1	6.24	—	—	Sunny
14:38		6.80	18.96	6053	-56.5	2.31	—	—	clear
14:41		6.80	19.71	6279	-59.1	1.81	—	—	clear
14:45		6.81	20.31	6243	-61.4	873			clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-11A Sample Time: 14:45 # of Containers:_____

Duplicate Sample Collected? ☐ Yes ☐ No ID:_____

Geochemical Analyses

Ferrous Iron: 6.0 mg/L

DO: 3.0 mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: 270 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-12

1. PROJECT INFORMATION

Project Number: 12832 Task Number: 015 Date: 12-9-99 Time: 16:30

Client: BSNCS Personnel: DEAN FAGUE

Project Location: Hobbs Weather: sunny, mild

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Total Depth of Well: 60.97 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 57.76 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Length of Water Column: 3.21 feet	Well Volume: 0.5 gal Screened Interval (from GS):

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

1. YSI-610D

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

2.

Was well purged dry? ☒ Yes ☐ No Pumping Rate: 0.2 gal/min

3.

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
16:05		7.15	17.36	1786	-62	4.40			

4. SAMPLING DATA

Method(s): ☒ Bailer, Size: 2 ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:

Materials: Pump/Bailer ☐ Stainless ☒ PVC ☐ Teflon® ☐ Other: ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☒ Other: NYLON ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Depth to Water at Time of Sampling: Field Filtered? ☐ Yes ☒ No

Sample ID: MW-12 Sample Time: 16:10 # of Containers:

Duplicate Sample Collected? ☐ Yes ☐ No ID:

Geochemical Analyses

Ferrous Iron: — mg/L

DO: — mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: — mg/L

5. COMMENTS

Insufficient well volume to purge with pump. collected grab sample 16:10

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

FORM GW-1 (Rev. 4/8/99)

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-12D

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date: 12-9-99 Time: 14:00

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 87.80 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 57.86 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product:_____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1._____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2._____

Was well purged dry? ☐ Yes ☐ No Pumping Rate:_____ gal/min 3._____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:_____	Comments
14:05	—	6.93	15.78	1214	-9.5	4.64	—	—	Clear
14:10		7.51	17.47	1196	-128.5	0.75	—	—	Clear
14:15		7.59	19.37	1204	-150.2	0.48	—	—	Clear
14:20		7.58	22.25	1206	-155.2	0.43	39	—	Clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-12D Sample Time: 14:20 # of Containers:_____

Duplicate Sample Collected? ☐ Yes ☐ No ID:_____

Geochemical Analyses

Ferrous Iron: 3.0 mg/L

DO: 2.0 mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: 250 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

FORM GW-1 (Rev 4/8/99)

Signature

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-13

1. PROJECT INFORMATION

Project Number: 12832 Task Number: 015 Date: 12-9-99 Time: 16:25

Client: BJ SVCS Personnel: DEAN, TEAGUE

Project Location: Hobbs Weather: Sunny, mild

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:
Total Depth of Well: 65'5 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 52.28 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other

Length of Water Column: 5.22 feet Well Volume: 1.4 gal Screened Interval (from GS): ____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Baller, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☒ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: ____

Equipment Model(s)

Materials: Pump/Baller ☒ Stainless ☐ PVC ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable 1. YSI-610D

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable 2. ____

Was well purged dry? ☐ Yes ☒ No Pumping Rate: 0.33 gal/min 3. ____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
16:30	—	4.71	16.42	2259	-12.1	4.08	—	—	Clear
16:39	1.5	6.72	17.45	1968	-78.1	1.08	—	—	Clear
16:37	3.0	7.13	18.22	1829	-86.8	0.46	—	—	Clear
16:40	4.5	7.21	18.64	1821	-78.5	0.71	343		

4. SAMPLING DATA

Method(s): ☐ Baller, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: ____

Materials: Pump/Baller ☒ Stainless ☐ PVC ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☒ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: ____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Depth to Water at Time of Sampling: ____ Field Filtered? ☐ Yes ☒ No

Sample ID: MW-13 Sample Time: 16:40 # of Containers: ____

Duplicate Sample Collected? ☐ Yes ☒ No ID: ____

Geochemical Analyses

Ferrous Iron: ____ mg/L

DO: ____ mg/L

Nitrate: ____ mg/L

Sulfate: ____ mg/L

Alkalinity: ____ mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

FORM GW-1 (Rev. 4/8/99)

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: GW-4

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date: 12-9-99 Time: 13:30

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 61.45 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Static Water: 58.92 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other
Depth to Product:_____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1._____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2._____

Was well purged dry? ☐ Yes ☐ No Pumping Rate:_____ gal/min 3._____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
		7.39	17.51	1611	34.6	7.40	>1000		

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☐ No

Sample ID: GW-4 Sample Time: 13:40 # of Containers:_____

Duplicate Sample Collected? ☐ Yes ☐ No ID:_____

Geochemical Analyses

Ferrous Iron: ___ ___ mg/L

DO: ___ ___ mg/L

Nitrate: ___ ___ mg/L

Sulfate: ___ ___ mg/L

Alkalinity: ___ ___ mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

Signature

FORM GW-1 (Rev. 4/18/95)

B

APPENDIX B

Laboratory Analytical Report for Groundwater Samples

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

Case Narrative for:

Brown & Caldwell

Certificate of Analysis Number:

99120268

Report To:		Project Name:	BJ- HOBBS
Brown & Caldwell		Site:	BJ-Hobbs
Rick Rexroad		Site Address:	
1415 Louisiana			
Suite 2500		PO Number:	
Houston		State:	New Mexico
TX		State Cert. No.:	N/A
77002-		Date Reported:	
ph: (713) 759-0999	fax: (713) 308-3886		

Any data flags or quality control exceptions associated with this report will be footnoted in the analytical result page(s) or the quality control summary page(s).

Please do not hesitate to contact us if you have any questions or comments pertaining to this data report. Please reference the above Certificate of Analysis Number.

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

Fini, Bernadette
Project Manager

1/3/00
Date

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

Brown & Caldwell

Certificate of Analysis Number:

99120268

Report To:	Brown & Caldwell		**Project Name:**	BJ- HOBBS
	Rick Rexroad		**Site:**	BJ-Hobbs
	1415 Louisiana		**Site Address:**	
	Suite 2500			
	Houston		**PO Number:**	
	TX		**State:**	New Mexico
	77002-		**State Cert. No.:**	N/A
	ph: (713) 759-0999	fax: (713) 308-3886	**Date Reported:**	
Fax To:	*Brown & Caldwell*			
	Rick Rexroad	*fax: (713) 308-3886*		

Client Sample ID	Lab Sample ID	Matrix	Date Collected	Date Received	COC ID	HOLD
MW-7	99120268-01	Water	12/9/99 12:18:00 PM	12/10/99 10:00:00 AM	093156	☐
MW-5	99120268-02	Water	12/9/99 1:05:00 PM	12/10/99 10:00:00 AM	093156	☐
OW 4	99120268-03	Water	12/9/99 1:40:00 PM	12/10/99 10:00:00 AM	093156	☐
MW 12D	99120268-04	Water	12/9/99 2:20:00 PM	12/10/99 10:00:00 AM	093156	☐
MW 11A	99120268-05	Water	12/9/99 2:45:00 PM	12/10/99 10:00:00 AM	093156	☐
MW 3	99120268-06	Water	12/9/99 3:05:00 PM	12/10/99 10:00:00 AM	093156	☐
MW 4	99120268-07	Water	12/9/99 3:25:00 PM	12/10/99 10:00:00 AM	093156	☐
MW 10	99120268-08	Water	12/9/99 3:50:00 PM	12/10/99 10:00:00 AM	093156	☐
MW 12	99120268-09	Water	12/9/99 4:10:00 PM	12/10/99 10:00:00 AM	093156	☐
MW 13	99120268-10	Water	12/9/99 4:40:00 PM	12/10/99 10:00:00 AM	093156	☐
Dup	99120268-11	Water	12/9/99	12/10/99 10:00:00 AM	093155	☐
Trip Blank 12/1/99	99120268-12	Water	12/9/99	12/10/99 10:00:00 AM	093155	☐

Fini, Bernadette
Project Manager

1/3/00
Date

Joel Grice
Laboratory Director

Ted Yen
Quality Assurance Officer

HOUSTON LABORATORY
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HOUSTON, TEXAS 77054
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Client Sample ID MW-7 **Collected:** 12/9/99 12:18:00 **SPL Sample ID:** 99120268-01

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	1.8		0.2		1		12/20/99 21:37	RR	138614
Surr: Pentacosane	41	%	20-131		1		12/20/99 21:37	RR	138614

Run ID/Seq #: HP_V_991215B-138614

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND		0.5		5		12/11/99 18:31	D_R	128129
Surr: 1,4-Difluorobenzene	96	%	62-144		5		12/11/99 18:31	D_R	128129
Surr: 4-Bromofluorobenzene	110	%	44-153		5		12/11/99 18:31	D_R	128129
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		5		5		12/11/99 18:31	D_R	128106
Ethylbenzene	ND		5		5		12/11/99 18:31	D_R	128106
Toluene	ND		5		5		12/11/99 18:31	D_R	128106
Xylenes,Total	ND		5		5		12/11/99 18:31	D_R	128106
Surr: 1,4-Difluorobenzene	85	%	72-137		5		12/11/99 18:31	D_R	128106
Surr: 4-Bromofluorobenzene	100	%	48-156		5		12/11/99 18:31	D_R	128106

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID MW-5 **Collected:** 12/9/99 1:05:00 **SPL Sample ID:** 99120268-02

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	ND		0.2		1		12/20/99 22:21	RR	138615
Surr: Pentacosane	62	%	20-131		1		12/20/99 22:21	RR	138615

Run ID/Seq #: HP_V_991215B-138615

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND		0.1		1		12/11/99 17:36	D_R	128127
Surr: 1,4-Difluorobenzene	93	%	62-144		1		12/11/99 17:36	D_R	128127
Surr: 4-Bromofluorobenzene	120	%	44-153		1		12/11/99 17:36	D_R	128127
HEADSPACE GAS ANALYSIS				**MCL**	**RSK147**		**Units: mg/L**		
Ethane	0.0025		0.0025		1		12/27/99 13:01	DR	140232
Ethylene	ND		0.0032		1		12/27/99 13:01	DR	140232
Methane	ND		0.0012		1		12/27/99 13:01	DR	140232
NITROGEN, NITRATE (AS N)				**MCL**	**E300**		**Units: mg/L**		
Nitrogen,Nitrate (As N)	4.2		0.1		1		12/10/99 11:47	ES	131129
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		1		1		12/11/99 17:36	D_R	128104
Ethylbenzene	ND		1		1		12/11/99 17:36	D_R	128104
Toluene	ND		1		1		12/11/99 17:36	D_R	128104
Xylenes,Total	ND		1		1		12/11/99 17:36	D_R	128104
Surr: 1,4-Difluorobenzene	110	%	72-137		1		12/11/99 17:36	D_R	128104
Surr: 4-Bromofluorobenzene	100	%	48-156		1		12/11/99 17:36	D_R	128104
SULFATE				**MCL**	**E300**		**Units: mg/L**		
Sulfate	210		5		25		12/13/99 11:17	ES	131096

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID OW 4 **Collected:** 12/9/99 1:40:00 **SPL Sample ID:** 99120268-03

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	ND		0.2		1		12/20/99 23:04	RR	138616
Surr: Pentacosane	28	%	20-131		1		12/20/99 23:04	RR	138616

Run ID/Seq #: HP_V_991215B-138616

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND		0.1		1		12/11/99 18:59	D_R	128130
Surr: 1,4-Difluorobenzene	92	%	62-144		1		12/11/99 18:59	D_R	128130
Surr: 4-Bromofluorobenzene	110	%	44-153		1		12/11/99 18:59	D_R	128130
HEADSPACE GAS ANALYSIS				**MCL**	**RSK147**		**Units: mg/L**		
Ethane	ND		0.0025		1		12/27/99 13:16	DR	140233
Ethylene	ND		0.0032		1		12/27/99 13:16	DR	140233
Methane	ND		0.0012		1		12/27/99 13:16	DR	140233
NITROGEN, NITRATE (AS N)				**MCL**	**E300**		**Units: mg/L**		
Nitrogen,Nitrate (As N)	3.4		0.1		1		12/10/99 11:47	ES	131132
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		1		1		12/11/99 18:59	D_R	128107
Ethylbenzene	ND		1		1		12/11/99 18:59	D_R	128107
Toluene	ND		1		1		12/11/99 18:59	D_R	128107
Xylenes,Total	ND		1		1		12/11/99 18:59	D_R	128107
Surr: 1,4-Difluorobenzene	91	%	72-137		1		12/11/99 18:59	D_R	128107
Surr: 4-Bromofluorobenzene	110	%	48-156		1		12/11/99 18:59	D_R	128107
SULFATE				**MCL**	**E300**		**Units: mg/L**		
Sulfate	200		4		20		12/13/99 11:17	ES	131099

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID MW 12D **Collected:** 12/9/99 2:20:00 **SPL Sample ID:** 99120268-04

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	ND		0.2		1		12/20/99 23:48	RR	138617
Surr: Pentacosane	63	%	20-131		1		12/20/99 23:48	RR	138617

Run ID/Seq #: HP_V_991215B-138617

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND		0.1		1		12/11/99 19:26	D_R	128131
Surr: 1,4-Difluorobenzene	94	%	62-144		1		12/11/99 19:26	D_R	128131
Surr: 4-Bromofluorobenzene	110	%	44-153		1		12/11/99 19:26	D_R	128131
HEADSPACE GAS ANALYSIS				**MCL**	**RSK147**		**Units: mg/L**		
Ethane	0.0027		0.0025		1		12/27/99 13:28	DR	140234
Ethylene	0.004		0.0032		1		12/27/99 13:28	DR	140234
Methane	0.0015		0.0012		1		12/27/99 13:28	DR	140234
NITROGEN, NITRATE (AS N)				**MCL**	**E300**		**Units: mg/L**		
Nitrogen,Nitrate (As N)	ND		0.1		1		12/10/99 11:47	ES	131133
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		1		1		12/11/99 19:26	D_R	128108
Ethylbenzene	ND		1		1		12/11/99 19:26	D_R	128108
Toluene	ND		1		1		12/11/99 19:26	D_R	128108
Xylenes,Total	ND		1		1		12/11/99 19:26	D_R	128108
Surr: 1,4-Difluorobenzene	96	%	72-137		1		12/11/99 19:26	D_R	128108
Surr: 4-Bromofluorobenzene	100	%	48-156		1		12/11/99 19:26	D_R	128108
SULFATE				**MCL**	**E300**		**Units: mg/L**		
Sulfate	210		4		20		12/13/99 11:17	ES	131100

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID MW 11A **Collected:** 12/9/99 2:45:00 **SPL Sample ID:** 99120268-05

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	ND		0.2		1		12/21/99 0:32	RR	138618
Surr: Pentacosane	33	%	20-131		1		12/21/99 0:32	RR	138618

Run ID/Seq #: HP_V_991215B-138618

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND		0.5		5		12/11/99 19:54	D_R	128132
Surr: 1,4-Difluorobenzene	95	%	62-144		5		12/11/99 19:54	D_R	128132
Surr: 4-Bromofluorobenzene	120	%	44-153		5		12/11/99 19:54	D_R	128132
HEADSPACE GAS ANALYSIS				**MCL**	**RSK147**		**Units: mg/L**		
Ethane	ND		0.0025		1		12/27/99 13:38	DR	140235
Ethylene	ND		0.0032		1		12/27/99 13:38	DR	140235
Methane	0.0079		0.0012		1		12/27/99 13:38	DR	140235
NITROGEN, NITRATE (AS N)				**MCL**	**E300**		**Units: mg/L**		
Nitrogen,Nitrate (As N)	ND		0.1		1		12/10/99 11:47	ES	131134
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		5		5		12/11/99 19:54	D_R	128109
Ethylbenzene	ND		5		5		12/11/99 19:54	D_R	128109
Toluene	ND		5		5		12/11/99 19:54	D_R	128109
Xylenes,Total	ND		5		5		12/11/99 19:54	D_R	128109
Surr: 1,4-Difluorobenzene	100	%	72-137		5		12/11/99 19:54	D_R	128109
Surr: 4-Bromofluorobenzene	99	%	48-156		5		12/11/99 19:54	D_R	128109
SULFATE				**MCL**	**E300**		**Units: mg/L**		
Sulfate	290		4		20		12/13/99 11:17	ES	131101

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID MW 3 **Collected:** 12/9/99 3:05:00 **SPL Sample ID:** 99120268-06

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	ND		0.2		1		12/21/99 1:15	RR	138619
Surr: Pentacosane	71	%	20-131		1		12/21/99 1:15	RR	138619

Run ID/Seq #: HP_V_991215B-138619

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND		0.1		1		12/11/99 18:04	D_R	128128
Surr: 1,4-Difluorobenzene	97	%	62-144		1		12/11/99 18:04	D_R	128128
Surr: 4-Bromofluorobenzene	110	%	44-153		1		12/11/99 18:04	D_R	128128
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		1		1		12/11/99 18:04	D_R	128105
Ethylbenzene	ND		1		1		12/11/99 18:04	D_R	128105
Toluene	ND		1		1		12/11/99 18:04	D_R	128105
Xylenes,Total	ND		1		1		12/11/99 18:04	D_R	128105
Surr: 1,4-Difluorobenzene	92	%	72-137		1		12/11/99 18:04	D_R	128105
Surr: 4-Bromofluorobenzene	98	%	48-156		1		12/11/99 18:04	D_R	128105

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID MW 4 **Collected:** 12/9/99 3:25:00 **SPL Sample ID:** 99120268-07

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	2		0.2		1		12/11/99 7:03	RR	129318
Surr: Pentacosane	26	%	20-131		1		12/11/99 7:03	RR	129318

Run ID/Seq #: HP_V_991211A-129318

Prep Method	Prep Date	Prep Initials
SW3510B	12/10/1999 12:25	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	0.53		0.1		1		12/11/99 21:44	D_R	128134
Surr: 1,4-Difluorobenzene	120	%	62-144		1		12/11/99 21:44	D_R	128134
Surr: 4-Bromofluorobenzene	140	%	44-153		1		12/11/99 21:44	D_R	128134
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		1		1		12/11/99 21:44	D_R	128111
Ethylbenzene	2.3		1		1		12/11/99 21:44	D_R	128111
Toluene	2.5		1		1		12/11/99 21:44	D_R	128111
Xylenes,Total	20.1		1		1		12/11/99 21:44	D_R	128111
Surr: 1,4-Difluorobenzene	93	%	72-137		1		12/11/99 21:44	D_R	128111
Surr: 4-Bromofluorobenzene	100	%	48-156		1		12/11/99 21:44	D_R	128111

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID MW 10 **Collected:** 12/9/99 3:50:00 **SPL Sample ID:** 99120268-08

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	0.44		0.2		1		12/21/99 1:59	RR	138620
Surr: Pentacosane	43	%	20-131		1		12/21/99 1:59	RR	138620

Run ID/Seq #: HP_V_991215B-138620

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	0.16		0.1		1		12/11/99 22:11	D_R	128135
Surr: 1,4-Difluorobenzene	97	%	62-144		1		12/11/99 22:11	D_R	128135
Surr: 4-Bromofluorobenzene	120	%	44-153		1		12/11/99 22:11	D_R	128135
HEADSPACE GAS ANALYSIS				**MCL**	**RSK147**		**Units: mg/L**		
Ethane	ND		0.0025		1		12/27/99 13:46	DR	140236
Ethylene	ND		0.0032		1		12/27/99 13:46	DR	140236
Methane	0.0039		0.0012		1		12/27/99 13:46	DR	140236
NITROGEN, NITRATE (AS N)				**MCL**	**E300**		**Units: mg/L**		
Nitrogen,Nitrate (As N)	0.49		0.1		1		12/10/99 11:47	ES	131135
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	23		1		1		12/11/99 22:11	D_R	128112
Ethylbenzene	ND		1		1		12/11/99 22:11	D_R	128112
Toluene	ND		1		1		12/11/99 22:11	D_R	128112
Xylenes,Total	1.2		1		1		12/11/99 22:11	D_R	128112
Surr: 1,4-Difluorobenzene	100	%	72-137		1		12/11/99 22:11	D_R	128112
Surr: 4-Bromofluorobenzene	94	%	48-156		1		12/11/99 22:11	D_R	128112
SULFATE				**MCL**	**E300**		**Units: mg/L**		
Sulfate	170		4		20		12/13/99 11:17	ES	131102

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID MW 12 **Collected:** 12/9/99 4:10:00 **SPL Sample ID:** 99120268-09

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	ND		0.2		1		12/21/99 2:43	RR	138621
Surr: Pentacosane	71	%	20-131		1		12/21/99 2:43	RR	138621

Run ID/Seq #: HP_V_991215B-138621

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	0.21		0.1		1		12/11/99 22:39	D_R	128136
Surr: 1,4-Difluorobenzene	110	%	62-144		1		12/11/99 22:39	D_R	128136
Surr: 4-Bromofluorobenzene	110	%	44-153		1		12/11/99 22:39	D_R	128136
HEADSPACE GAS ANALYSIS				**MCL**	**RSK147**		**Units: mg/L**		
Ethane	ND		0.0025		1		12/27/99 14:02	DR	140237
Ethylene	ND		0.0032		1		12/27/99 14:02	DR	140237
Methane	ND		0.0012		1		12/27/99 14:02	DR	140237
NITROGEN, NITRATE (AS N)				**MCL**	**E300**		**Units: mg/L**		
Nitrogen,Nitrate (As N)	ND		0.1		1		12/10/99 11:47	ES	131136
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	64		1		1		12/11/99 22:39	D_R	128113
Ethylbenzene	ND		1		1		12/11/99 22:39	D_R	128113
Toluene	ND		1		1		12/11/99 22:39	D_R	128113
Xylenes,Total	ND		1		1		12/11/99 22:39	D_R	128113
Surr: 1,4-Difluorobenzene	100	%	72-137		1		12/11/99 22:39	D_R	128113
Surr: 4-Bromofluorobenzene	93	%	48-156		1		12/11/99 22:39	D_R	128113
SULFATE				**MCL**	**E300**		**Units: mg/L**		
Sulfate	180		4		20		12/13/99 11:17	ES	131103

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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

Client Sample ID MW 13 **Collected:** 12/9/99 4:40:00 **SPL Sample ID:** 99120268-10

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit	MCL	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS					SW8015B		Units: mg/L		
Diesel Range Organics	0.46		0.2		1		12/11/99 7:41	RR	129319
Surr: Pentacosane	49	%	20-131		1		12/11/99 7:41	RR	129319

Run ID/Seq #: HP_V_991211A-129319

Prep Method	Prep Date	Prep Initials
SW3510B	12/10/1999 12:25	KL

Analyses/Method	Result		Rep.Limit	MCL	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
GASOLINE RANGE ORGANICS					SW8015B		Units: mg/L		
Gasoline Range Organics	3.2		0.5		5		12/11/99 23:06	D_R	128137
Surr: 1,4-Difluorobenzene	120	%	62-144		5		12/11/99 23:06	D_R	128137
Surr: 4-Bromofluorobenzene	120	%	44-153		5		12/11/99 23:06	D_R	128137
PURGEABLE AROMATICS					SW8021B		Units: ug/L		
Benzene	430		5		5		12/11/99 23:06	D_R	128114
Ethylbenzene	410		5		5		12/11/99 23:06	D_R	128114
Toluene	16		5		5		12/11/99 23:06	D_R	128114
Xylenes,Total	40.9		5		5		12/11/99 23:06	D_R	128114
Surr: 1,4-Difluorobenzene	110	%	72-137		5		12/11/99 23:06	D_R	128114
Surr: 4-Bromofluorobenzene	99	%	48-156		5		12/11/99 23:06	D_R	128114

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Client Sample ID Dup | **Collected:** 12/9/99 | **SPL Sample ID:** 99120268-11

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Diesel Range Organics	1.9		0.2		1		12/22/99 17:23	RR	138626
Surr: Pentacosane	42	%	20-131		1		12/22/99 17:23	RR	138626

Run ID/Seq #: HP_V_991215B-138626

Prep Method	Prep Date	Prep Initials
SW3510B	12/12/1999 8:54	KL

GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	3.2		0.5		5		12/11/99 23:34	D_R	128138
Surr: 1,4-Difluorobenzene	120	%	62-144		5		12/11/99 23:34	D_R	128138
Surr: 4-Bromofluorobenzene	120	%	44-153		5		12/11/99 23:34	D_R	128138
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	460		5		5		12/11/99 23:34	D_R	128115
Ethylbenzene	420		5		5		12/11/99 23:34	D_R	128115
Toluene	12		5		5		12/11/99 23:34	D_R	128115
Xylenes,Total	34		5		5		12/11/99 23:34	D_R	128115
Surr: 1,4-Difluorobenzene	110	%	72-137		5		12/11/99 23:34	D_R	128115
Surr: 4-Bromofluorobenzene	110	%	48-156		5		12/11/99 23:34	D_R	128115

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID Trip Blank 12/1/99 **Collected:** 12/9/99 **SPL Sample ID:** 99120268-12

Site: BJ-Hobbs

Analyses/Method	Result		Rep.Limit		Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
GASOLINE RANGE ORGANICS				**MCL**	**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND		0.1		1		12/12/99 0:01	D_R	128139
Surr: 1,4-Difluorobenzene	94	%	62-144		1		12/12/99 0:01	D_R	128139
Surr: 4-Bromofluorobenzene	110	%	44-153		1		12/12/99 0:01	D_R	128139
PURGEABLE AROMATICS				**MCL**	**SW8021B**		**Units: ug/L**		
Benzene	ND		1		1		12/12/99 0:01	D_R	128116
Ethylbenzene	ND		1		1		12/12/99 0:01	D_R	128116
Toluene	ND		1		1		12/12/99 0:01	D_R	128116
Xylenes,Total	ND		1		1		12/12/99 0:01	D_R	128116
Surr: 1,4-Difluorobenzene	98	%	72-137		1		12/12/99 0:01	D_R	128116
Surr: 4-Bromofluorobenzene	100	%	48-156		1		12/12/99 0:01	D_R	128116

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

Quality Control Documentation

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Diesel Range Organics
Method: SW8015B

WorkOrder: 99120268
Lab Batch ID: 2068

Method Blank

RunID: HP_V_991211A-129298 Units: mg/L
Analysis Date: 12/11/1999 1:20 Analyst: RR
Preparation Date: 12/10/1999 12:25 Prep By: KL Method SW3510B

Samples In Analytical Batch:

Lab Sample ID	Client Sample ID
99120268-07B	MW 4
99120268-10B	MW 13

Analyte	Result	Rep Limit
Diesel Range Organics	ND	0.20
Surr: Pentacosane	73.6	20-131

Laboratory Control Sample (LCS)

RunID: HP_V_991211A-129309 Units: mg/L
Analysis Date: 12/11/1999 1:20 Analyst: RR
Preparation Date: 12/10/1999 12:25 Prep By: KL Method SW3510B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Diesel Range Organics	2.5	1.9	77	53	148

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99120165-01
RunID: HP_V_991211A-129301 Units: mg/L
Analysis Date: 12/11/1999 2:36 Analyst: RR
Preparation Date: 12/10/1999 12:25 Prep By: KL Method SW3510B

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Diesel Range Organics	ND	2.5	1.5	61.0	2.5	3	121	65.8*	39	21	175

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Diesel Range Organics
Method: SW8015B

WorkOrder: 99120268
Lab Batch ID: 2093

Method Blank

RunID: HP_V_991215B-132744 Units: mg/L
Analysis Date: 12/15/1999 5:47 Analyst: RR
Preparation Date: 12/12/1999 8:54 Prep By: KL Method SW3510B

Analyte	Result	Rep Limit
Diesel Range Organics	ND	0.20
Surr: Pentacosane	80.6	20-131

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99120268-01B	MW-7
99120268-02B	MW-5
99120268-03B	OW 4
99120268-04B	MW 12D
99120268-05B	MW 11A
99120268-06B	MW 3
99120268-08B	MW 10
99120268-09B	MW 12
99120268-11B	Dup

Laboratory Control Sample (LCS)

RunID: HP_V_991215B-132745 Units: mg/L
Analysis Date: 12/15/1999 6:25 Analyst: RR
Preparation Date: 12/12/1999 8:54 Prep By: KL Method SW3510B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Diesel Range Organics	2.5	2.3	93	53	148

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99120305-01
RunID: HP_V_991215B-132753 Units: mg/L
Analysis Date: 12/15/1999 12:08 Analyst: RR
Preparation Date: 12/12/1999 8:54 Prep By: KL Method SW3510B

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Diesel Range Organics	ND	5	1.6	32.1	5	1.4	27.7	14.8	39	21	175

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Headspace Gas Analysis
Method: RSK147
WorkOrder: 99120268
Lab Batch ID: R6641

Method Blank

RunID: VARH_991227A-140201 Units: mg/L
Analysis Date: 12/27/1999 10:46 Analyst: DR

Analyte	Result	Rep Limit
Ethane	ND	0.0025
Ethylene	ND	0.0032
Methane	ND	0.0012

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99120268-02C	MW-5
99120268-03C	OW 4
99120268-04C	MW 12D
99120268-05C	MW 11A
99120268-08C	MW 10
99120268-09C	MW 12

Sample Duplicate

Original Sample: 99120501-01
RunID: VARH_991227A-140202 Units: mg/L
Analysis Date: 12/27/1999 11:02 Analyst: DR

Analyte	Sample Result	DUP Result	RPD	RPD Limit
2-Methylpropane	ND	ND	0	50
Butane	ND	ND	0	50
Ethane	0.0032	0.0032	0	50
Ethylene	ND	ND	0	50
Methane	ND	ND	0	50
Propane	0.0041	0.0039	5	50
Propylene	ND	ND	0	50

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Purgeable Aromatics
Method: SW8021B

WorkOrder: 99120268
Lab Batch ID: R6008

Method Blank

RunID: VARE_991211A-128121 Units: ug/L
Analysis Date: 12/11/1999 12:34 Analyst: D_R

Analyte	Result	Rep Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
Xylenes,Total	ND	1.0
Surr: 1,4-Difluorobenzene	98.6	72-137
Surr: 4-Bromofluorobenzene	103.6	48-156

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99120268-01A	MW-7
99120268-02A	MW-5
99120268-03A	OW 4
99120268-04A	MW 12D
99120268-05A	MW 11A
99120268-06A	MW 3
99120268-07A	MW 4
99120268-08A	MW 10
99120268-09A	MW 12
99120268-10A	MW 13
99120268-11A	Dup
99120268-12A	Trip Blank 12/1/99

Laboratory Control Sample (LCS)

RunID: VARE_991211A-128099 Units: ug/L
Analysis Date: 12/11/1999 11:38 Analyst: D_R

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Benzene	50	54	108	61	119
Ethylbenzene	50	54	107	70	118
Toluene	50	55	110	65	125
Xylenes,Total	150	149	99	72	117

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99120268-02
RunID: VARE_991211A-128102 Units: ug/L
Analysis Date: 12/11/1999 15:19 Analyst: D_R

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Benzene	ND	20	21	107	20	20	97.8	8.91	21	32	164
thylbenzene	ND	20	19	97.3	20	18	88.4	9.60	19	52	142
oluene	ND	20	22	109	20	19	97.5	11.2	20	38	159
Xylenes,Total	ND	60	61	102	60	54	90.0	12.2	18	53	144

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Gasoline Range Organics
Method: SW8015B
WorkOrder: 99120268
Lab Batch ID: R6009

Method Blank

RunID: VARE_991211B-128124 Units: mg/L
Analysis Date: 12/11/1999 12:34 Analyst: D_R

Analyte	Result	Rep Limit
Gasoline Range Organics	ND	0.10
Surr: 1,4-Difluorobenzene	90.2	62-144
Surr: 4-Bromofluorobenzene	124.7	44-153

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99120268-01A	MW-7
99120268-02A	MW-5
99120268-03A	OW 4
99120268-04A	MW 12D
99120268-05A	MW 11A
99120268-06A	MW 3
99120268-07A	MW 4
99120268-08A	MW 10
99120268-09A	MW 12
99120268-10A	MW 13
99120268-11A	Dup
99120268-12A	Trip Blank 12/1/99

Laboratory Control Sample (LCS)

RunID: VARE_991211B-128123 Units: mg/L
Analysis Date: 12/11/1999 12:06 Analyst: D_R

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Gasoline Range Organics	1	1.1	107	64	131

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99120268-06
RunID: VARE_991211B-128125 Units: mg/L
Analysis Date: 12/11/1999 16:14 Analyst: D_R

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Gasoline Range Organics	ND	0.9	0.76	84.3	0.9	0.57	63.1	28.8	36	36	160

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Sulfate
Method: E300

WorkOrder: 99120268
Lab Batch ID: R6142A

Method Blank

RunID: WET_991213J-131074 Units: mg/L
Analysis Date: 12/13/1999 11:17 Analyst: ES

Analyte	Result	Rep Limit
Sulfate	ND	0.20

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99120268-02D	MW-5
99120268-03D	OW 4
99120268-04D	MW 12D
99120268-05D	MW 11A
99120268-08D	MW 10
99120268-09D	MW 12

Laboratory Control Sample (LCS)

RunID: WET_991213J-131075 Units: mg/L
Analysis Date: 12/13/1999 11:17 Analyst: ES

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Sulfate	10	9.8	98	90	110

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99120268-02
RunID: WET_991213J-131097 Units: mg/L
Analysis Date: 12/13/1999 11:17 Analyst: ES

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Sulfate	210	250	460	100	250	450	97.7	2.51	20	80	120

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Nitrogen, Nitrate (As N) **WorkOrder:** 99120268
Method: E300 **Lab Batch ID:** R6145

Method Blank

RunID: WET_991210R-131127 Units: mg/L
Analysis Date: 12/10/1999 11:47 Analyst: ES

Analyte	Result	Rep Limit
Nitrogen,Nitrate (As N)	ND	0.10

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99120268-02D	MW-5
99120268-03D	OW 4
99120268-04D	MW 12D
99120268-05D	MW 11A
99120268-08D	MW 10
99120268-09D	MW 12

Laboratory Control Sample (LCS)

RunID: WET_991210R-131128 Units: mg/L
Analysis Date: 12/10/1999 11:47 Analyst: ES

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Nitrogen,Nitrate (As N)	10	9.1	91	90	110

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99120268-02
RunID: WET_991210R-131130 Units: mg/L
Analysis Date: 12/10/1999 11:47 Analyst: ES

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
itrogen,Nitrate (As N)	4.2	10	14	96.8	10	14	96.5	0.321	20	86	115

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Recovery Unreportable due to Dilution

Chain of Custody

And

Sample Receipt Checklist

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 9912026 8 — 093156 — page 1 of ___

Client Name: Brown & Caldwell
Address/Phone: 1415 Louisiana #2500
Client Contact: Rick Rexroad 713 759-0999
Project Name: BJ - Hobbs
Project Number: 12 832.
Project Location: Hobbs - New Mexico
Invoice To: Rick Rexroad

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil SL=sludge O=other:)	bottle (P=plastic A=amber glass G=glass V=vial)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz)	pres. (1=HCl 2=HNO3 3=H2SO4 O=other:)	Number of Containers	Requested Analysis: BTEX 8021 B	TPH-D 8015	TPH-G 8015	RSK SOP 175/147 Methane/Ethane/Ethene	300.0 Nitrate/Sulfate				
* MW-7	12/09/99	1218		X	W	VA		1	5	X	X	X						
* MW-5		1305		X	W	VAP		1	9	X	X	X	X	X				
OWH		1340		X	W	VAP		1	9	X	X	X	X	X				
* MW 12 D		1420		X	W	VAP		1	9	X	X	X	X	X				
MW 11 A		1445		X	W	VAP		1	9	X	X	X	X	X			pH	
MW 3		1505		X	W	VA		1	5	X	X	X					12/10	
MW 4 (24-hour)		1525		X	W	VA		1	5	X	X	X						
MW 10		1550		X	W	VAP		1	9	X	X	X	X	X			NB	
MW 12		1610		X	W	VAP		1	9	X	X	X	X	X			RUSH	
MW 13 (24 Hour)		1640		X	W	VA		1	5	X	X	X						

Client/Consultant Remarks: MW 4 & MW 13 are 24-hr turnaround.
* MW-7, MW-5, & MW 12D - Amber Glass leaked HCl during pre-sample shipping; No Preserv!

Laboratory remarks:

Intact? ☐ Y ☐ N
Temp: 4

Requested TAT: 24hr ☒ (see NOR) 72hr ☐ 48hr ☐ Standard ☒ Other ☐ _____

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

Special Detection Limits (specify): 8143729529990 50

PM review (initial): BAF

	date	time
1. Relinquished by Sampler:	12/09/99	1745
2. Received by:		
3. Relinquished by:	date	time
4. Received by:		
5. Relinquished by:	date	time
6. Received by Laboratory:	12/10	1000

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☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775
☐ 459-Hughes Drive, Traverse City, MI 49684 (616) 947-5777

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 99120268 — 093155 — page 2 of 2

Client Name: Brown & Caldwell
Address/Phone: 1415 Louisiana #2500
Client Contact: Rick Rexroad 713 757 0999
Project Name: BJ-Hobbs
Project Number: 12832
Project Location: Hobbs, New Mexico
Invoice To: Rick Rexroad

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil SL=sludge O=other:)	bottle (P=plastic A=amber glass G=glass V=vial)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz)	pres. (1=HCl 2=HNO3 3=H2SO4 O=other:)	Number of Containers	Requested Analysis: BTEX 8021B	TPH-D 8015	TPH-G 8015
Dup	12/9/99	—		X	W	VA		1	5	X	X	X
Trip Blank	—	—		-	W	V		1	2	X	X	

Client/Consultant Remarks: MW4 & MW13 are 24-hr turnaround

Laboratory remarks:

Intact? ☐ Y ☐ N
Temp: 4

Requested TAT
24hr ☒ (See Note) 72hr ☐
48hr ☐ Standard ☒
Other ☐ _____

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

Special Detection Limits (specify):

PM review (initial): BAF

	date	time	
1. Relinquished by Sampler: Leslie Layne	12/09/99	1745	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date	time	6. Received by Laboratory: 12/10 1000

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Sample Receipt Checklist

Workorder:	99120268	Received by:	Stelly, D'Anna
Date and Time Received:	12/10/99 10:00:00 AM	Carrier name:	FedEx
Temperature:	4		

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Water - VOA vials have zero headspace?	Yes ☑	No ☐	Not Present ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	

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TRANSMITTAL MEMORANDUM

To: Wayne Price State of New Mexico Oil Conservation Division 2040 South Pacheco Street State Land Office Building Santa Fe, New Mexico 87505	Date: November 29, 1999 | Job No: 12832-014 Subject: Hobbs, New Mexico Facility Contract No.: Equipment No: Spec. Ref: Submittal No:

WE ARE SENDING: ☒ Attached ☐ Under separate cover via **Certified Mail** the following items:
☐ Shop Drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☒ Other: Groundwater Sampling Report

THESE ARE TRANSMITTED AS CHECKED BELOW:
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SUBMITTAL REVIEW ACTIONS:
- ☐ No exceptions taken
- ☐ Make revisions
- ☐ Amend and resubmit
- ☐ Rejected--see Remarks
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cc: Chris Williams, State of New Mexico
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Richard Rexroad

Richard Rexroad

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SEPTEMBER 1999 GROUNDWATER SAMPLING REPORT HOBBS, NEW MEXICO FACILITY

BJ SERVICES COMPANY, U.S.A.

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SEPTEMBER 1999 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: 12832.014

Richard L. Rexroad, P.G.
Principal Geologist

November 29, 1999

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Contents

CONTENTS

1.0 INTRODUCTION 1

2.0 FIELD ACTIVITIES AND RESULTS 2
2.1 Groundwater Measurements and Sampling 2
2.4 Results of Groundwater Analyses 3
2.5 Natural Attenuation Evaluation 5

3.0 REMEDIATION SYSTEM 9
3.1 System Installation and Effectiveness 9
3.2 Air Emissions 11

4.0 CONCLUSIONS AND RECOMMENDATIONS 13
4.1 Conclusions 13
4.2 Recommendations 13

DISTRIBUTION AND QA/QC REVIEWER'S SIGNATURE

FIGURES

1 Site Map
2 Groundwater Elevation Map for September 13-14, 1999
3 Benzene Isoconcentration and Total BTEX Distribution Map for September 13-14, 1999
4 Total Petroleum Hydrocarbons Distribution Map for September 13-14, 1999
5 Dissolved Benzene Mass vs. Time: West Plume

TABLES

1 Site Chronology
2 Cumulative Groundwater Elevation Data
3 Field Screening Results for Groundwater Samples
4 Cumulative Analytical Results for Groundwater Samples
5 Current and Historical Nitrate, Sulfate, and Dissolved Methane Data for Monitor Wells MW-5, MW-10, MW-11A, MW-12, MW-12D, and OW-4
6 Summary of Analytical Results for Air Emissions

APPENDICES

A Groundwater Sampling Forms
B Laboratory Analytical Reports for Groundwater Samples

1

1.0 INTRODUCTION

Brown and Caldwell conducted field activities associated with the September 1999 quarterly groundwater sampling event at the BJ Services Company, U.S.A. (BJ Services) facility located at 2708 West County Road in Hobbs, New Mexico on September 13-14, 1999. Groundwater samples collected from existing monitor wells at the facility in September 1999 were analyzed for the quarterly monitoring constituents specified in by the New Mexico Oil Conservation Division (NMOCD) in NMOCD Permit GW-072. Samples from selected wells were also analyzed for dissolved methane/ethylene/ethane, sulfate, and nitrate to evaluate the potential for natural attenuation of hydrocarbons at the facility. This report presents a description of the groundwater sampling field activities, a summary of the analytical results, and an evaluation of remedial technologies being applied at the facility.

The facility formerly operated an above-grade on-site fueling system. The facility layout is shown in Figure 1. Subsurface impact near a diesel fueling system was first detected by the NMOCD 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 NMOCD has required a quarterly groundwater monitoring program to assess the concentration of hydrocarbon constituents in groundwater. A biosparging system was activated in November 1995 to remediate soil and groundwater at the facility. A site chronology detailing the history of the fueling system, the soil and groundwater remediation system, and previous sampling events is presented in Table 1. Expansions of the biosparging system were performed in March/April 1997 and February/March 1998.

2.0 FIELD ACTIVITIES AND RESULTS

On September 13-14, 1999, Brown and Caldwell purged and sampled the groundwater monitor wells at and adjacent to the BJ Services Hobbs facility to determine concentrations of dissolved-phase hydrocarbons in groundwater. The locations of these wells are shown in the site map presented as Figure 1.

The following subsections describe the activities conducted by Brown and Caldwell at the BJ Services Hobbs facility in September 1999 and present the results of the groundwater analyses.

2.1 Groundwater Measurements and Sampling

Groundwater level measurements were obtained from the monitor wells prior to purging and sampling the wells. 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 in Table 2. The groundwater elevation data indicates that the general groundwater flow direction is to the east-northeast with a hydraulic gradient of approximately 0.006 foot/foot (ft/ft). A potentiometric surface map is presented in Figure 2.

Groundwater samples were collected after purging of the wells with a submersible pump was completed. Field parameter measurements for pH, conductivity, oxidation-reduction (redox) potential, dissolved oxygen (DO), and temperature were collected during and upon completion of well purging. In addition to using these parameters as indicators of stability of produced groundwater, they are also important for evaluating the potential for natural attenuation of dissolved phase hydrocarbons at the facility. Ferrous iron and alkalinity were also measured during the purging and sampling activities to assess natural attenuation potential.

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 sampling event are presented in Table 3.

The groundwater samples were collected directly after completion of purging operations through the submersible pump discharge. 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.

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 water. Purge water generated from the monitor wells was discharged to the on-site water reclamation system for re-use for other purposes by BJ Services.

2.2 Results of Groundwater Analyses

Groundwater samples collected during this sampling event were analyzed for diesel- and gasoline-range total petroleum hydrocarbons (TPH-D and TPH-G) by EPA Method 8015 Modified and for benzene, toluene, ethylbenzene, and xylene (BTEX) by EPA Method 8021B. The laboratory analytical reports and chain-of-custody records for the groundwater samples collected during the September 1999 field activities are included in Appendix B.

Current and cumulative analytical results for BTEX, TPH-D, and TPH-G are presented in Table 4. Six monitor wells (MW-5, MW-10, MW-11A, MW-12, MW-12D and OW-4) were sampled for methane/ethylene/ethane, nitrate, and sulfate to evaluate natural attenuation processes. The results of these analyses are presented in Table 5.

BTEX constituent concentrations in excess of applicable laboratory detection limits were reported in only four of the 13 groundwater samples collected during this sampling event. Benzene concentrations were at or below the New Mexico Water Quality Control Commission (WQCC) standard of 0.01 milligrams per liter (mg/L) in all monitor wells except MW-12 and MW-13. Figure 3 presents a benzene isoconcentration and total BTEX distribution map for the September 1999 sampling event.

Benzene concentrations in monitor wells MW-1, MW-3, and MW-4, which are located near the former source area, have continued to decrease since the modification of the biosparging system in February/March 1998. Benzene was not detected in any of these wells during the September 1999 sampling event. Benzene concentrations in a nearby off-site monitor well, MW-9, have not exceeded 0.01 mg/L since March 1997. Benzene has not been detected in monitor wells MW-1 or MW-9 since September 1998.

The decrease in benzene concentration from 0.075 mg/L in monitor well MW-12 (screened at a depth of 50 feet to 65 feet bgs) to less than 0.001 mg/L in monitor well MW-12D (screened at a depth of 77.5 feet to 87.5 feet bgs) suggests that benzene impact to groundwater, where present, is limited vertically to the uppermost portion of the aquifer. A similar vertical gradient in benzene concentration at the MW-12/MW-12D location was observed during the June/July 1999 sampling event at the facility.

Benzene was detected at a concentration of 1.5 mg/L in a groundwater sample collected from monitor well MW-13 on July 2, 1999. Adjustments to the biosparging system were made on July 14, 1999 to increase air flow to biosparging system Lateral No. 1, located in the eastern portion of the plume associated with the former fueling system (i.e., the western plume). Well construction details for the air injection portion of air injection/extraction wells AV-16 through AV-19 that comprise Lateral No.1, located in the downgradient area of the western plume, are as follows:

Well	Screened Interval (ft below grade)	Screened Interval (ft above MSL)	Top of Filter Pack (ft below grade)	Top of Filter Pack (ft above MSL)
AV-16	58.8-61.3	3585.4-3582.9	55.5	3588.7
AV-17	58-60.5	3586.2-3583.7	55.7	3588.5
AV-18	58-60.5	3586.2-3583.7	52.2	3592.0
AV-19	57.9-60.4	3586.3-3583.8	53.2	3591.0

At the time of the installation of the biosparging system in November 1995, the depth to groundwater in monitor wells MW-1, MW-6, MW-7, and MW-8, which are located in the vicinity

of air injection/extraction wells AV-16 through AV-19, ranged from approximately 51.2 to 52.0 feet below grade (i.e., 3593.07 to 3593.84 feet above mean sea level). The depths of submergence of the top of the filter pack surrounding the air injection screened interval of wells AV-16 through AV-19 therefore ranged from approximately 1 to 5 feet below the top of the saturated zone at the time that these wells were installed. Groundwater elevations have declined since November 1995, however, as documented in the June/July 1999 Quarterly Sampling Report for the BJ Services Hobbs, New Mexico Facility (Brown and Caldwell, 1999). Based on data from monitor wells MW-1, MW-7, MW-8, and MW-13 collected on July 2, 1999 (see Table 2), the depths of submergence of the top of the filter pack surrounding the air injection screened interval of wells AV-16 through AV-19 ranged from approximately 2.9 feet above to 0.6 feet below the top of the saturated zone at that time. Therefore, in addition to increasing air flow to Lateral No. 1, air flow was shut off to wells non-submerged wells AV-18 and AV-19, so that all of the air directed to Lateral No.1 would be injected through wells AV-16 and AV-17, which remained submerged.

These adjustments resulted in a decrease in the concentration of benzene in monitor well MW-13 from 1.5 mg/L on July 2, 1999 to 0.860 mg/L on September 14, 1999 and a decrease in total BTEX concentration from 2.331 mg/L to 1.360 mg/L in this well over that time period, a decline of approximately 42% for both of these parameters.

A total petroleum hydrocarbon distribution map for the September 1999 sampling event is presented in Figure 4. Concentrations of TPH-G and/or TPH-D decreased relative to June/July 1999 concentrations or remained at non-detectable levels in all wells except MW-12 during the September 1999 sampling event. In monitor well MW-12, TPH-D dropped from 0.22 mg/L to less than 0.20 mg/L between June 1999 and September 1999, but the TPH-G concentration increased from 0.13 mg/L to 0.23 mg/L during this time period.

2.3 Natural Attenuation Evaluation

Natural attenuation is planned to be the primary remediation mechanism for the dissolved-phase hydrocarbon plume located in the area of the former field waste tanks (see Figure 1).

The primary evidence of natural attenuation is plume behavior. Natural attenuation of hydrocarbons is occurring at a rate greater than hydrocarbon loading from the source area when a hydrocarbon plume is decreasing in size or concentration. Conversely, increases in size or hydrocarbon concentrations of a plume indicate that rates of hydrocarbon loading exceed the natural attenuation capacity in the area. Concentrations of total dissolved-phase BTEX stabilized at concentrations generally less than 100 mg/L subsequent to removal of the field waste tanks in March 1997. Dissolved-phase BTEX concentrations in former field waste tanks area monitor wells MW-10 and MW-11A have displayed continuous decreases from September 1998 to the present. Monitor well MW-12 also displayed a decrease in BTEX concentration between September 1998 and June 1999. The increase in BTEX concentration in monitor well MW-12 between June 1999 and September 1999 may be attributed to sporadic loading from the vadose zone in excess of the natural attenuation capacity of the area.

Secondary evidence of natural attenuation can be obtained by the collection and evaluation of data relating to the concentrations of indigenous electron acceptors such as dissolved oxygen (DO), nitrate, ferric iron, sulfate, and carbon dioxide. The following lines of geochemical evidence suggest that intrinsic bioremediation (an important natural attenuation mechanism) of dissolved-phase hydrocarbons is occurring in the area of the former field waste tanks:

1. Dissolved oxygen (DO) is utilized during intrinsic bioremediation. DO concentrations should therefore be depressed in areas where intrinsic bioremediation is occurring.

   Monitor well MW-12 contains the highest hydrocarbon concentrations observed in the eastern plume (i.e., in the former field waste tanks area). The DO concentration measured in monitor well MW-12 is depressed relative to monitor wells MW-10 and MW-11A, which are located at the fringe of the eastern plume and display lower to non-detectable hydrocarbon concentrations.

   A similar phenomenon was observed in the western plume. The DO concentration measured in monitor well MW-13, which contains the highest hydrocarbon concentrations observed in the western plume, is depressed relative to DO concentrations observed in other monitor wells located in the vicinity of the western plume.

The DO concentrations measured at the facility therefore provide secondary evidence that natural attenuation of hydrocarbons is occurring at the facility.

2. Nitrate may be utilized as an electron acceptor during intrinsic bioremediation after dissolved oxygen is depleted. Therefore, nitrate concentrations may be depressed in areas where intrinsic bioremediation is occurring.

   Nitrate concentrations were measured at less than 0.1 mg/L in monitor wells MW-10, MW-12, and MW-12D and at 0.22 mg/L in monitor well MW-11A. These concentrations are less than the background nitrate concentration of 4.3 mg/L measured in monitor well MW-5 (see Table 5). The decreased nitrate concentrations in monitor wells MW-10, MW-11A, MW-12, and MW-12D provide secondary evidence that natural attenuation of hydrocarbons is occurring at the facility.

   No BTEX constituents were detected in downgradient well OW-4. The nitrate concentration of 3.5 mg/L in OW-4 is comparable to the nitrate concentration of 4.3 mg/L observed in background in well MW-5. The combination of non-detectable BTEX concentration and nitrate concentration near that of background in downgradient well OW-4 supports the contention that the decreased nitrate concentrations observed in monitor wells MW-10, MW-11A, MW-12, and MW-12D reflects natural attenuation of hydrocarbons in this area rather than a simple eastward decrease in nitrate content of groundwater at the facility.

3. When DO and nitrate are depleted, anaerobic microbes that utilize other electron acceptors become active. Ferrous iron is the reduction product of ferric iron, a common electron acceptor. Therefore, ferrous iron concentrations should increase in areas where intrinsic bioremediation is occurring. Ferrous iron was measured at concentrations ranging from 6 mg/L to 8 mg/L in monitor wells MW-10, MW-11A, and MW-12 (see Table 3). Ferrous iron was not detected in the background wells at the facility (MW-5, MW-7, and MW-8).

   The elevated ferrous iron concentration in monitor wells MW-10, MW-11A, and MW-12 provides secondary evidence that natural attenuation of hydrocarbons is occurring at the former field waste tanks area.

4. Redox is a measure of chemical energy in groundwater. Redox values in the vicinity of background wells MW-5, MW-7, and MW-8 ranged from 241.1 millivolts (mV) to 269.2 mV (see Table 3). Redox values in the vicinity of former field waste tanks area wells MW-10, MW-11A, and MW-12 ranged from 30.2 mV to –118.7 mV. The predominantly negative redox values in monitor wells MW-10, MW-11A, and MW-12 indicate that electron acceptors other than dissolved oxygen and nitrate (e.g., ferric iron) are being utilized in these areas.

5. Methane is a reaction product generated during utilization of carbon dioxide as an electron acceptor, and its concentration should therefore increase in areas where depletion of dissolved oxygen, nitrate, and ferric iron has occurred.

   The concentration of methane is elevated in former field waste tanks area well MW-10 relative to the methane concentrations in background well MW-5 and downgradient well OW-4 (see Table 5), suggesting that utilization of carbon dioxide may be occurring locally in the area of the former field waste tanks.

6. Fatty acids are formed as hydrocarbons degrade. These fatty acids may dissolve carbonates in saturated zone soils, causing alkalinity to increase where biodegradation is occurring. The alkalinity data generated during the September 1999 groundwater sampling event may also provide evidence that natural attenuation of hydrocarbons is occurring. Former field waste tanks area monitor wells MW-10, MW-11A, and MW-12 displayed elevated alkalinity levels relative to all wells at the facility, suggesting that natural attenuation of hydrocarbons is occurring in the vicinity of these wells.

The sulfate data presented in Table 5 displays no discernable trend, indicating that sulfate in not being utilized during intrinsic bioremediation.

Therefore, it appears that DO, nitrate, and ferric iron are supplying adequate electron acceptors to facilitate natural attenuation. In addition, carbon dioxide may be acting as an electron acceptor in the vicinity of monitor well MW-10, as indicated by an elevated dissolved methane concentration in that well.

It is recommended that monitoring for natural attenuation evaluation parameters continue in the former field waste tanks area wells, downgradient well OW-4, and in background monitor well MW-5.

3.0 REMEDIATION SYSTEM

Brown and Caldwell submitted a Remedial Action Plan (RAP) to the NMOCD 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 volatile and semivolatile 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 and semivolatile 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 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 air also strips volatile and semivolatile contaminants.

3.1 System Installation and Effectiveness

The NMOCD approved the RAP on August 11, 1994. Installation activities for the biosparging system were conducted August 2 through 24, 1995. Nineteen combined injection and extraction wells, three vacuum extraction wells, associated piping, 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. Five additional injection wells, AI-20 through AI-24, were installed in February 1998. Injection wells AI-20 through AI-24 were installed at locations near the center of the plume associated with the former fueling system. These injection wells were constructed such that a 10-foot screen submergence was achieved, thereby providing treatment to an expanded vertical interval of the aquifer in that area. Injection wells AI-20 through AI-24 are supplied by a separate blower than the one used to supply injection wells AI-1 through AI-19 in order to avoid short-circuiting to wells with less screen submergence. Three additional vapor extraction wells, VE-5 through VE-7, were also installed in February 1998. The new injection and

extraction wells were brought on-line on March 10, 1998, and operation of injection wells AI-1 through AI-19, which had been suspended on February 19, 1998, was resumed on March 24, 1998.

Benzene, TPH, and total BTEX concentrations measured in monitor well MW-1 during the September 1999 groundwater sampling event display a decline relative to concentrations of these parameters prior to installation of injection wells AI-20 through AI-24 in February 1998. Benzene concentrations dropped from 7.6 mg/L in December 1997 to less than 0.001 mg/L during the December 1998 through September 1999 sampling events. Total BTEX concentrations have dropped from 30.6 mg/L to non-detectable levels between December 1997 and September 1999. TPH concentrations in MW-1 decreased from 82 mg/L to non-detectable levels during this time period.

Benzene concentrations have decreased from 0.240 mg/L in monitor well MW-3 and 0.230 mg/L in monitor well MW-4 to less than 0.001 mg/L in both wells between December 1997 and September 1999. Similarly, total BTEX concentrations have decreased from 1.930 mg/L to non-detectable levels in monitor well MW-3 and from 4.250 mg/L to 0.016 mg/L in monitor well MW-4 between December 1997 and September 1999. TPH concentrations in monitor well MW-3 dropped from 5.89 mg/L to non-detectable levels during this time period, and TPH concentrations in MW-4 have declined from 19.7 mg/L to 0.52 mg/L. These decreases are attributable to increased air flow being applied to the aquifer through air injection wells AI-20 through AI-24.

Similarly, the application of increased air flow to Lateral No. 1 injection wells AV-16 and AV-17 in mid-July 1999 resulted in a substantial decrease in the concentrations of benzene and total BTEX in monitor well MW-13 between July 2, 1999 and on September 14, 1999.

A graph showing the calculated dissolved-phase benzene mass in the western plume versus time is presented in Figure 5. This graph shows that the plume mass was increasing up until December 1995, when the biosparging system was installed. This increase was probably due to benzene loading to groundwater from vadose zone soils. The benzene mass then decreased

steadily after installation of the biosparging system. The plume mass has continued to decrease since the system modifications were implemented in February 1998. This indicates that the system modifications have been effective in increasing benzene removal from groundwater in the center of the former western plume area.

3.2 Air Emissions

The vapors recovered during the extraction process are discharged to the atmosphere in accordance with the State of New Mexico Air Quality Regulations. Following initial 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 was not required, effluent air samples were collected and analyzed voluntarily on a quarterly basis through July 1997. 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 demonstrated a significant reduction in hydrocarbon vapor concentrations and emissions rates between November 1995 and July 1997. Total BTEX concentrations decreased from 391 parts per million by volume (ppmv) in November 1995 to 17.3 ppmv in July 1997. The corresponding BTEX emissions decreased from 0.77 lb/hour to 0.03 lb/hour. TPH concentrations decreased from 1,870 ppmv in November 1995 to 65 ppmv in July 1997. The corresponding TPH - Volatile Organic Compound (VOC) emissions rate 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, use of a field monitoring instrument utilizing a flame ionization detector (FID) to measure the VOC concentration in the vapors commenced in September 1997. The VOC measurements collected using the FID correspond to TPH concentrations previously determined in the analytical laboratory. The VOC concentration measured using the FID during the September 1999 sampling event was 12.5 parts per million by volume (ppmv).

The TPH concentration of 12.5 ppmv measured during the September 1999 sampling event shows a substantial drop from the 1500 ppmv TPH discharge rate observed during the March 24, 1998 groundwater sampling event. The September 1999 TPH discharge rate of 12.5 ppmv is comparable to TPH concentrations measured during the time period from August 1996 through December 1997, prior to the system modifications performed in February and March 1998. The increased TPH concentration observed in the March 1998 event relative to the time period from August 1997 through December 1997 is believed to be a result of the addition of air injection wells AI-20 through AI-24 to the biosparging system. However, discharge rates have returned to more typical levels during the period from June 1998 through September 1999.

The VOC emissions rate calculated for the September 1999 groundwater sampling event was 0.02 pound per hour (lb/hour). This emission rate is below the regulatory limit of 10 lb/hour for VOCs. The September 1999 VOC emissions rate is typical of VOC emissions rates during the time period of August 1996 through December 1997, and represents a substantial drop from the 1.91 lb/hour VOC emissions rate calculated for the March 1998 sampling event. Discharge rates have varied between 0.02 lb/hour and 0.33 lb/hour during the time period of June 1998 through September 1999.

A cumulative summary of analytical results for air emissions monitoring is included in Table 6. These results are based on both laboratory and field analyses.

The initial increase in mass transfer rates after system modification was indicative of increased stripping of hydrocarbons within soil and groundwater from pathways that were not in contact with injected air prior to the system modification. The subsequent decrease in mass transfer, in concert with plume mass calculations shown in Figure 5, indicate that the overall contaminant mass has been reduced by operation of the biosparging system.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on information obtained during the September 1999 groundwater sampling event at the BJ Services Hobbs, New Mexico facility.

4.1 Conclusions

- Groundwater flow was to the east-northeast at an average hydraulic gradient of 0.006 ft/ft.
- Dissolved benzene, BTEX, and TPH concentrations in monitor wells MW-1, MW-3 and MW-4, which are located at the former fueling system area, continued to decline and are below applicable standards.
- Benzene concentrations in all monitor wells at the facility except MW-12 and MW-13 are at or below the New Mexico WQCC standard of 0.01 mg/L for benzene.
- Increases in air flow rates to biosparge injection wells AI-16 and AI-17 have resulted in substantially decreased benzene and total BTEX concentrations in monitor well MW-13 between July 2, 1999 and September 14, 1999.
- No BTEX or TPH constituents have been detected in monitor well MW-12D, which is screened at a depth of approximately 20 to 30 feet below the top of the uppermost aquifer at the facility. Comparison of this data to BTEX and TPH concentrations in adjacent monitor well MW-12, which is screened in the uppermost portion of the aquifer, suggests that hydrocarbon impact to groundwater, where present at the facility, is limited to the uppermost portion of the aquifer.
- Natural attenuation processes appear to be occurring to reduce hydrocarbon concentrations in monitor wells MW-10 and MW-11A, which are located in the vicinity of the former field waste tanks that were removed in March 1997.

4.2 Recommendations

- Maintain the increased air injection rate to wells AV-16 and AV-17 in the easternmost lateral of the biosparging system in order to exert optimal remedial pressure in the recalcitrant eastern area of the west plume.
- 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.

- Continue monitoring for natural attenuation parameters in monitor wells MW-5, MW-10, MW-11A, MW-12, MW-12D, and OW-4.

- Convert from quarterly monitoring to annual monitoring for monitor wells MW-1, MW-8, and MW-9. Benzene concentrations in monitor wells MW-1 and MW-9 have not exceeded the New Mexico WQCC benzene standard of 0.01 mg/L for five and ten quarters, respectively; benzene has not been detected in monitor well MW-8 since August 1995.

DISTRIBUTION

September 1999 Groundwater Sampling Report
BJ Services Company, U.S.A.
Hobbs, New Mexico

November 29, 1999

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Robert N. Jennings, P.E.
Vice President

RLR/uak/srd

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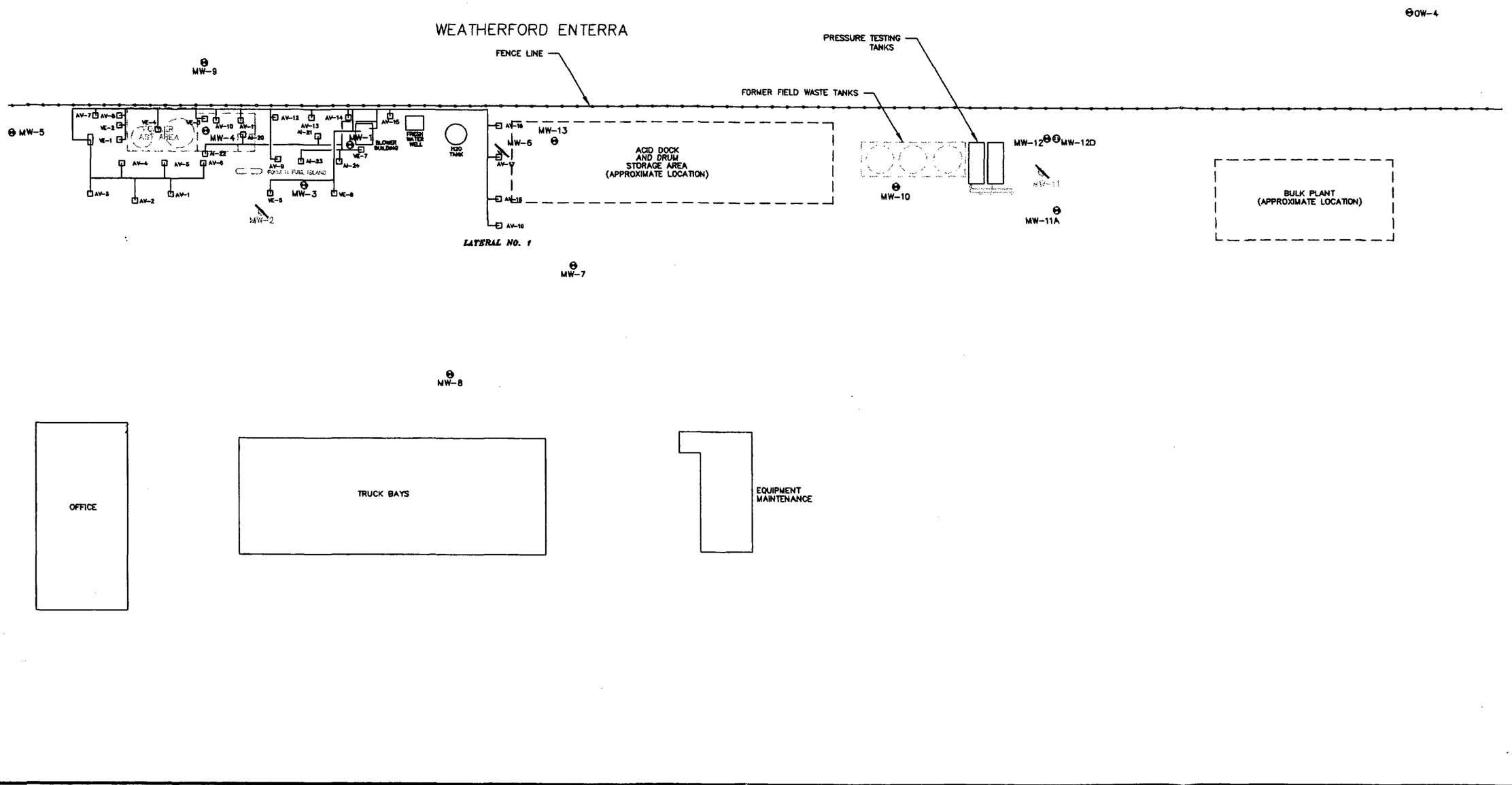
Figures

FIGURES



P:\12832\PMWLocations.dwg 03-16-99 CLK

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 30 60
SCALE: 1" = 60'
DRAWN BY: ____ DATE ____
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

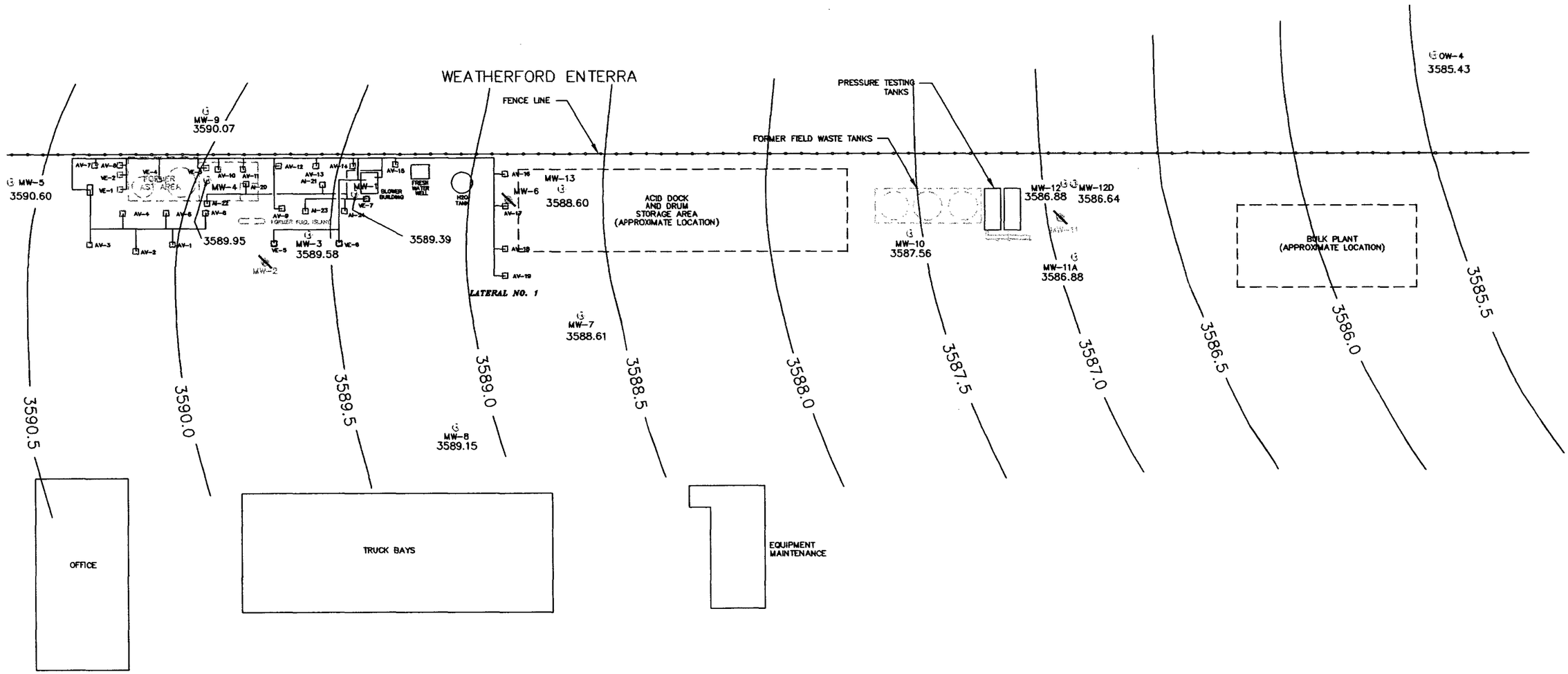
LEGEND

MW-3 EXISTING MONITOR WELL LOCATION

BIOSPARGING SYSTEM

MW-2 MONITOR WELL (PLUGGED AND ABANDONED)

TITLE: SITE MAP	DATE: 03/16/99
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 12832.021
SITE: HOBBS, NEW MEXICO	FIGURE NUMBER: 1



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BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 30 60
SCALE: 1" = 60'
DRAWN BY: ____ DATE ____
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

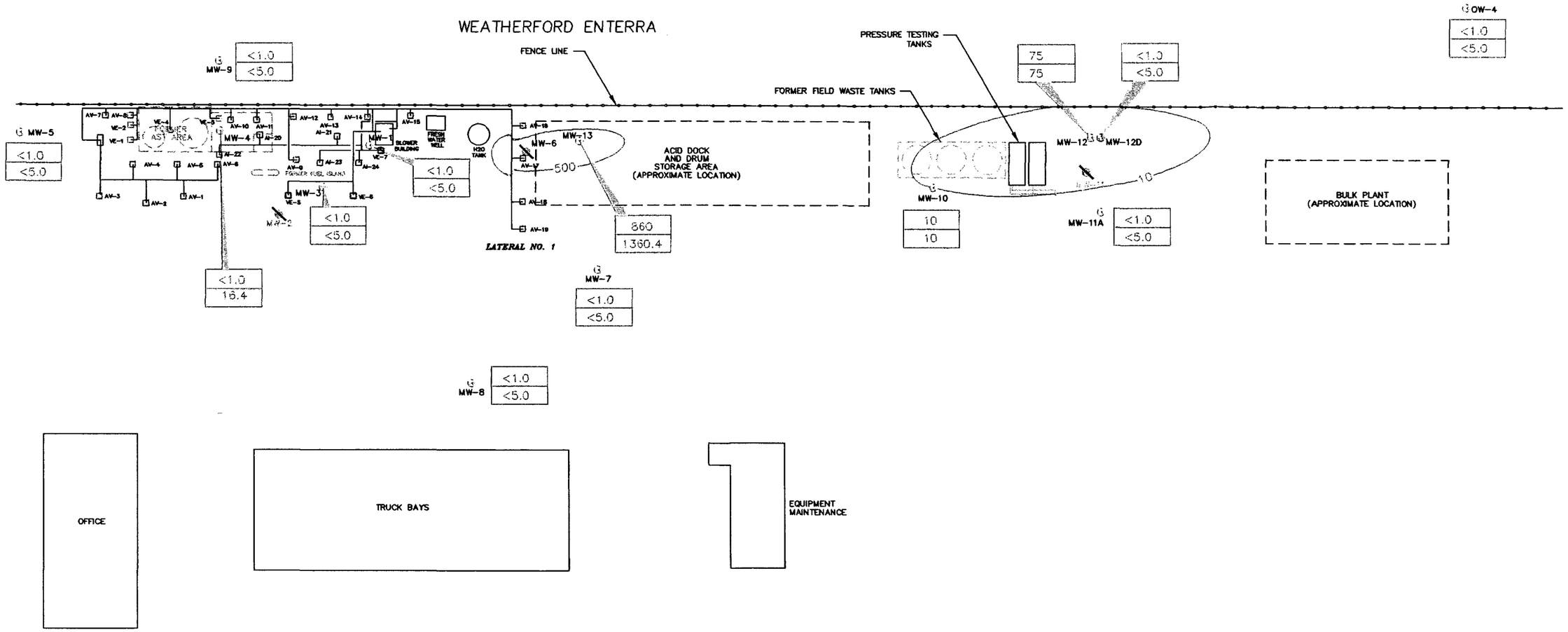
LEGEND

3589.58 MW-3 — MONITOR WELL LOCATION WITH GROUNDWATER ELEVATION (feet AMSL)

BIOSPARGING SYSTEM

MW-2 — MONITOR WELL (PLUGGED AND ABANDONED)

TITLE: GROUNDWATER ELEVATION MAP FOR SEPTEMBER 13–14, 1999	DATE: 07/22/99
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 12832.021
SITE: HOBBS, NEW MEXICO	FIGURE NUMBER: 2



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BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

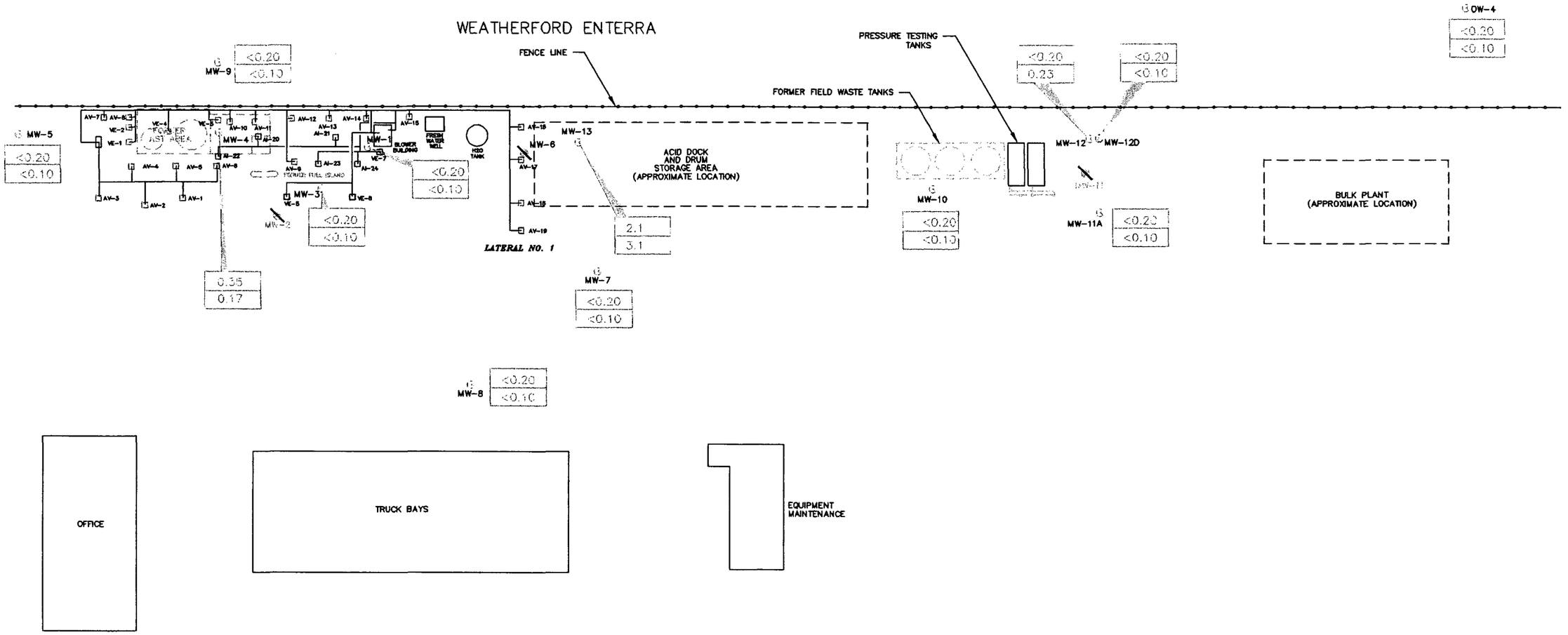
APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 30 60
SCALE: 1" = 60'
DRAWN BY: ____ DATE ____
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

LEGEND

- MW-3 — EXISTING MONITOR WELL LOCATION
- MW-2 — MONITOR WELL (PLUGGED AND ABANDONED)
- <1.0 / <5.0 — BENZENE CONCENTRATION (ug/L) / TOTAL BTEX CONCENTRATION (ug/L)
- BIOSPARGING SYSTEM
- BENZENE ISOCONCENTRATION CONTOUR (ug/L)

TITLE	BENZENE ISOCONCENTRATION AND TOTAL BTEX DISTRIBUTION MAP FOR SEPTEMBER 13-14, 1999
CLIENT	BJ SERVICES COMPANY, U.S.A.
SITE	HOBBS, NEW MEXICO
DATE	07/07/99
PROJECT NUMBER	12832.014
FIGURE NUMBER	3



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BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 30 60
SCALE: 1" = 60'

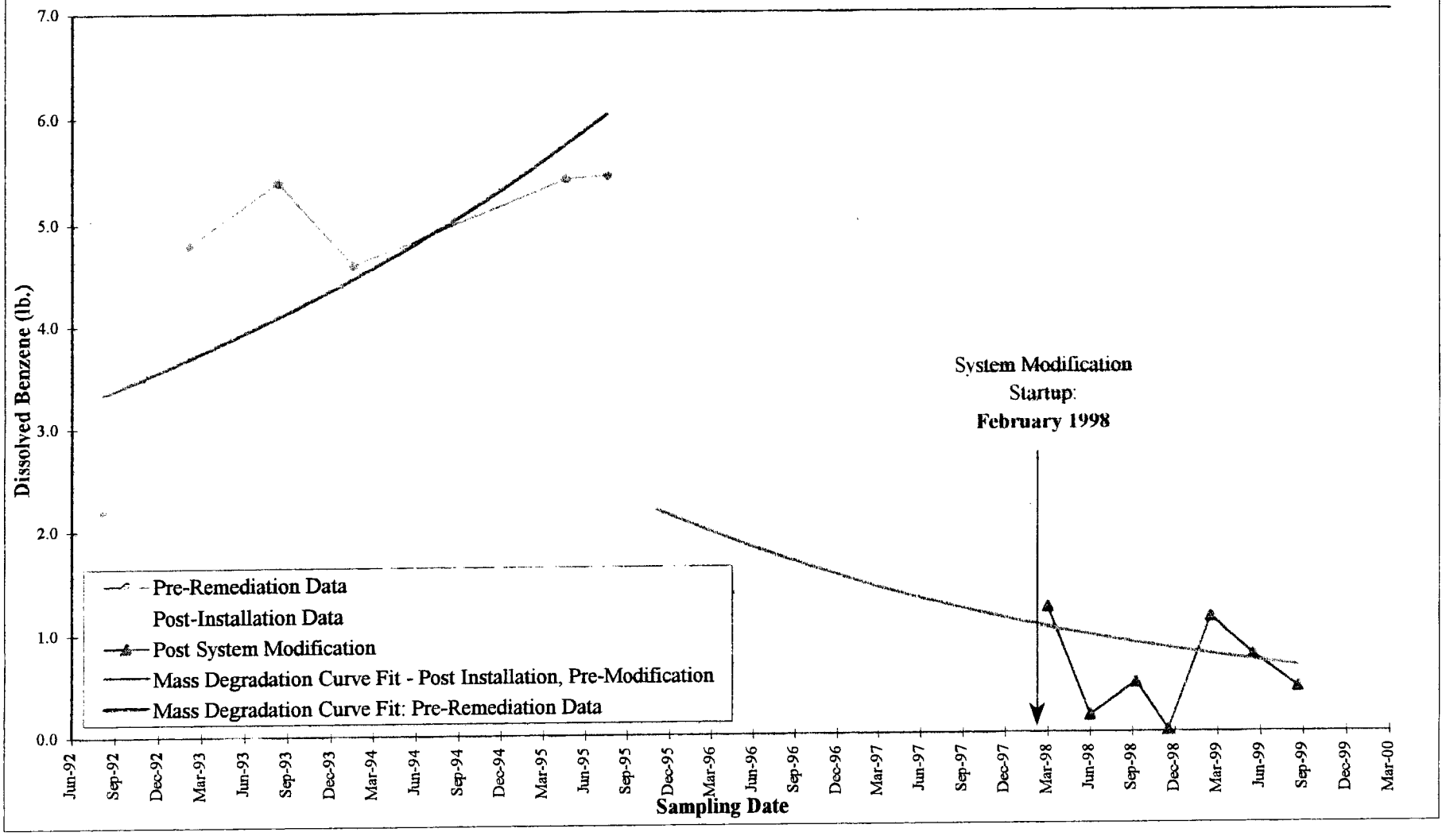
DRAWN BY: ____ DATE ____
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

LEGEND

MW-3 EXISTING MONITOR WELL LOCATION
MW-2 MONITOR WELL (PLUGGED AND ABANDONED)
BIOSPARGING SYSTEM
<0.2 – TPH-D CONCENTRATION (mg/L)
<0.. – TPH-G CONCENTRATION (mg/L)

TITLE	TOTAL PETROLEUM HYDROCARBONS DISTRIBUTION MAP FOR SEPTEMBER 13-14, 1999
DATE	07/22/99
CLIENT	BJ SERVICES COMPANY, U.S.A.
PROJECT NUMBER	12832.014
SITE	HOBBS, NEW MEXICO
FIGURE NUMBER	4

FIGURE 5
Dissolved Benzene Mass vs. Time
West Plume
BJ Services - Hobbs, New Mexico



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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 Chronology
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 6-7, 1997	BJ Services removed the field waste tank and associated hydrocarbon impacted soil.
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.
February 3-14, 1998	Air injection wells AI-20 through AI-24, vapor extraction wells VE-5 though VE-7 and monitor wells MW-11A and MW-12 were installed.
February 19, 1998	Operation of previously existing injection wells suspended in preparation for start-up of injection wells AI-20 through AI-24.
March 10, 1998	Operation of air injection wells AI-20 through AI-24 commenced.
March 23-24, 1998	Brown and Caldwell conducted the March 1998 groundwater sampling event.
March 24, 1998	Operation of previously existing injection wells resumed.
June 23, 1998	Brown and Caldwell conducted the June 1998 groundwater sampling event.
September 30, 1998	Brown and Caldwell conducted the September 1998 groundwater sampling event.
December 9-10, 1998	Brown and Caldwell conducted the December 1998 groundwater sampling event.
January 21, 1999	NMOCD requested submittal of a work plan by March 22, 1999 to perform additional groundwater delineation in the area of the former field waste tanks and the former AST/MW-6 area.

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

Date	Activity
March 9-10, 1999	Brown and Caldwell conducted the March 1999 groundwater sampling event.
March 19, 1999	Brown and Caldwell submitted the work plan for groundwater delineation activities that was requested on January 22, 1999 to NMOCD.
May 19, 1999	NMOCD approved the groundwater delineation work plan.
June10, 1999	Brown and Caldwell performed sampling of existing monitor wells for the June /July 1999 groundwater sampling event.
July 2, 1999	Brown and Caldwell completed plugging and abandonment of monitor wells MW-2, MW-6, and MW-11; installed and developed monitor wells MW-12D and MW-13; and sampled monitor wells MW-12D and MW-13 to complete the June/July 1999 groundwater sampling event.
July 14, 1999	Brown and Caldwell redirected air discharge from the shallow well injection system to Lateral No. 1 and optimized air flow to injection wells AI-16 and AI-17 to apply increased remedial pressure to the eastern potion of the west plume.
September 13-14, 1999	Brown and Caldwell conducted the September 1999 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
	3,647.53	3/24/98	55.81	0.00	3,591.72	PSH Sheen
	3,647.53	6/23/98	56.38	0.06	3,591.20	
	3,647.53	9/30/98	56.82	0.00	3,590.71	PSH Sheen
	3,647.53	12/9/98	57.05	0.00	3,590.48	
	3,647.53	3/10/99	57.45	0.00	3,590.08	
	3,647.53	6/10/99	58.02	0.00	3,589.51	
	3,647.53	7/2/99	57.90	0.00	3,589.63	
	3,647.53	9/14/99	58.14	0.00	3,589.39	
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),(5)

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	
	3,645.00	3/23/98	53.22	0.00	3,591.78	
	3,645.00	6/23/98	53.66	0.00	3,591.34	
	3,645.00	9/30/98	54.06	0.00	3,590.94	
	3,645.00	12/9/98	54.36	0.00	3,590.64	
	3,645.00	3/10/99	54.72	0.00	3,590.28	
	3,645.00	6/10/99	55.17	0.00	3,589.83	
	3,645.00	7/2/99	55.15	0.00	3,589.85	
	3,645.00	9/14/99	55.42	0.00	3,589.58	

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	
	3,645.28	12/10/97	52.89	0.00	3,592.39	PSH Sheen
	3,645.28	3/24/98	53.20	0.25	3,592.29	
	3,645.28	6/23/98	53.82	0.22	3,591.64	
	3,645.28	9/30/98	53.96	0.00	3,591.32	200 ml PSH
	3,645.28	12/9/98	54.27	0.00	3,591.01	
	3,645.28	3/10/99	54.69	0.04	3,590.62	
	3,645.28	6/10/99	55.07	0.00	3,590.21	
	3,645.28	7/2/99	55.10	0.00	3,590.18	
	3,645.28	9/14/99	55.33	0.00	3,589.95	

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	
	3,647.72	12/10/97	54.66	0.00	3,593.06	
	3,647.72	3/23/98	55.05	0.00	3,592.67	
	3,647.72	6/23/98	55.44	0.00	3,592.28	
	3,647.72	9/30/98	55.65	0.00	3,592.07	
	3,647.72	12/9/98	56.00	0.00	3,591.72	
	3,647.72	3/9/99	56.45	0.00	3,591.27	
	3,647.72	6/10/99	56.91	0.00	3,590.81	
	3,647.72	7/2/99	56.93	0.00	3,590.79	
	3,647.72	9/14/99	57.12	0.00	3,590.60	

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	
	3,644.74	12/10/97	53.27	0.00	3,591.47	
	3,644.74	3/23/98	53.56	0.00	3,591.18	
	3,644.74	6/23/98	52.88	0.00	3,591.86	
	3,644.74	9/30/98	54.89	0.00	3,589.85	
	3,644.74	12/9/98	54.57	0.00	3,590.17	
	3,644.74	3/10/99	55.10	0.00	3,589.64	
		7/2/99				(5)

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	
	3,644.55	3/23/98	53.59	0.00	3,590.96	
	3,644.55	6/23/98	54.20	0.00	3,590.35	
	3,644.55	9/30/98	54.54	0.00	3,590.01	
	3,644.55	12/9/98	54.74	0.00	3,589.81	
	3,644.55	3/9/99	55.15	0.00	3,589.40	
	3,644.55	6/10/99	55.66	0.00	3,588.89	
	3,644.55	7/2/99	55.73	0.00	3,588.82	
	3,644.55	9/13/99	55.94	0.00	3,588.61	

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	
	3,644.87	12/10/97	53.15	0.00	3,591.72	
	3,644.87	3/23/98	53.51	0.00	3,591.36	
	3,644.87	6/23/98	54.01	0.00	3,590.86	
	3,644.87	9/30/98	54.35	0.00	3,590.52	
	3,644.87	12/9/98	54.60	0.00	3,590.27	
	3,644.87	3/9/99	55.00	0.00	3,589.87	
	3,644.87	6/10/99	55.56	0.00	3,589.31	
	3,644.87	7/2/99	55.57	0.00	3,589.30	
	3,644.87	9/13/99	55.72	0.00	3,589.15	

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
	3,644.78	3/23/98	52.68	0.00	3,592.10	Slight Sheen
	3,644.78	6/23/98	53.08	0.00	3,591.70	PSH Sheen
	3,644.78	9/30/98	53.39	0.01	3,591.40	PSH Sheen
	3,644.78	12/9/98	53.68	0.00	3,591.10	
	3,644.78	3/10/99	54.15	0.00	3,590.63	
	3,644.78	6/10/99	54.68	0.00	3,590.10	
	3,644.78	7/2/99	54.71	0.00	3,590.07	
	3,644.78	9/13/99	54.71	0.00	3,590.07	

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	
	3,644.47	12/10/97	54.12	0.00	3,590.35	
	3,644.47	3/23/98	54.51	0.00	3,589.96	
	3,644.47	6/23/98	55.12	0.00	3,589.35	
	3,644.47	9/30/98	55.61	0.00	3,588.86	
	3,644.47	12/9/98	55.80	0.00	3,588.67	
	3,644.47	3/9/99	56.09	0.00	3,588.38	
	3,644.47	6/10/99	56.60	0.00	3,587.87	
	3,644.47	7/2/99	56.64	0.00	3,587.83	
	3,644.47	9/14/99	56.91	0.00	3,587.56	
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),(6)

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-11A						
	3,644.24	3/23/98	54.79	0.00	3,589.45	(7)
	3,644.24	6/23/98	55.43	0.00	3,588.81	
	3,644.24	9/30/98	55.96	0.00	3,588.28	
	3,644.24	12/9/98	56.13	0.00	3,588.11	
	3,644.24	3/10/99	56.43	0.00	3,587.81	
	3,644.24	6/10/99	56.94	0.00	3,587.30	
	3,644.24	7/2/99	57.01	0.00	3,587.23	
	3,644.24	9/14/99	57.36	0.00	3,586.88	
MW-12						
	3,644.29	3/23/98	54.72	0.00	3,589.57	(7)
	3,644.29	6/23/98	55.48	0.00	3,588.81	
	3,644.29	9/30/98	56.02	0.00	3,588.27	
	3,644.29	12/9/98	56.17	0.00	3,588.12	
	3,644.29	3/10/99	56.45	0.00	3,587.84	
	3,644.29	6/10/99	56.97	0.00	3,587.32	
	3,644.29	7/2/99	56.99	0.00	3,587.30	
	3,644.29	9/14/99	57.41	0.00	3,586.88	
MW-12D						
	3,644.38	7/2/99	57.13	0.00	3,587.25	(8)
	3,644.38	9/14/99	57.74	0.00	3,586.64	
MW-13						
	3,645.52	7/2/99	56.60	0.00	3,588.92	(9)
	3,645.52	9/14/99	56.92	0.00	3,588.60	
OW-4						
	3,644.06	7/2/99	58.18	0.00	3,585.88	(8)
	3,644.06	9/14/99	58.63	0.00	3,585.43	

(1) Top of casing elevations and groundwater elevations of all monitor wells were relative to an arbitary 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:
Groundwater Elevation = (TOC elevation) - (Depth to groundwater) + [(Free product thickness) X (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 after January, 1994.

(5) Well plugged and abandonned July 2, 1999.

(6) MW-11 could not be located after September 12, 1997.

(7) TOC elevations for MW-11A and MW-12 estimated relative to TOC elevation for MW-10.

(8) TOC elevations for MW-12D and OW-4 estimated relative to TOC elevation for MW-12.

(9) TOC elevation for MW-13 estimated relative to TOC elevation for MW-7.

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

Monitor Well	Date Measured	Cumulative Gallons Removed	pH	Temperature oC	Conductivity (umhos)	Redox (mV)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)	Alkalinity (mg/L)
MW-1	9/14/99	0	7.76	21.12	970	150.4	5.22	NM	NM
		0.5	7.62	22.74	921	160.9	3.87	NM	NM
		1.0	7.55	21.21	897	165.2	3.86	NM	NM
		1.5	7.55	20.87	916	165.5	3.78	NM	NM
		2.0	7.56	20.56	912	165.9	3.89	0.0	120
MW-3	09/14/99	0	7.61	20.20	1361	26.6	5.44	NM	NM
		0.5	7.27	19.42	1394	74.5	3.60	NM	NM
		1.0	7.17	19.60	1407	100.9	3.32	NM	NM
		1.5	7.15	19.92	1421	108.6	3.39	NM	NM
		2.0	7.15	20.10	1433	109.8	3.27	0.0	280
MW-4	09/14/99	0	7.68	22.61	1371	103.2	7.12	NM	NM
		0.5	7.51	19.23	1321	27.4	3.35	NM	NM
		1.0	7.37	20.10	1301	3.4	3.19	NM	NM
		1.5	7.36	20.22	1304	9.4	3.31	NM	NM
		2.0	7.36	20.49	1290	13.1	3.65	0.0	220
MW-5	09/14/99	0	7.68	18.88	1403	256.2	8.39	NM	NM
		1.0	7.58	19.02	1399	258.9	8.28	NM	NM
		2.0	7.48	19.04	1398	261.7	8.06	NM	NM
		2.5	7.31	19.13	1364	269.0	7.39	NM	NM
		3.0	7.31	19.16	1360	269.2	7.36	0.0	240
MW-7	09/13/99	0	7.68	24.11	1420	237	7.83	NM	NM
		0.5	7.04	23.16	1585	249	6.88	NM	NM
		1.0	6.82	23.05	1644	259.1	6.19	NM	NM
		1.5	6.79	23.21	1646	261	6.27	NM	NM
		1.7	6.79	23.25	1644	262.7	6.34	0	360
MW-8	09/13/99	0	6.91	27.50	1656	259.2	6.22	NM	NM
		0.5	7.27	23.40	1660	240.7	7.33	NM	NM
		1.0	7.14	22.80	1667	244.1	5.89	NM	NM
		1.5	6.96	22.18	1661	240.9	2.92	NM	NM
		2.0	6.97	22.17	1658	241.1	2.88	0.0	300
MW-9	09/13/99	0	8.15	23.09	1388	257.2	5.31	NM	NM
		0.5	7.24	20.56	1311	256.5	2.97	NM	NM
		1.0	7.22	21.08	1310	256.7	3.04	NM	NM
		1.5	7.21	21.15	1311	257.9	2.91	NM	NM
		2.0	7.25	21.79	1284	258	5.29	2.0	320
MW-10	09/14/99	0	7.05	23.73	2423	-80.8	4.87	NM	NM
		0.5	7.02	23.25	2449	-84.1	4.76	NM	NM
		1.0	6.99	22.12	2476	-90.8	4.58	NM	NM
		1.5	6.96	22.36	2456	-92.2	4.63	NM	NM
		2.0	6.91	22.48	2456	-92.1	4.98	6.0	1665
MW-11A	09/13/99	0	6.69	23.18	4334	71.8	5.12	NM	NM
		NM	6.69	23.0	4566	55.1	4.97	NM	NM
		NM	6.69	23.1	4683	36.2	6.20	NM	NM
		NM	6.69	23.21	4693	33.3	6.13	NM	NM
		NM	6.69	23.36	4698	30.2	6.07	8.0	1665
MW-12	09/14/99	0	7.51	23.74	1193	32.3	6.27	NM	NM
		0.5	7.14	22.31	1939	-89.7	4.99	NM	NM
		1.0	7.11	21.19	2005	-110.2	3.14	NM	NM
		1.5	7.09	21.30	2061	-116.7	2.69	NM	NM
		2.0	7.06	21.34	2180	-118.7	2.41	6	1665
MW-12D	09/14/99	0	7.73	20.93	893	259.7	7.64	NM	NM
		1.0	7.81	20.36	1215	-58.2	1.49	NM	NM
		2.5	7.81	20.49	1237	-92.1	1.04	NM	NM
		4.0	7.78	20.60	1247	-152.5	0.94	NM	NM
		5.5	7.77	20.65	1248	-155.4	0.84	0.0	340
MW-13	09/14/99	0	7.50	24.09	2106	-87.0	5.07	NM	NM
		0.5	7.47	21.34	2146	-95.9	3.07	NM	NM
		1.0	7.35	20.64	2156	-98.4	1.40	NM	NM
		1.5	7.31	20.45	2151	-105.7	1.28	NM	NM
		2.0	7.31	20.42	2149	-106.2	1.23	NM	NM
OW-4	09/14/99	0	7.40	22.16	1624	139.6	7.63	NM	NM
		1.0	7.13	19.15	1734	165.9	7.67	NM	NM
		2.0	7.08	19.21	1738	175.0	7.67	NM	NM
		3.0	7.06	19.42	1730	182.1	7.74	NM	NM
		4.0	7.05	19.80	1722	185.9	7.73	0.0	340

MW-2 not operative after January 1994; P&A'd 7/1/99.

MW-6 P&A'd 7/1/99.

MW-11 not operative after September 1997; P&A'd 7/1/99.

NM=Not Measured

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

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/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
	3/24/98	Regular	4800	7200	1200	2400	4.2	38
	6/23/98	Regular	53	680	580	1400	1.4	9.2
	09/30/98	Regular	3.2	90	280	970	2.5	3.6
	12/10/98	Regular	<1.0	1.5	17	110	1.4	0.31
	03/10/99	Regular	<1.0	<1.0	8.2	110	0.62	0.85
	03/10/99	Duplicate	<1.0	<1.0	7.9	110	0.66	0.84
	06/10/99	Regular	<1.0	1.1	<1.0	28	0.53	0.55
	06/10/99	Duplicate	<1.0	1.8	<1.0	41	0.69	0.76
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
MW-2 [1]								
	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
	3/24/98	Regular	140	630	360	310	0.56	3.9
	6/23/98	Regular	100	720	350	490	0.40	4.9
	09/30/98	Regular	42	470	450	530	1.0	3.8
	12/10/98	Regular	13	220	160	290	1.3	0.43
	03/10/99	Regular	3.2	7.4	42	32	0.2	0.44
	06/10/99	Regular	1.7	3.1	<1.0	36	<0.20	0.18
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10

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

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/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
	3/24/98	Regular	150	510	270	620	1.2	5.6
	6/23/98	Regular	160	890	590	1600	0.69	10
	09/30/98	Regular	80	180	370	840	2.0	3.9
	12/10/98	Regular	28	70	210	960	9.3	4.3
	12/10/98	Duplicate	26	62	180	830	3.9	4.3
	03/10/99	Regular	8	20	250	1400	13.0	13
	06/10/99	Regular	<1.0	<1.0	12	12	0.44	0.63
	09/14/99	Regular	< 1.0	< 1.0	3.3	13.1	0.35	0.17
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
	3/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	6/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	09/30/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	12/10/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	03/09/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
	09/14/99	Regular	<1.0	<1.0	<1.0	<2.0	<0.20	<0.10
MW-6 [1]								
	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

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

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
	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
MW-6 [1]	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
	3/23/98	Regular	3.6	< 1	4	< 1	< 0.2	< 0.1
	6/23/98	Regular	170	4.1	15	7.2	1.2	0.51
	09/30/98	Regular	1000	420	140	270	4.0	3.3
	12/10/98	Regular	7.6	6.6	1.7	5.8	2.0	< 0.1
	03/10/99	Regular	2500	930	590	1400	11.0	13
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
	3/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	6/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	09/30/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	12/10/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	03/09/99	Regular	<1.0	<1.0	<1.0	<1.0	4.7	< 0.1
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	< 0.20	< 0.1
	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
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

Table 4

Cumulative Analytical Results for Groundwater Samples

Hobbs, New Mexico Facility

BJ Services Company, U.S.A.

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
	12/10/97	Regular	< 1	< 1	< 1	< 1	0.3	< 0.1
	3/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	6/23/98	Regular	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	09/30/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	12/10/98	Regular	< 1.0	< 1.0	< 1.0	< 1.0	< 0.20	< 0.1
	03/09/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.1
MW-8	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
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
	3/24/98	Regular	< 1	< 1	< 1	26	0.9	1
	6/23/98	Regular	2.4	22	10	36	< 0.2	0.25
	09/30/98	Regular	1.1	5.5	21	59	0.27	0.27
	12/10/98	Regular	< 1.0	1.9	17	79	5.1	0.25
	03/10/99	Regular	<1.0	<1.0	5.7	68	<0.2	0.22
	06/10/99	Regular	<1.0	1.8	1.8	71	<0.20	0.43
	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
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
	3/23/98	Regular	36	< 5	5.9	< 5	1.6	< 0.5
	3/23/98	Duplicate	36	< 1	5.3	1.3	1.7	0.18
	6/23/98	Regular	37	< 5	< 5	< 5	2.1	< 0.5
	09/30/98	Regular	84	3.2	30	2.2	1.4	0.36

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

Monitor Well	Sample Date	Sample Type	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
			micrograms per liter, ug/l				milligrams per liter, mg/L	
	12/10/98	Regular	29	1.0	7.0	1.0	0.86	0.18
	03/09/99	Regular	28	<5.0	5.8	<5.0	0.92	<0.5
	06/10/99	Regular	17	<1.0	<1.0	<1.0	0.30	0.16
	09/14/99	Regular	10	< 1.0	< 1.0	< 2.0	<0.20	<0.10
MW-11 [1]								
	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
MW-11 [1]	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-11A								
	3/24/98	Regular	24	5	< 5	< 5	0.28	0.14
	6/23/98	Regular	9.9	< 5	< 5	< 5	< 0.2	< 0.5
	09/30/98	Regular	9.3	3.7	2.2	7.0	<0.20	0.1
	12/10/98	Regular	1.7	<1.0	<1.0	<1.0	<0.20	<0.1
	03/10/99	Regular	<5	<5	<5	<5	0.3	<0.5
	06/10/99	Regular	<1.0	<1.0	<1.0	<1.0	<0.20	<0.10
	09/13/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
MW-12								
	3/24/98	Regular	100	11	6	8	0.29	0.41
	6/23/98	Regular	88	< 5	< 5	< 5	< 0.2	< 0.5
	6/23/98	Duplicate	89	< 5	< 5	< 5	0.31	< 0.5
	09/30/98	Regular	260	3.0	1.2	7.9	<0.20	0.62
	12/10/98	Regular	160	<1.0	<1.0	1.2	0.21	0.36
	03/10/99	Regular	160	1.1	<1.0	2.9	0.38	0.45
	06/10/99	Regular	49	1.4	<1.0	<1.0	0.22	0.13
	09/14/99	Regular	75	< 1.0	< 1.0	< 2.0	<0.20	0.23
MW-12D								
	07/02/99	Regular	< 5	< 5	< 5	< 5	<0.20	<0.10
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10
MW-13								
	07/02/99	Regular	1500	23.0	750	58	2.2	5.1
	09/14/99	Regular	860	16	450	34.4	2.1	3.1
OW-4								
	06/10/99	Regular	<1.0	<1.0	<1.0	4.4	<0.2	<0.10
	09/14/99	Regular	< 1.0	< 1.0	< 1.0	< 2.0	<0.20	<0.10

[1] Well plugged and abandoned 7/1/99

NA=Not Analyzed NS=Not Sampled

NSP=Not Sampled due to Phase Separated Hydrocarbons

Table 5
Current and Historical Nitrate, Sulfate, and Dissolved Methane Data for Monitor Wells MW-5, MW-10, MW-11A, MW-12, MW-12D, and OW-4
BJ Services Company, U.S.A.
Hobbs, New Mexico

Well	Date	Nitrate[1] (mg/L)	Sulfate[1] (mg/L)	Dissolved Methane (mg/l)
MW-5	3/23/98	3.87	190	<0.0012
	3/9/99	<0.1	195	<0.0012
	6/10/99	4.73	209	<0.0012
	9/14/99	4.3	210	<0.0012
MW-10	3/23/98	0.07	320	0.91
	6/23/98	<0.1	325	0.55
	9/30/98	<0.1	204	0.81
	12/10/98	<0.1	180	0.091
	3/9/99	<0.1	142	0.035
			223[3]	
	9/14/99	<0.10	160	0.0049
MW-11A	3/23/98	<0.05	190	0.14
	6/23/98	<0.1	225	0.11
	9/30/98	0.4	196	0.043
	12/10/98	0.7	188	0.033
	3/10/99	<0.1	164	0.094
		<0.1[2]	227[3]	
	6/10/99	<0.1	181	0.0036
	9/13/99	0.22	250	<0.0012
MW-12	3/23/98	<0.05	240	<0.0012
	6/23/98	<0.1	240	<0.0012
	9/30/98	<0.1	168	<0.0012
	12/10/98	<0.1	202	<0.0012
	3/10/99	<0.1	137	<0.0012
		<0.1[2]	193[3]	
	6/10/99	<0.1	217	<0.0012
	9/14/99	<0.10	230	<0.0012
MW-12D	7/2/99	2.1	249	0.0015
	9/14/99	<0.10	200	0.0065
OW-4	6/10/99	3.96	192	<0.0012
	9/14/99	3.5	200	<0.0012

1=By EPA Method 300, except as noted
2=By EPA Method 353.3
3=By EPA Method 375.4

Table 6
Summary of Analytical Results for Air Emissions
Hobbs, New Mexico Facilty
BJ Services Company, U.S.A.

Sample Number	Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	TPH	Discharge Rate, scfm	Benzene Emission Rate, lb/hr	Total BTEX Emission Rate, lb/hr	TPH Emission Rate, lb/hr
		parts per million by volume, ppmv								
Extraction-1	9/19/95	790	1100	340	920	9700	132.47	1.235	5.943	16.31
Effluent-1	9/20/95	990	2500	560	1600	16000	135.76	1.575	10.939	27.37
Effluent-2	9/28/95	13	28	6	18	2533	123.56	0.019	0.112	3.89
Effluent-4	11/7/95	15	58	12	36	1500	131.10	0.024	0.239	2.59
Effluent 111595-01	11/15/95	39	180	42	130	1870	133.33	0.062	0.773	3.21
Effluent 121995-01	12/19/95	10	45	11	33	530	129.64	0.016	0.191	0.89
Effluent 12996-01	1/29/96	12	61	17	53	1200	128.45	0.018	0.271	1.95
Effluent 032296-01	3/22/96	6	44	12	40	990	124.68	0.009	0.189	1.56
Effluent 042496-01	4/25/96	4	37	10	36	900	118.34	0.005	0.147	1.29
Effluent 053196-01	5/31/96	3.7	40	10	33	670	124.11	0.005	0.158	1.04
Effluent 082396-01	8/23/96	<5	12	<5	<5	200	126.18	0.007	0.047	0.31
Effluent 120296-01	12/2/96	<1	<1	<1	<1	<5	129.04	0.002	0.008	0.01
Eff-31297-1	3/12/97	2.1	15	4.6	15	250	110.56	0.003	0.057	0.33
Effluent 070297-01	7/2/97	<1	6.3	2.4	8.6	65	109.90	0.001	0.028	0.08
Monitor 970912 (1)	9/12/97	NA	NA	NA	NA	340	105.40	NA	NA	0.39
Eff-1-2832	12/10/97	<0.001	0.013	0.009	0.031	210	106.27	0.000	0.000	0.28
Monitor 980324 (1)	3/24/98	NA	NA	NA	NA	1500	108.97	NA	NA	1.91
Monitor 980622 (1)	6/22/98	NA	NA	NA	NA	190	108.16	NA	NA	0.24
Monitor 980930 (1)	9/30/98	NA	NA	NA	NA	200	123.74	NA	NA	0.33
Monitor 981210 (1)	12/10/98	NA	NA	NA	NA	180	111.14	NA	NA	0.24
Monitor 990310 (1)	3/10/99	NA	NA	NA	NA	80	111.14	NA	NA	0.11
Monitor 990610 (1)	6/10/99	NA	NA	NA	NA	140	73.68	NA	NA	0.12
Monitor 990914 (1)	9/14/99	NA	NA	NA	NA	12.5	116.24	NA	NA	0.02

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

NA = Not Analyzed

(1) All analysis based on field FID readings

Appendices

APPENDICES

A

APPENDIX A

Groundwater Sampling Forms

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: mw-1

1. PROJECT INFORMATION

Project Number: 12632 Task Number: _____ Date: 5-14-99 Time: 12:15

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: _____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: _____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 64.11 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 58.14 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: _____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. _____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other: _____	Comments
12:25	-	7.71	21.12	970	150.4	5.22	-	-	clear
12:30	0.5	7.62	20.74	921	160.9	3.57	-	-	clear
12:35	1.0	7.55	21.21	897	165.2	3.56	-	-	clear
12:40	1.5	7.55	20.87	916	165.5	3.78	-	-	clear
12:45	2.0	7.56	20.56	912	165.9	3.87	-	-	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: mw-1 Sample Time: 12:45 # of Containers: 5

Duplicate Sample Collected? ☐ Yes ☐ No ID: _____

Geochemical Analyses

Ferrous Iron: 0.0 mg/L

DO: 1.5 mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: 120 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-3

1. PROJECT INFORMATION

Project Number: 12832 Task Number: _____ Date: 9/14/99 Time: 9:55

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 62 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 55.42 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: _____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☒ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Rope/Tubing ☐ Polyethylene ☒ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Was well purged dry? ☐ Yes ☐ No Pumping Rate: 0.1 gal/min

Equipment Model(s)

1. YSI 6 [illegible]
2. _____
3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
10:00	—	7.61	20.26	1361	26.6	5.41	~	—	clear
10:05	0.5	7.27	19.42	1364	74.5	3.60	~	—	clear
10:10	1.0	7.17	19.60	1427	100.9	3.32	~	~	clear
10:15	1.5	7.15	19.52	1421	108.6	3.39	~	~	clear
10:20	2.0	7.15	20.10	1433	109.8	3.27	~	~	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☒ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-3 Sample Time: 10:20 # of Containers: 5

Duplicate Sample Collected? ☐ Yes ☒ No ID: _____

Geochemical Analyses

Ferrous Iron: 0.0 mg/L

DO: 2.5 mg/L

Nitrate: ~ mg/L

Sulfate: ~ mg/L

Alkalinity: 282 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-4

1. PROJECT INFORMATION

Project Number: 12832 Task Number: _____ Date: 9-14-99 Time: 12:30

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 61.5 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 55.33 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: – feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. _____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other: _____	Comments
12:35	—	7.68	22.61	1371	133.2	7.12	–	–	clear
12:40	0.5	7.51	19.23	1321	27.4	3.35	–	–	clear
12:42	1.0	7.37	22.10	1321	3.4	3.19	–	–	clear
12:45	1.5	7.36	22.22	1324	9.4	3.31	–	–	clear
12:50	2.0	7.36	22.49	1290	13.1	3.65	–	–	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☒ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☒ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☒ No

Sample ID: MW-4 Sample Time: 12:50 # of Containers: 5

Duplicate Sample Collected? ☐ Yes ☒ No ID: _____

Geochemical Analyses

Ferrous Iron: 2.0 mg/L

DO: 1.5 mg/L

Nitrate: – mg/L

Sulfate: – mg/L

Alkalinity: 220 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-5

1. PROJECT INFORMATION

Project Number: 12831 Task Number: _____ Date: 9.14.99 Time: 8:20

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 64.65 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 57.12 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☒ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Rope/Tubing ☐ Polyethylene ☒ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Was well purged dry? ☐ Yes ☐ No Pumping Rate: 0.2 gal/min

Equipment Model(s)

1. YSI-600

2. _____

3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other: _____	Comments
8:25	—	7.68	15.85	1403	256.2	5.39	—	—	clear
8:30	~~1.0~~	7.58	15.02	1359	258.9	8.28	—	—	clear
8:35	2.0	7.48	14.04	1378	261.7	5.06	—	—	clear
8:40	2.5	7.31	14.13	1361	269.0	7.39	—	—	clear
8:45	3.0	7.31	14.16	1360	269.2	7.36			clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: _____ Sample Time: 8:45 # of Containers: 9

Duplicate Sample Collected? ☐ Yes ☐ No ID: _____

Geochemical Analyses

Ferrous Iron: 0.0 mg/L

DO: 5.0 mg/L

Nitrate: — mg/L

Sulfate: ~ mg/L

Alkalinity: 240 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-7

1. PROJECT INFORMATION

Project Number: 12-912 Task Number: _____ Date: _____ Time: 15:50

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 61.50 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 55.94 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: _____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. _____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other: _____	Comments
15:50	—	7.68	24.11	1420	237	7.85	—	—	clear
15:55	0.5	7.04	23.16	1585	249	6.88	—	—	clear
16:00	1.0	6.82	23.05	1644	255.1	6.19			clear
16:05	1.5	6.75	23.21	1646	261	6.27			clear
16:10	1.7	6.75	23.25	1644	262.7	6.34			clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-7 Sample Time: 16:10 # of Containers: 5

Duplicate Sample Collected? ☐ Yes ☐ No ID: _____

Geochemical Analyses

Ferrous Iron: 0 mg/L

DO: 5.0 mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: 360 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-8

1. PROJECT INFORMATION

Project Number: 12872 Task Number: _____ Date: 9.13.99 Time: 16:15

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: _____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 62.30 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 55.72 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: _____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. _____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: _____ gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
16:20	—	6.91	23.50	1656	255.2	6.22	—	—	Clear
16:25	0.5	7.27	23.40	1660	242.7	7.33	—	—	Clear
16:30	1.0	7.14	22.80	1667	244.1	5.89	—	—	Clear
16:35	1.5	6.96	22.18	1661	240.9	2.92	—	—	Clear
16:40	2.0	6.97	22.17	1658	241.1	2.68	—	—	Clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-8 Sample Time: 16:40 # of Containers: 5

Duplicate Sample Collected? ☐ Yes ☒ No ID: _____

Geochemical Analyses

Ferrous Iron: 0.0 mg/L

DO: 3.10 mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: 300 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-9

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date: 9-13-19 Time: 14:20

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter: 2" inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter: 2" inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 60.75 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Static Water: 54.71 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Product: — feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☒ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

1. YSI-600

Materials: Rope/Tubing ☐ Polyethylene ☒ Polypropylene ☐ Teflon® ☐ Other:_____ ☒ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

2. _____

Was well purged dry? ☐ Yes ☒ No Pumping Rate: 0.1 gal/min

3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
14:30	—	8.15	23.07	1385	257.2	5.31	—	—	clear
14:35	0.5	7.24	22.96	1311	256.5	2.57	—	—	clear
14:40	1.0	7.22	21.85	1310	256.7	3.04	—	—	clear
14:45	1.5	7.21	21.15	1311	257.7	2.91			clear
14:50	2.0	7.25	21.79	1284	258	5.29			clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Materials: Pump/Bailer ☐ Stainless ☒ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☒ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☒ No

Sample ID: MW-9 Sample Time: 14:45 # of Containers: 5

Duplicate Sample Collected? ☐ Yes ☐ No ID:_____

Geochemical Analyses

Ferrous Iron: 0 mg/L

DO: 2.0 mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: 320 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-10

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date: 9-14-99 Time: 13:25

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 62.7 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Static Water: 56.91 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Product:_____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ____ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. _____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate:_____ gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other: _____	Comments
13:25	—	7.05	23.73	2423	-82.8	4.57	—	—	clear
13:30	0.5	7.02	23.25	2445	-84.1	4.76	—	—	clear
13:35	1.0	6.99	22.12	2476	-90.8	4.58	—	—	clear
13:40	1.5	6.96	22.36	2456	-92.2	4.63	—	—	clear
13:45	2.0	6.91	22.48	2456	-92.1	4.65	—	—	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ____ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-10 Sample Time: 13:45 # of Containers: 9

Duplicate Sample Collected? ☒ Yes ☐ No ID: Duplicate

Geochemical Analyses

Ferrous Iron: 6.0 mg/L

DO: 2.6 mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: 1665 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-11A

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date:_____ Time: 16.50

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter: 2 inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 63.50 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Static Water: 57.36 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Product:_____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1._____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2._____

Was well purged dry? ☐ Yes ☐ No Pumping Rate:_____ gal/min 3._____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
16:55	—	6.69	23.18	4334	71.8	5.12	—	—	silty
17:00		6.67	22.96	4566	55.1	4.97	—	—	silty
17:05		6.69	23.14	4683	36.2	6.20	—	—	clear
17:10		6.69	23.21	4693	33.3	6.13	—	—	clear
17:15		6.69	23.36	4698	32.2	6.07	—	—	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-11A Sample Time: 17:15 # of Containers: 9

Duplicate Sample Collected? ☐ Yes ☒ No ID:_____

Geochemical Analyses

Ferrous Iron: 8.0 mg/L

DO: 1.6 mg/L

Nitrate: — mg/L

Sulfate: — mg/L

Alkalinity: 1665 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-12

1. PROJECT INFORMATION

Project Number: 12832 Task Number: _____ Date: 9/14-99 Time: 12:55

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: _____ inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: _____ inches	Type: ☒ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 61 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 57.41 feet	From: ☒ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: _____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☒ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☒ Field Cleaned ☐ Disposable 1. YSI-600

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☒ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: 0.1 gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other: _____	Comments
13:00	~	7.51	25.74	1195	32.3	6.27	~	~	clear
13:05	0.5	7.14	22.31	1939	-89.7	4.79	~	~	clear
13:10	1.0	7.11	21.19	2005	-112.2	3.14	~	~	clear
13:15	1.5	7.09	21.30	2061	-116.7	2.69	~	~	clear
13:20	2.0	7.06	21.34	2186	-118.7	2.41	~	~	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: MW-12 Sample Time: 13:20 # of Containers: 9

Duplicate Sample Collected? ☐ Yes ☐ No ID: _____

Geochemical Analyses

Ferrous Iron: 6.0 mg/L

DO: 1.5 mg/L

Nitrate: ~ mg/L

Sulfate: ~ mg/L

Alkalinity: 1665 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-12D

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date: 5.14.99 Time: 5:00

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 87.65 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Static Water: 57.71 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Product:_____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1._____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2._____

Was well purged dry? ☐ Yes ☐ No Pumping Rate:_____ gal/min 3._____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:_____	Comments
5:05	-	7.75	20.53	5.93	255.7	7.64	-	-	clear
5:10	1.0	7.81	20.36	1215	-58.2	1.49	-	-	clear
5:20	2.5	7.81	20.49	1237	-92.1	1.04	-	-	clear
5:30	4.0	7.78	20.66	1247	-152.5	0.94	-	-	clear
5:45	5.5	7.77	20.65	1248	-155.4	0.85	-	-	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☐ No

Sample ID:_____ Sample Time:_____ # of Containers:_____

Duplicate Sample Collected? ☐ Yes ☐ No ID:_____

Geochemical Analyses

Ferrous Iron: 2.0 mg/L

DO: 2.5 mg/L

Nitrate: - mg/L

Sulfate: - mg/L

Alkalinity: 340 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: MW-13

1. PROJECT INFORMATION

Project Number:_____ Task Number:_____ Date: 9-14-99 Time: 14:00

Client:_____ Personnel:_____

Project Location:_____ Weather:_____

2. WELL DATA

Casing Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Screen Diameter:_____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other:_____
Total Depth of Well: 65.2 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Static Water: 56.92 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____
Depth to Product:_____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other:_____

Length of Water Column:_____ feet Well Volume:_____ gal Screened Interval (from GS):_____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1._____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2._____

Was well purged dry? ☐ Yes ☐ No Pumping Rate:_____ gal/min 3._____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
14:35	—	7.50 Rpt	24.09	2106	-87.0	5.07	—	—	clear
14:40	0.5	7.47	21.34	2146	-95.1	3.07	—	—	clear
14:45	1.0	7.35	20.64	2156	-58.4	1.40	—	—	clear
14:50	1.5	7.31	22.43	2151	-105.7	1.26	—	—	clear
14:55	2.0	7.31	20.42	2149	-106.2	1.25	—	—	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other:_____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other:_____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling:_____ Field Filtered? ☐ Yes ☐ No

Sample ID:_____ Sample Time:_____ # of Containers:_____

Duplicate Sample Collected? ☐ Yes ☐ No ID:_____

Geochemical Analyses

Ferrous Iron: _____ mg/L

DO: _____ mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: _____ mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL or other items not on the field data sheet.

BROWN AND CALDWELL

GROUNDWATER SAMPLING FIELD DATA SHEET

WELL ID: GW-4

1. PROJECT INFORMATION

Project Number: 12-932 Task Number: 014 Date: 5.14.99 Time: 11:05

Client: _____ Personnel: _____

Project Location: _____ Weather: _____

2. WELL DATA

Casing Diameter: _____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Screen Diameter: _____ inches	Type: ☐ PVC ☐ Stainless ☐ Galv. Steel ☐ Teflon® ☐ Other: _____
Total Depth of Well: 61.30 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Static Water: 58.63 feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____
Depth to Product: _____ feet	From: ☐ Top of Well Casing (TOC) ☐ Top of Protective Casing ☐ Other: _____

Length of Water Column: _____ feet Well Volume: _____ gal Screened Interval (from GS): _____

Note: 2-inch well = 0.167 gal/ft 4-inch well = 0.667 gal/ft

3. PURGE DATA

Purge Method: ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Centrifugal Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Equipment Model(s)

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 1. _____

Materials: Rope/Tubing ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable 2. _____

Was well purged dry? ☐ Yes ☐ No Pumping Rate: 0.2 gal/min 3. _____

Time	Cum. Gallons Removed	pH	Temp	Spec. Cond.	Eh	Dissolved Oxygen	Turbidity	Other:	Comments
11:25	—	7.40	22.16	1624	139.6	7.63	—	—	clear
11:30	1.0	7.13	19.15	1734	165.8	7.67	—	—	clear
11:35	2.0	7.08	18.21	1738	175.6	7.67	—	—	clear
10:40	3.0	7.06	19.42	1730	182.1	7.94	—	—	clear
11:45	4.0	7.05	19.80	1722	185.9	7.93	—	—	clear

4. SAMPLING DATA

Method(s): ☐ Bailer, Size: ___ ☐ Bladder Pump ☐ 2" Submersible Pump ☐ 4" Submersible Pump ☐ Peristaltic Pump ☐ Inertial Lift Pump ☐ Other: _____

Materials: Pump/Bailer ☐ Stainless ☐ PVC ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Materials: Tubing/Rope ☐ Polyethylene ☐ Polypropylene ☐ Teflon® ☐ Other: _____ ☐ Dedicated ☐ Prepared Off-Site ☐ Field Cleaned ☐ Disposable

Depth to Water at Time of Sampling: _____ Field Filtered? ☐ Yes ☐ No

Sample ID: _____ Sample Time: _____ # of Containers: _____

Duplicate Sample Collected? ☐ Yes ☐ No ID: _____

Geochemical Analyses

Ferrous Iron: 0.0 mg/L

DO: 4.0 mg/L

Nitrate: _____ mg/L

Sulfate: _____ mg/L

Alkalinity: 340 mg/L

5. COMMENTS

Note: Include comments such as well condition, odor, presence of NAPL, or other items not on the field data sheet.

B

APPENDIX B

Laboratory Analytical Reports for Groundwater Samples

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

Case Narrative for:

Brown & Caldwell

Certificate of Analysis Number:

99090123

Report To:		Project Name:	BJ- HOBBS
Brown & Caldwell		Site:	BJ-HOBBS
Rick Rexroad		Site Address:	
1415 Louisiana			
Suite 2500		PO Number:	
Houston		State:	New Mexico
TX		State Cert. No.:	
77002-		Date Reported:	09/30/1999
ph (713) 759-0999	fax: (713) 308-3886		

Your sample ID " Duplicate " (SPL ID:99090123-10) was randomly selected for the use in SPL's quality control program for the Purgeable Aromatics analysis by SW846 method 8021B. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) were outside of the advisable quality control limits for Total Xylenes (Batch ID: R2561), due to matrix interference. A Laboratory Control Sample (LCS) was analyzed as a quality control check for the analytical batch and all recoveries were within acceptable limits.

Any other data flags or quality control exceptions associated with this report will be footnoted in the analytical result page(s) or the quality control summary page(s).

Please do not hesitate to contact us if you have any questions or comments pertaining to this data report. Please reference the above Certificate of Analysis Number.

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

Lynch, Pat
Project Manager

09/30/1999
Date

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

Brown & Caldwell

Certificate of Analysis Number:

99090123

Report To:

Brown & Caldwell
Rick Rexroad
1415 Louisiana
Suite 2500
Houston
TX
77002-
ph: (713) 759-0999 fax: (713) 308-3886

Project Name: BJ- HOBBS
Site: BJ-HOBBS
Site Address:
PO Number:
State: New Mexico
State Cert. No.:
Date Reported: 9/29/99

Client Sample ID	Lab Sample ID	Matrix	Date Collected	Date Received	COC ID	HOLD
MW-5	99090123-01	Water	09/14/1999 8:45	09/15/1999 10:00	095990	☐
MW-12D	99090123-02	Water	09/14/1999 9:45	09/15/1999 10:00	095990	☐
MW-3	99090123-03	Water	09/14/1999 10:20	09/15/1999 10:00	095990	☐
MW-4	99090123-04	Water	09/14/1999 10:50	09/15/1999 10:00	095990	☐
OW-4	99090123-05	Water	09/14/1999 11:45	09/15/1999 10:00	095990	☐
MW-1	99090123-06	Water	09/14/1999 12:45	09/15/1999 10:00	095990	☐
MW-12	99090123-07	Water	09/14/1999 13:20	09/15/1999 10:00	095990	☐
MW-10	99090123-08	Water	09/14/1999 13:45	09/15/1999 10:00	095990	☐
MW-13	99090123-09	Water	09/14/1999 14:25	09/15/1999 10:00	095990	☐
Duplicate	99090123-10	Water	09/14/1999 0:00	09/15/1999 10:00	095990	☐
Trip Blank 9/8/99	99090123-11	Water	09/14/1999 0:00	09/15/1999 10:00		☐

Lynch, Pat
Project Manager

9/29/99
Date

Joel Grice
Laboratory Director

Ted Yen
Quality Assurance Officer

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

Client Sample ID: MW-5 Collected: 09/14/99 8:45 SPL Sample ID: 99090123-01

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	ND	0.20	1		09/22/99 21:22	RR	59348
Surr: Pentacosane	75	20-131	1		09/22/99 21:22	RR	59348

Run ID/Seq #: HP_V_990921B-59348

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	ND	0.10	1		09/16/99 12:56	CJ	61769
Surr: 1,4-Difluorobenzene	89	62-144	1		09/16/99 12:56	CJ	61769
Surr: 4-Bromofluorobenzene	70	44-153	1		09/16/99 12:56	CJ	61769
HEADSPACE GAS ANALYSIS			RSK147		Units: mg/L		
Ethane	ND	0.0025	1		09/21/99 14:50	PC	59209
Ethylene	ND	0.0032	1		09/21/99 14:50	PC	59209
Methane	ND	0.0012	1		09/21/99 14:50	PC	59209
NITROGEN, NITRATE (AS N)			E300		Units: mg/L		
Nitrogen,Nitrate (As N)	4.3	0.10	1		09/15/99 14:45	ES	60819
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	ND	1.0	1		09/16/99 12:56	CJ	56214
Ethylbenzene	ND	1.0	1		09/16/99 12:56	CJ	56214
Toluene	ND	1.0	1		09/16/99 12:56	CJ	56214
Xylenes,Total	ND	2.0	1		09/16/99 12:56	CJ	56214
Surr: 1,4-Difluorobenzene	97	72-137	1		09/16/99 12:56	CJ	56214
Surr: 4-Bromofluorobenzene	78	48-156	1		09/16/99 12:56	CJ	56214
SULFATE			E300		Units: mg/L		
Sulfate	210	5.0	25		09/27/99 12:13	ES	61589

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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

Client Sample ID: MW-12D | Collected: 09/14/99 9:45 | SPL Sample ID: 99090123-02

Analyses/Method	Result	Rep.Limit	MCL	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B			Units: mg/L		
Diesel Range Organics	ND	0.20		1		09/22/99 0:12	RR	59332
Surr: Pentacosane	65	20-131		1		09/22/99 0:12	RR	59332
Run ID/Seq #: HP_V_990921B-59332								
Prep Method: SW3510B	Prep Date: 09/17/1999 8:40	Prep Initials: KL						
GASOLINE RANGE ORGANICS			SW8015B			Units: mg/L		
Gasoline Range Organics	ND	0.10		1		09/16/99 13:21	CJ	61770
Surr: 1,4-Difluorobenzene	91	62-144		1		09/16/99 13:21	CJ	61770
Surr: 4-Bromofluorobenzene	67	44-153		1		09/16/99 13:21	CJ	61770
HEADSPACE GAS ANALYSIS			RSK147			Units: mg/L		
Ethane	ND	0.0025		1		09/21/99 15:03	PC	59210
Ethylene	ND	0.0032		1		09/21/99 15:03	PC	59210
Methane	0.0065	0.0012		1		09/21/99 15:03	PC	59210
NITROGEN, NITRATE (AS N)			E300			Units: mg/L		
Nitrogen,Nitrate (As N)	ND	0.10		1		09/15/99 14:45	ES	60820
PURGEABLE AROMATICS			SW8021B			Units: ug/L		
Benzene	ND	1.0		1		09/16/99 13:21	CJ	56216
Ethylbenzene	ND	1.0		1		09/16/99 13:21	CJ	56216
Toluene	ND	1.0		1		09/16/99 13:21	CJ	56216
Xylenes,Total	ND	2.0		1		09/16/99 13:21	CJ	56216
Surr: 1,4-Difluorobenzene	96	72-137		1		09/16/99 13:21	CJ	56216
Surr: 4-Bromofluorobenzene	77	48-156		1		09/16/99 13:21	CJ	56216
SULFATE			E300			Units: mg/L		
Sulfate	200	4.0		20		09/27/99 12:13	ES	61592

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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

Client Sample ID: MW-3 Collected: 09/14/99 10:20 SPL Sample ID: 99090123-03

Analyses/Method	Result	Rep.Limit	MCL	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B			Units: mg/L		
Diesel Range Organics	ND	0.20		1		09/22/99 22:01	RR	59349
Surr: Pentacosane	65	20-131		1		09/22/99 22:01	RR	59349

Run ID/Seq #: HP_V_990921B-59349

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B			Units: mg/L		
Gasoline Range Organics	ND	0.10		1		09/16/99 11:18	CJ	61765
Surr: 1,4-Difluorobenzene	87	62-144		1		09/16/99 11:18	CJ	61765
Surr: 4-Bromofluorobenzene	80	44-153		1		09/16/99 11:18	CJ	61765
PURGEABLE AROMATICS			SW8021B			Units: ug/L		
Benzene	ND	1.0		1		09/16/99 11:18	CJ	55492
Ethylbenzene	ND	1.0		1		09/16/99 11:18	CJ	55492
Toluene	ND	1.0		1		09/16/99 11:18	CJ	55492
Xylenes,Total	ND	2.0		1		09/16/99 11:18	CJ	55492
Surr: 1,4-Difluorobenzene	100	72-137		1		09/16/99 11:18	CJ	55492
Surr: 4-Bromofluorobenzene	96	48-156		1		09/16/99 11:18	CJ	55492

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Client Sample ID: MW-4 **Collected:** 09/14/99 10:50 **SPL Sample ID:** 99090123-04

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	0.35	0.20	1		09/22/99 14:59	RR	59339
Surr: Pentacosane	69	20-131	1		09/22/99 14:59	RR	59339

Run ID/Seq #: HP_V_990921B-59339

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	0.17	0.10	1		09/16/99 11:43	CJ	61766
Surr: 1,4-Difluorobenzene	88	62-144	1		09/16/99 11:43	CJ	61766
Surr: 4-Bromofluorobenzene	87	44-153	1		09/16/99 11:43	CJ	61766
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	ND	1.0	1		09/16/99 11:43	CJ	55493
Ethylbenzene	3.3	1.0	1		09/16/99 11:43	CJ	55493
Toluene	ND	1.0	1		09/16/99 11:43	CJ	55493
Xylenes,Total	13.1	2.0	1		09/16/99 11:43	CJ	55493
Surr: 1,4-Difluorobenzene	91	72-137	1		09/16/99 11:43	CJ	55493
Surr: 4-Bromofluorobenzene	88	48-156	1		09/16/99 11:43	CJ	55493

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Client Sample ID: OW-4 **Collected:** 09/14/99 11:45 **SPL Sample ID:** 99090123-05

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	ND	0.20	1		09/22/99 15:38	RR	59340
Surr: Pentacosane	43	20-131	1		09/22/99 15:38	RR	59340

Run ID/Seq #: HP_V_990921B-59340

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	ND	0.10	1		09/16/99 13:45	CJ	61771
Surr: 1,4-Difluorobenzene	88	62-144	1		09/16/99 13:45	CJ	61771
Surr: 4-Bromofluorobenzene	68	44-153	1		09/16/99 13:45	CJ	61771
HEADSPACE GAS ANALYSIS			RSK147		Units: mg/L		
Ethane	ND	0.0025	1		09/21/99 15:13	PC	59211
Ethylene	ND	0.0032	1		09/21/99 15:13	PC	59211
Methane	ND	0.0012	1		09/21/99 15:13	PC	59211
NITROGEN, NITRATE (AS N)			E300		Units: mg/L		
Nitrogen,Nitrate (As N)	3.5	0.10	1		09/15/99 14:45	ES	60818
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	ND	1.0	1		09/16/99 13:45	CJ	56217
Ethylbenzene	ND	1.0	1		09/16/99 13:45	CJ	56217
Toluene	ND	1.0	1		09/16/99 13:45	CJ	56217
Xylenes,Total	ND	2.0	1		09/16/99 13:45	CJ	56217
Surr: 1,4-Difluorobenzene	96	72-137	1		09/16/99 13:45	CJ	56217
Surr: 4-Bromofluorobenzene	79	48-156	1		09/16/99 13:45	CJ	56217
SULFATE			E300		Units: mg/L		
Sulfate	200	4.0	20		09/27/99 12:13	ES	61593

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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8880 INTERCHANGE DRIVE
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Client Sample ID: MW-1 Collected: 09/14/99 12:45 SPL Sample ID: 99090123-06

Analyses/Method	Result	Rep.Limit	MCL	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B			Units: mg/L		
Diesel Range Organics	ND	0.20		1		09/22/99 17:33	RR	59342
Surr: Pentacosane	64	20-131		1		09/22/99 17:33	RR	59342

Run ID/Seq #: HP_V_990921B-59342

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B			Units: mg/L		
Gasoline Range Organics	ND	0.10		1		09/16/99 12:07	CJ	61767
Surr: 1,4-Difluorobenzene	85	62-144		1		09/16/99 12:07	CJ	61767
Surr: 4-Bromofluorobenzene	86	44-153		1		09/16/99 12:07	CJ	61767
PURGEABLE AROMATICS			SW8021B			Units: ug/L		
Benzene	ND	1.0		1		09/16/99 12:07	CJ	55494
Ethylbenzene	ND	1.0		1		09/16/99 12:07	CJ	55494
Toluene	ND	1.0		1		09/16/99 12:07	CJ	55494
Xylenes,Total	ND	2.0		1		09/16/99 12:07	CJ	55494
Surr: 1,4-Difluorobenzene	95	72-137		1		09/16/99 12:07	CJ	55494
Surr: 4-Bromofluorobenzene	92	48-156		1		09/16/99 12:07	CJ	55494

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Client Sample ID: MW-12 Collected: 09/14/99 13:20 SPL Sample ID: 99090123-07

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	ND	0.20	1		09/22/99 7:17	RR	59335
Surr: Pentacosane	80	20-131	1		09/22/99 7:17	RR	59335

Run ID/Seq #: HP_V_990921B-59335

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	0.23	0.10	1		09/16/99 16:38	CJ	61776
Surr: 1,4-Difluorobenzene	91	62-144	1		09/16/99 16:38	CJ	61776
Surr: 4-Bromofluorobenzene	84	44-153	1		09/16/99 16:38	CJ	61776
HEADSPACE GAS ANALYSIS			RSK147		Units: mg/L		
Ethane	ND	0.0025	1		09/23/99 13:45	PC	59740
Ethylene	ND	0.0032	1		09/23/99 13:45	PC	59740
Methane	ND	0.0012	1		09/23/99 13:45	PC	59740
NITROGEN, NITRATE (AS N)			E300		Units: mg/L		
Nitrogen,Nitrate (As N)	ND	0.10	1		09/15/99 14:45	ES	60821
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	75	1.0	1		09/16/99 16:38	CJ	56221
Ethylbenzene	ND	1.0	1		09/16/99 16:38	CJ	56221
Toluene	ND	1.0	1		09/16/99 16:38	CJ	56221
Xylenes,Total	ND	2.0	1		09/16/99 16:38	CJ	56221
Surr: 1,4-Difluorobenzene	100	72-137	1		09/16/99 16:38	CJ	56221
Surr: 4-Bromofluorobenzene	90	48-156	1		09/16/99 16:38	CJ	56221
SULFATE			E300		Units: mg/L		
Sulfate	230	4.0	20		09/27/99 12:13	ES	61594

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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(713) 660-0901

Client Sample ID: MW-10 Collected: 09/14/99 13:45 SPL Sample ID: 99090123-08

Analyses/Method	Result	Rep.Limit	MCL	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B			Units: mg/L		
Diesel Range Organics	ND	0.20		1		09/22/99 7:56	RR	59336
Surr: Pentacosane	62	20-131		1		09/22/99 7:56	RR	59336

Run ID/Seq #: HP_V_990921B-59336

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B			Units: mg/L		
Gasoline Range Organics	ND	0.10		1		09/16/99 14:10	CJ	61772
Surr: 1,4-Difluorobenzene	88	62-144		1		09/16/99 14:10	CJ	61772
Surr: 4-Bromofluorobenzene	78	44-153		1		09/16/99 14:10	CJ	61772
HEADSPACE GAS ANALYSIS			RSK147			Units: mg/L		
Ethane	ND	0.0025		1		09/23/99 13:53	PC	59742
Ethylene	ND	0.0032		1		09/23/99 13:53	PC	59742
Methane	0.0049	0.0012		1		09/23/99 13:53	PC	59742
NITROGEN, NITRATE (AS N)			E300			Units: mg/L		
Nitrogen,Nitrate (As N)	ND	0.10		1		09/15/99 14:45	ES	60822
PURGEABLE AROMATICS			SW8021B			Units: ug/L		
Benzene	10	1.0		1		09/16/99 14:10	CJ	56218
Ethylbenzene	ND	1.0		1		09/16/99 14:10	CJ	56218
Toluene	ND	1.0		1		09/16/99 14:10	CJ	56218
Xylenes,Total	ND	2.0		1		09/16/99 14:10	CJ	56218
Surr: 1,4-Difluorobenzene	97	72-137		1		09/16/99 14:10	CJ	56218
Surr: 4-Bromofluorobenzene	89	48-156		1		09/16/99 14:10	CJ	56218
SULFATE			E300			Units: mg/L		
Sulfate	160	2.0		10		09/27/99 12:13	ES	61595

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
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Client Sample ID: MW-13 Collected: 09/14/99 14:25 SPL Sample ID: 99090123-09

Analyses/Method	Result	Rep.Limit	MCL	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B			Units: mg/L		
Diesel Range Organics	2.1	0.20		1		09/22/99 9:52	RR	59338
Surr: Pentacosane	60	20-131		1		09/22/99 9:52	RR	59338

Run ID/Seq #: HP_V_990921B-59338

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B			Units: mg/L		
Gasoline Range Organics	3.1	0.50		5		09/16/99 12:32	CJ	61768
Surr: 1,4-Difluorobenzene	98	62-144		5		09/16/99 12:32	CJ	61768
Surr: 4-Bromofluorobenzene	91	44-153		5		09/16/99 12:32	CJ	61768
PURGEABLE AROMATICS			SW8021B			Units: ug/L		
Benzene	860	5.0		5		09/16/99 12:32	CJ	55509
Ethylbenzene	450	5.0		5		09/16/99 12:32	CJ	55509
Toluene	16	5.0		5		09/16/99 12:32	CJ	55509
Xylenes,Total	34.4	10		5		09/16/99 12:32	CJ	55509
Surr: 1,4-Difluorobenzene	110	72-137		5		09/16/99 12:32	CJ	55509
Surr: 4-Bromofluorobenzene	98	48-156		5		09/16/99 12:32	CJ	55509

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
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(713) 660-0901

Client Sample ID: Duplicate | **Collected:** 09/14/99 0:00 | **SPL Sample ID:** 99090123-10

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	ND	0.20	1		09/22/99 18:11	RR	59343
Surr: Pentacosane	42	20-131	1		09/22/99 18:11	RR	59343

Run ID/Seq #: HP_V_990921B-59343

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	ND	0.10	1		09/16/99 16:13	CJ	61775
Surr: 1,4-Difluorobenzene	93	62-144	1		09/16/99 16:13	CJ	61775
Surr: 4-Bromofluorobenzene	80	44-153	1		09/16/99 16:13	CJ	61775
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	7.3	1.0	1		09/16/99 16:13	CJ	56220
Ethylbenzene	ND	1.0	1		09/16/99 16:13	CJ	56220
Toluene	ND	1.0	1		09/16/99 16:13	CJ	56220
Xylenes,Total	ND	2.0	1		09/16/99 16:13	CJ	56220
Surr: 1,4-Difluorobenzene	97	72-137	1		09/16/99 16:13	CJ	56220
Surr: 4-Bromofluorobenzene	90	48-156	1		09/16/99 16:13	CJ	56220

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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

Client Sample ID: Trip Blank 9/8/99 Collected: 09/14/99 0:00 SPL Sample ID: 99090123-11

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	ND	0.10	1		09/22/99 20:09	CJ	61344
Surr: 1,4-Difluorobenzene	87	62-144	1		09/22/99 20:09	CJ	61344
Surr: 4-Bromofluorobenzene	74	44-153	1		09/22/99 20:09	CJ	61344
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	ND	1.0	1		09/22/99 20:09	CJ	60928
Ethylbenzene	ND	1.0	1		09/22/99 20:09	CJ	60928
Toluene	ND	1.0	1		09/22/99 20:09	CJ	60928
Xylenes,Total	ND	2.0	1		09/22/99 20:09	CJ	60928
Surr: 1,4-Difluorobenzene	96	72-137	1		09/22/99 20:09	CJ	60928
Surr: 4-Bromofluorobenzene	84	48-156	1		09/22/99 20:09	CJ	60928

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

Quality Control Documentation

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

Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Diesel Range Organics
Method: SW8015B
WorkOrder: 99090123
Lab Batch ID: 854

Method Blank

RunID: HP_V_990921B-59330 Units: mg/L
Analysis Date: 09/21/1999 22:55 Analyst: RR
Preparation Date: 09/17/1999 8:40 Prep By: KL Method SW3510B

Analyte	Result	Rep Limit
Diesel Range Organics	ND	0.20
Surr: Pentacosane	91.5	20-131

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-01B	MW-5
99090123-02B	MW-12D
99090123-03D	MW-3
99090123-04B	MW-4
99090123-05B	OW-4
99090123-06B	MW-1
99090123-07B	MW-12
99090123-08B	MW-10
99090123-09B	MW-13
99090123-10B	Duplicate

Laboratory Control Sample (LCS)

RunID: HP_V_990921B-59331 Units: mg/L
Analysis Date: 09/21/1999 23:33 Analyst: RR
Preparation Date: 09/17/1999 8:40 Prep By: KL Method SW3510B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Diesel Range Organics	5	4.8	97	53	148

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090123-02
RunID: HP_V_990921B-59333 Units: mg/L
Analysis Date: 09/22/1999 6:00 Analyst: RR

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Diesel Range Organics	ND	5	4.7	93.0	5	5.3	106	12.9	39	21	175

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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

Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Headspace Gas Analysis
Method: RSK147

WorkOrder: 99090123
Lab Batch ID: R2694

Method Blank

RunID: VARC_990921A-58256 Units: mg/L
Analysis Date: 09/21/1999 10:41 Analyst: PC

Analyte	Result	Rep Limit
Ethane	ND	0.0025
Methane	ND	0.0012

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-01D	MW-5
99090123-02D	MW-12D
99090123-05D	OW-4

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
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(713) 660-0901

Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Headspace Gas Analysis
Method: RSK147

WorkOrder: 99090123
Lab Batch ID: R2779

Method Blank

RunID: VARC_990923A-59735 Units: mg/L
Analysis Date: 09/23/1999 10:12 Analyst: PC

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-07D	MW-12
99090123-08D	MW-10

Analyte	Result	Rep Limit
Ethane	ND	0.0025
Ethylene	ND	0.0032
Methane	ND	0.0012

Qualifiers:

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D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Purgeable Aromatics
Method: SW8021B

WorkOrder: 99090123
Lab Batch ID: R2561

Method Blank

RunID: HP_J_990916A-55508 Units: ug/L
Analysis Date: 09/16/1999 9:31 Analyst: CJ

Analyte	Result	Rep Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
Xylenes,Total	ND	2.0
Surr: 1,4-Difluorobenzene	96.4	72-137
Surr: 4-Bromofluorobenzene	78.8	48-156

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-01A	MW-5
99090123-02A	MW-12D
99090123-03A	MW-3
99090123-04A	MW-4
99090123-05A	OW-4
99090123-06A	MW-1
99090123-07A	MW-12
99090123-08A	MW-10
99090123-09A	MW-13
99090123-10A	Duplicate

Laboratory Control Sample (LCS)

RunID: HP_J_990916A-55489 Units: ug/L
Analysis Date: 09/16/1999 9:56 Analyst: CJ

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Benzene	50	52	104	61	119
Ethylbenzene	50	52	104	70	118
Toluene	50	52	104	65	125
Xylenes,Total	150	149	99	72	116

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090123-10
RunID: HP_J_990916A-56532 Units: ug/L
Analysis Date: 09/17/1999 11:54 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Benzene	7.3	20	35	137	20	16	43	105*	21	32	164
Ethylbenzene	ND	20	25	122	20	11	56	74.8*	19	52	142
Toluene	ND	20	25	126	20	12	57	75.4*	20	38	159
Xylenes,Total	ND	60	25	41.7*	60	11	18*	77.8*	17	53	143

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Purgeable Aromatics
Method: SW8021B
WorkOrder: 99090123
Lab Batch ID: R2729

Method Blank

RunID: HP_J_990921A-59432 Units: ug/L
Analysis Date: 09/22/1999 15:10 Analyst: CJ

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-11A	Trip Blank 9/8/99

Analyte	Result	Rep Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
Xylenes,Total	ND	2.0
Surr: 1,4-Difluorobenzene	94.8	72-137
Surr: 4-Bromofluorobenzene	80.5	48-156

Laboratory Control Sample (LCS)

RunID: HP_J_990921A-58639 Units: ug/L
Analysis Date: 09/21/1999 12:03 Analyst: CJ

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Benzene	50	52	104	61	119
Ethylbenzene	50	51	102	70	118
Toluene	50	52	104	65	125
Xylenes,Total	150	150	100	72	116

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090100-01
RunID: HP_J_990921A-60934 Units: ug/L
Analysis Date: 09/22/1999 13:30 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Benzene	ND	20	18	92.2	20	13	63	38.1*	21	32	164
Ethylbenzene	ND	20	18	91.0	20	12	61	39.1*	19	52	142
Toluene	ND	20	18	91.8	20	12	62	38.4*	20	38	159
Xylenes,Total	ND	60	55.1987	92.0	60	37.1491	62	39.1*	17	53	143

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Gasoline Range Organics
Method: SW8015B

WorkOrder: 99090123
Lab Batch ID: R2847

Method Blank

RunID: HP_J_990922B-61342 Units: mg/L
Analysis Date: 09/22/1999 15:10 Analyst: CJ

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-11A	Trip Blank 9/8/99

Analyte	Result	Rep Limit
Gasoline Range Organics	ND	0.10
Surr: 1,4-Difluorobenzene	86.7	62-144
Surr: 4-Bromofluorobenzene	70.6	44-153

Laboratory Control Sample (LCS)

RunID: HP_J_990922B-61339 Units: mg/L
Analysis Date: 09/22/1999 13:05 Analyst: CJ

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Gasoline Range Organics	1	0.7	70	64	131

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090100-02
RunID: HP_J_990922B-61340 Units: mg/L
Analysis Date: 09/22/1999 14:19 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Gasoline Range Organics	ND	1	0.45	45.4	1	0.77	77	50.9*	36	36	160

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Gasoline Range Organics
Method: SW8015B

WorkOrder: 99090123
Lab Batch ID: R2877

Method Blank

RunID: HP_J_990916C-61764 Units: mg/L
Analysis Date: 09/16/1999 9:31 Analyst: CJ

Analyte	Result	Rep Limit
Gasoline Range Organics	ND	0.10
Surr: 1,4-Difluorobenzene	88.3	62-144
Surr: 4-Bromofluorobenzene	68.5	44-153

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-01A	MW-5
99090123-02A	MW-12D
99090123-03A	MW-3
99090123-04A	MW-4
99090123-05A	OW-4
99090123-06A	MW-1
99090123-07A	MW-12
99090123-08A	MW-10
99090123-09A	MW-13
99090123-10A	Duplicate

Laboratory Control Sample (LCS)

RunID: HP_J_990916C-61773 Units: mg/L
Analysis Date: 09/16/1999 14:59 Analyst: CJ

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Gasoline Range Organics	1	0.82	82	64	131

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090123-07
RunID: HP_J_990916C-61778 Units: mg/L
Analysis Date: 09/17/1999 12:43 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Gasoline Range Organics	0.23	1	1.3	108	1	0.91	68	45.6*	36	36	160

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Nitrogen, Nitrate (As N) **WorkOrder:** 99090123
Method: E300 **Lab Batch ID:** R2834

Method Blank

RunID: WET_990915L-60813 Units: mg/L
Analysis Date: 09/15/1999 14:45 Analyst: ES

Analyte	Result	Rep Limit
Nitrogen,Nitrate (As N)	ND	0.10

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-01C	MW-5
99090123-02C	MW-12D
99090123-05C	OW-4
99090123-07C	MW-12
99090123-08C	MW-10

Laboratory Control Sample (LCS)

RunID: WET_990915L-60814 Units: mg/L
Analysis Date: 09/15/1999 14:45 Analyst: ES

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Nitrogen,Nitrate (As N)	10	9.3	93	90	110

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 9909414-01A
RunID: WET_990915L-60816 Units: mg/L
Analysis Date: 09/15/1999 14:45 Analyst: ES

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Nitrogen,Nitrate (As N)	ND	10	9.1	90.6	10	9.1	91	.0772	20	86	115

Qualifiers:

ND/U - Not Detected at the Reporting Limit
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* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Sulfate
Method: E300

WorkOrder: 99090123
Lab Batch ID: R2873

Method Blank

RunID: WET_990927B-61587 Units: mg/L
Analysis Date: 09/27/1999 12:13 Analyst: ES

Analyte	Result	Rep Limit
Sulfate	ND	0.20

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090123-01C	MW-5
99090123-02C	MW-12D
99090123-05C	OW-4
99090123-07C	MW-12
99090123-08C	MW-10

Laboratory Control Sample (LCS)

RunID: WET_990927B-61588 Units: mg/L
Analysis Date: 09/27/1999 12:13 Analyst: ES

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Sulfate	10	9.9	99	90	110

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090123-01
RunID: WET_990927B-61590 Units: mg/L
Analysis Date: 09/27/1999 12:13 Analyst: ES

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Sulfate	210	250	480	106	250	470	104	2.50	20	80	120

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

Chain of Custody

And

Sample Receipt Checklist

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 9909045 05 — 095990 — page 1 of 1

Client Name: Brown & Caldwell
Address/Phone: 1415 Louisiana #2500 713-759-0999
Client Contact: Bob Jennings
Project Name: BJ - Hobbs
Project Number: 12832
Project Location: Hobbs
Invoice To: Rick Rexroad

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil SL=sludge O=other:)	bottle (P=plastic A=amber glass G=glass V=vial)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz)	pres. (1=HCl 2=HNO3 3=H2SO4 O=other:)	Number of Containers	Requested Analysis: BTEX-8021B	TPH-D -8015 TPH-G	Nitrate 300.0 Sulfate	Methane, Ethylene, Ethane - RSK-SOP-147/175
MW-5	9.14.99	8:45			W				5	X	X	X	X
MW-12D	9.14.99	9:45			W				5	X	X	X	X
MW-3 *	9.14.99	10:20			W				5	X	X		
MW-4 *	9.14.99	10:50			W				5	X	X		
OW-4	9.14.99	11:45			W				5	X	X	X	X
MW-17	9.14.99	12:45			W				5	X	X	X	X
MW-12	9.14.99	13:20			W				5	X	X	X	X
MW-10	9.14.99	13:45			W				5	X	X	X	X
MW-13 *	9.14.99	14:25			W				5	X	X		
Duplicate	9.14.99				W				5	X	X		

PUSH

Client/Consultant Remarks: * 24-hr rush on BTEX for MW-1, MW-3, MW-4, MW-13

Laboratory remarks:

Intact? ☑ Y ☐ N
Temp: 5c

Requested TAT
24hr ☒ 72hr ☐
48hr ☐ Standard ☐
Other ☐ _____

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

Special Detection Limits (specify):

PM review (initial):

	date	time	
1. Relinquished by Sampler:	9/14/99	16:35	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date	time	6. Received by Laboratory: 9/15/99 1000

☑ 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901
☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775
☐ 459-Hughes Drive, Traverse City, MI 49684 (616) 947-5777

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Sample Receipt Checklist

Workorder:	99090123	Received by:	Stelly, D'Anna
Date and Time Received:	9/15/99 10:00:00 AM	Carrier name:	FedEx
Temperature:	5		

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Water - VOA vials have zero headspace?	Yes ☑	No ☐	Not Present ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	

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Brown & Caldwell

Certificate of Analysis Number:

99090124

Report To:

Brown & Caldwell
Rick Rexroad
1415 Louisiana
Suite 2500
Houston
TX
77002-
ph: (713) 759-0999 fax: (713) 308-3886

Project Name: BJ- HOBBS
Site: BJ-Hobbs
Site Address:
PO Number:
State: New Mexico
State Cert. No.:
Date Reported:

Client Sample ID	Lab Sample ID	Matrix	Date Collected	Date Received	COC ID	HOLD
MW-9	99090124-01	Water	09/13/1999 14:45	09/14/1999 10:00		☐
MW-7	99090124-02	Water	09/13/1999 16:10	09/14/1999 10:00		☐
MW-8	99090124-03	Water	09/13/1999 16:40	09/14/1999 10:00		☐
MW-11A	99090124-04	Water	09/13/1999 17:15	09/14/1999 10:00		☐

Patricia L. Lynch

Lynch, Pat
Project Manager

9/29/99
Date

Joel Grice
Laboratory Director

Ted Yen
Quality Assurance Officer

HOUSTON LABORATORY
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Client Sample ID: MW-9 Collected: 09/13/99 14:45 SPL Sample ID: 99090124-01

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			**SW8015B**		**Units: mg/L**		
Diesel Range Organics	ND	0.20	1		09/22/99 18:49	RR	59344
Surr: Pentacosane	55	20-131	1		09/22/99 18:49	RR	59344

Run ID/Seq #: HP_V_990921B-59344

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			**SW8015B**		**Units: mg/L**		
Gasoline Range Organics	ND	0.10	1		09/26/99 19:19	WR	60860
Surr: 1,4-Difluorobenzene	89	62-144	1		09/26/99 19:19	WR	60860
Surr: 4-Bromofluorobenzene	96	44-153	1		09/26/99 19:19	WR	60860
PURGEABLE AROMATICS			**SW8021B**		**Units: ug/L**		
Benzene	ND	1.0	1		09/22/99 22:13	CJ	61535
Ethylbenzene	ND	1.0	1		09/22/99 22:13	CJ	61535
Toluene	ND	1.0	1		09/22/99 22:13	CJ	61535
Xylenes,Total	ND	2.0	1		09/22/99 22:13	CJ	61535
Surr: 1,4-Difluorobenzene	97	72-137	1		09/22/99 22:13	CJ	61535
Surr: 4-Bromofluorobenzene	85	48-156	1		09/22/99 22:13	CJ	61535

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID: MW-7 **Collected:** 09/13/99 16:10 **SPL Sample ID:** 99090124-02

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	ND	0.20	1		09/22/99 19:28	RR	59345
Surr: Pentacosane	34	20-131	1		09/22/99 19:28	RR	59345

Run ID/Seq #: HP_V_990921B-59345

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	ND	0.10	1		09/26/99 19:48	WR	60861
Surr: 1,4-Difluorobenzene	88	62-144	1		09/26/99 19:48	WR	60861
Surr: 4-Bromofluorobenzene	95	44-153	1		09/26/99 19:48	WR	60861
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	ND	1.0	1		09/22/99 22:42	CJ	61536
Ethylbenzene	ND	1.0	1		09/22/99 22:42	CJ	61536
Toluene	ND	1.0	1		09/22/99 22:42	CJ	61536
Xylenes,Total	ND	2.0	1		09/22/99 22:42	CJ	61536
Surr: 1,4-Difluorobenzene	96	72-137	1		09/22/99 22:42	CJ	61536
Surr: 4-Bromofluorobenzene	82	48-156	1		09/22/99 22:42	CJ	61536

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Client Sample ID: MW-8 Collected: 09/13/99 16:40 SPL Sample ID: 99090124-03

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	ND	0.20	1		09/22/99 20:06	RR	59346
Surr: Pentacosane	42	20-131	1		09/22/99 20:06	RR	59346

Run ID/Seq #: HP_V_990921B-59346

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	ND	0.10	1		09/26/99 20:17	WR	60862
Surr: 1,4-Difluorobenzene	90	62-144	1		09/26/99 20:17	WR	60862
Surr: 4-Bromofluorobenzene	94	44-153	1		09/26/99 20:17	WR	60862
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	ND	1.0	1		09/22/99 23:07	CJ	61537
Ethylbenzene	ND	1.0	1		09/22/99 23:07	CJ	61537
Toluene	ND	1.0	1		09/22/99 23:07	CJ	61537
Xylenes,Total	ND	2.0	1		09/22/99 23:07	CJ	61537
Surr: 1,4-Difluorobenzene	95	72-137	1		09/22/99 23:07	CJ	61537
Surr: 4-Bromofluorobenzene	83	48-156	1		09/22/99 23:07	CJ	61537

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

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Client Sample ID: MW-11A | Collected: 09/13/99 17:15 | SPL Sample ID: 99090124-04

Analyses/Method	Result	Rep.Limit	Dil. Factor	QUAL	Date Analyzed	Analyst	Seq. #
DIESEL RANGE ORGANICS			SW8015B		Units: mg/L		
Diesel Range Organics	ND	0.20	1		09/22/99 20:44	RR	59347
Surr: Pentacosane	21	20-131	1		09/22/99 20:44	RR	59347
GASOLINE RANGE ORGANICS			SW8015B		Units: mg/L		
Gasoline Range Organics	ND	0.10	1		09/26/99 20:46	WR	60863
Surr: 1,4-Difluorobenzene	88	62-144	1		09/26/99 20:46	WR	60863
Surr: 4-Bromofluorobenzene	95	44-153	1		09/26/99 20:46	WR	60863
HEADSPACE GAS ANALYSIS			RSK147		Units: mg/L		
Ethane	ND	0.0025	1		09/23/99 14:04	PC	59744
Ethylene	ND	0.0032	1		09/23/99 14:04	PC	59744
Methane	ND	0.0012	1		09/23/99 14:04	PC	59744
NITROGEN, NITRATE (AS N)			E300		Units: mg/L		
Nitrogen,Nitrate (As N)	0.22	0.10	1		09/14/99 18:50	ES	56565
PURGEABLE AROMATICS			SW8021B		Units: ug/L		
Benzene	ND	1.0	1		09/22/99 23:31	CJ	61538
Ethylbenzene	ND	1.0	1		09/22/99 23:31	CJ	61538
Toluene	ND	1.0	1		09/22/99 23:31	CJ	61538
Xylenes,Total	ND	2.0	1		09/22/99 23:31	CJ	61538
Surr: 1,4-Difluorobenzene	95	72-137	1		09/22/99 23:31	CJ	61538
Surr: 4-Bromofluorobenzene	85	48-156	1		09/22/99 23:31	CJ	61538
SULFATE			E300		Units: mg/L		
Sulfate	250	4.0	20		09/17/99 14:00	ES	59383

Run ID/Seq #: HP_V_990921B-59347

Prep Method	Prep Date	Prep Initials
SW3510B	09/17/1999 8:40	KL

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution

Quality Control Documentation

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

Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Diesel Range Organics
Method: SW8015B
WorkOrder: 99090124
Lab Batch ID: 854

Method Blank

RunID: HP_V_990921B-59330 Units: mg/L
Analysis Date: 09/21/1999 22:55 Analyst: RR
Preparation Date: 09/17/1999 8:40 Prep By: KL Method SW3510B

Analyte	Result	Rep Limit
Diesel Range Organics	ND	0.20
Surr: Pentacosane	91.5	20-131

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090124-01B	MW-9
99090124-02B	MW-7
99090124-03B	MW-8
99090124-04B	MW-11A

Laboratory Control Sample (LCS)

RunID: HP_V_990921B-59331 Units: mg/L
Analysis Date: 09/21/1999 23:33 Analyst: RR
Preparation Date: 09/17/1999 8:40 Prep By: KL Method SW3510B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Diesel Range Organics	5	4.8	97	53	148

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090123-02
RunID: HP_V_990921B-59333 Units: mg/L
Analysis Date: 09/22/1999 6:00 Analyst: RR

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Diesel Range Organics	ND	5	4.7	93.0	5	5.3	106	12.9	39	21	175

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Headspace Gas Analysis
Method: RSK147

WorkOrder: 99090124
Lab Batch ID: R2779

Method Blank

RunID: VARC_990923A-59735 Units: mg/L
Analysis Date: 09/23/1999 10:12 Analyst: PC

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090124-04D	MW-11A

Analyte	Result	Rep Limit
Ethane	ND	0.0025
Ethylene	ND	0.0032
Methane	ND	0.0012

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Purgeable Aromatics
Method: SW8021B
WorkOrder: 99090124
Lab Batch ID: R2865

Method Blank

RunID: HP_J_990922C-61532 Units: ug/L
Analysis Date: 09/22/1999 15:10 Analyst: CJ

Analyte	Result	Rep Limit
Benzene	ND	1.0
Ethylbenzene	ND	1.0
Toluene	ND	1.0
Xylenes,Total	ND	2.0
Surr: 1,4-Difluorobenzene	94.8	72-137
Surr: 4-Bromofluorobenzene	80.5	48-156

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090124-01A	MW-9
99090124-02A	MW-7
99090124-03A	MW-8
99090124-04A	MW-11A

Laboratory Control Sample (LCS)

RunID: HP_J_990922C-61529 Units: ug/L
Analysis Date: 09/22/1999 12:41 Analyst: CJ

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Benzene	50	54	108	61	119
Ethylbenzene	50	53	107	70	118
Toluene	50	54	108	65	125
Xylenes,Total	150	162	108	72	116

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090100-01
RunID: HP_J_990922C-61530 Units: ug/L
Analysis Date: 09/22/1999 13:30 Analyst: CJ

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Benzene	ND	20	18	92.2	20	13	63	38.1*	21	32	164
Ethylbenzene	ND	20	18	91.0	20	12	61	39.1*	19	52	142
Toluene	ND	20	18	91.8	20	12	62	38.4*	20	38	159
Xylenes,Total	ND	60	55	91.7	60	37	62	39.1*	17	53	143

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
J - Estimated value between MDL and PQL
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Gasoline Range Organics
Method: SW8015B
WorkOrder: 99090124
Lab Batch ID: R2838

Method Blank

RunID: HP_S_990924A-60855 Units: mg/L
Analysis Date: 09/24/1999 17:23 Analyst: WR

Analyte	Result	Rep Limit
Gasoline Range Organics	ND	0.10
Surr: 1,4-Difluorobenzene	88.7	62-144
Surr: 4-Bromofluorobenzene	94.3	44-153

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090124-01A	MW-9
99090124-02A	MW-7
99090124-03A	MW-8
99090124-04A	MW-11A

Laboratory Control Sample (LCS)

RunID: HP_S_990924A-60854 Units: mg/L
Analysis Date: 09/24/1999 16:54 Analyst: WR

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Gasoline Range Organics	1	0.9	90	64	131

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 9909616-06A
RunID: HP_S_990924A-60856 Units: mg/L
Analysis Date: 09/24/1999 18:49 Analyst: WR

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Gasoline Range Organics	ND	1	0.99	98.5	1	0.95	95	3.23	36	36	160

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Nitrogen, Nitrate (As N) **WorkOrder:** 99090124
Method: E300 **Lab Batch ID:** R2617

Method Blank

RunID: WET_990914J-56558 Units: mg/L
Analysis Date: 09/14/1999 18:50 Analyst: ES

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090124-04C	MW-11A

Analyte	Result	Rep Limit
Nitrogen,Nitrate (As N)	ND	0.10

Laboratory Control Sample (LCS)

RunID: WET_990914J-56559 Units: mg/L
Analysis Date: 09/14/1999 18:50 Analyst: ES

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Nitrogen,Nitrate (As N)	10	9.3	93	90	110

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090100-01
RunID: WET_990914J-56561 Units: mg/L
Analysis Date: 09/14/1999 18:50 Analyst: ES

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Nitrogen,Nitrate (As N)	0.22	10	9.4	91.8	10	9.4	92	.0654	20	86	115

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

HOUSTON LABORATORY
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Quality Control Report

Brown & Caldwell

BJ- HOBBS

Analysis: Sulfate
Method: E300
WorkOrder: 99090124
Lab Batch ID: R2767

Method Blank

RunID: WET_990921M-59376 Units: mg/L
Analysis Date: 09/17/1999 14:00 Analyst: ES

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
99090124-04C	MW-11A

Analyte	Result	Rep Limit
Sulfate	ND	0.20

Laboratory Control Sample (LCS)

RunID: WET_990921M-59377 Units: mg/L
Analysis Date: 09/17/1999 14:00 Analyst: ES

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Sulfate	10	10	101	90	110

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 99090100-02
RunID: WET_990921M-59379 Units: mg/L
Analysis Date: 09/17/1999 14:00 Analyst: ES

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Sulfate	230	500	740	101	500	740	100	0.927	20	80	120

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte detected in the associated Method Blank
* - Recovery Outside Advisable QC Limits
D - Surrogate Recovery Unreportable due to Dilution

Chain of Custody

And

Sample Receipt Checklist

SPL, Inc.

Analysis Request & Chain of Custody Record

SPL Workorder No: 99090124 | 095991 | page 1 of 1

Client Name: Brown & Caldwell
Address/Phone: 1415 Louisiana #2500 713-7550599
Client Contact: Rick Rexroad
Project Name: BS- Hobbs
Project Number: 12832
Project Location: Hobbs, N.M.
Invoice To: Rick Rexroad

SAMPLE ID	DATE	TIME	comp	grab	matrix (W=water S=soil SL=sludge O=other:)	bottle (P=plastic A=amber glass G=glass V=vial)	size (1=1 liter 4=4oz 40=vial 8=8oz 16=16oz)	pres. (1=HCl 2=HNO3 3=H2SO4 O=other:)	Number of Containers	Requested Analysis: BTEX-5021B	TPH-DRO-CRO 8015	NITRATE 300.0 SULFATE	METHANE ETHANE ACETYLENE RSK-SOP/M 175					
MW-3	9.13.99	14:45			W				5	X	X							
MW-7	9.13.99	16:10			W				5	X	X							
MW-8	9.13.99	16:40			W				5	X	X							
MW-11A	9.13.99	17:15			W				9	X	X	X	X					

RUSH

Client/Consultant Remarks:

Laboratory remarks:

Intact? ☐ Y ☐ N
Temp: 5°C

Requested TAT
24hr ☐ 72hr ☐
48hr ☐ Standard ☒
Other ☐ _____

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

Special Detection Limits (specify):

PM review (initial):

	date	time		
1. Relinquished by Sampler:	9.13.99	17:30	2. Received by:	
3. Relinquished by:	date	time	4. Received by:	
5. Relinquished by:	9-14-99	1000	6. Received by Laboratory:	

☒ 3880 Interchange Drive, Houston, TX 77054 (713) 660-0901
☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775
☐ 459 Hughes Drive, Traverse City, MI 49684 (616) 947-5777

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Sample Receipt Checklist

Workorder:	99090124	Received by:	Turnell, Randy
Date and Time Received:	9/14/99 10:00:00 AM	Carrier name:	FedEx
Temperature:	5 C		

Shipping container/cooler in good condition?	Yes	☑	No ☐	Not Present	☐
Custody seals intact on shippping container/cooler?	Yes	☑	No ☐	Not Present	☐
Custody seals intact on sample bottles?	Yes	☐	No ☐	Not Present	☑
Chain of custody present?	Yes	☑	No ☐		
Chain of custody signed when relinquished and received?	Yes	☑	No ☐		
Chain of custody agrees with sample labels?	Yes	☑	No ☐		
Samples in proper container/bottle?	Yes	☑	No ☐		
Sample containers intact?	Yes	☑	No ☐		
Sufficient sample volume for indicated test?	Yes	☑	No ☐		
All samples received within holding time?	Yes	☑	No ☐		
Container/Temp Blank temperature in compliance?	Yes	☑	No ☐		
Water - VOA vials have zero headspace?	Yes	☑	No ☐	Not Present	☐
Water - pH acceptable upon receipt?	Yes	☑	No ☐		