GW - 12

MONITORING REPORTS

DATE:

BROWN AND CALDWELL

Suite 2500, 1415 Louisiana, Houston, TX 77002 TRANSMITTAL MEMORANDUM (713) 759-0999 • (713) 308-3886 To: Mr. Wayne Price Date: October 14, 1999 Job No: 12832.014 State of New Mexico Subject: BJ Services - Hobbs, New Mexico Energy, Minerals, and Natural Resources Dept. Contract No.: Equipment No: Oil Conservation Division 2040 South Pacheco Street, State Land Office Bldg. Spec. Ref: Certified # P 076 598 832 Submittal No: Santa Fe, New Mexico 87505 WE ARE SENDING: Under separate cover via 1st Class Mail the following items: ⊠Attached ∐Samples JShop Drawings JPrints. ☐ Specifications Change Order Copy of letter Other: Final Report THESE ARE TRANSMITTED AS CHECKED BELOW: SUBMITTAL REVIEW ACTIONS: Second submittal ☐ No exceptions taken 🛛 For your use Make revisions For approval Amend and resubmit For review and comment Rejected--see Remarks With submittal review action noted None Copies Date No. Description 1 10/1/99 12832.014 Final June/July 1999 Groundwater Sampling Report Hobbs, New Mexico

Facility BJ Services Company, U.S.A.

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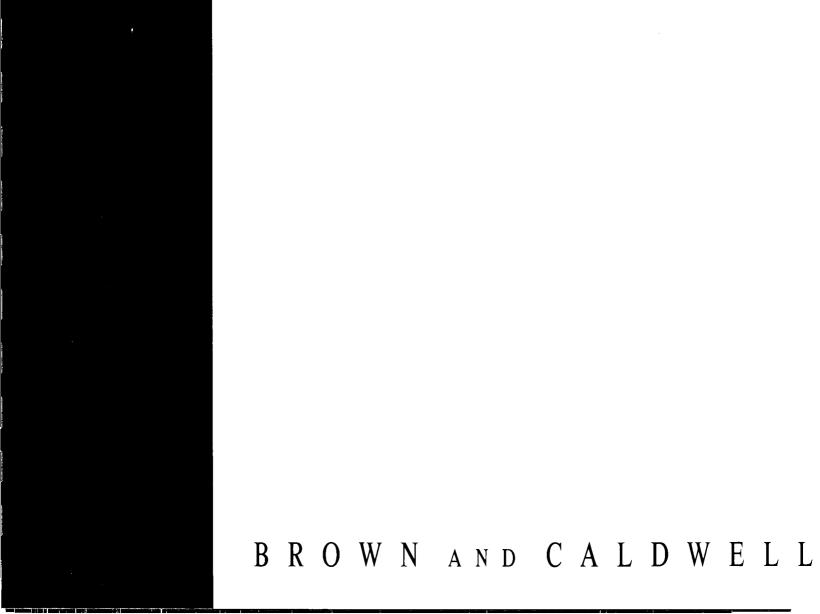
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JUNE/JULY 1999 GROUNDWATER SAMPLING REPORT HOBBS, NEW MEXICO FACILITY

BJ SERVICES COMPANY, U.S.A.

SEPTEMBER 29, 1999

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

Prepared for

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CONTENTS

1.0	INTRODUCTION1					
2.0	FIELD ACTIVITIES AND RESULTS					
	2.1 Monitor Well Installation Activities 3					
	2.2 Plugging and Abandonment Activities					
	2.3 Groundwater Measurements and Sampling 6					
	 2.4 Results of Groundwater Analyses 2.5 Natural Attenuation Evaluation 11 					
	2.3 Natural Attenuation Evaluation					
3.0 REMEDIATION SYSTEM						
	3.1 System Installation and Effectiveness					
	3.2 Air Emissions					
4.0	CONCLUSIONS AND RECOMMENDATIONS20					
	4.1 Conclusions 20					
	4.2 Recommendations 20					
DISTI	RIBUTION AND QA/QC REVIEWER'S SIGNATURE					
FIGU	RES					
1	Site Map					
2	Groundwater Elevation Map for July 2, 1999					
3	Benzene Isoconcentration and Total BTEX Distribution Map for June 10/July 2, 1999					
4	Total Petroleum Hydrocarbons Distribution Map for June 10/July 2, 1999					
5	Chloride Isoconcentration Map					
6	Dissolved Benzene Mass vs. Time: West Plume					
7	Groundwater Elevation and Depth to Groundwater vs. Time					
	······································					
TABL	ES					
1	Site Chronology					
2	Cumulative Groundwater Elevation Data					
3	Field Screening Results for Groundwater Samples					
4	Cumulative Analytical Results for Groundwater Samples					
5	Summary of Detected Analytes for PAHs, Metals, VOCs, SVOCs, and Groundwater					
	Quality Parameters					
6	Laboratory Analytical Results for Natural Attenuation Evaluation Parameters					
7	Summary of Analytical Results for Air Emissions					

CONTENTS (Continued)

APPENDICES

- A Regulatory Correspondence
- B Boring Logs and Well Construction Diagrams for Monitor Wells MW-12D and MW-13
- C Groundwater Sampling Forms
- D Laboratory Analytical Reports for Groundwater Samples

1.0 INTRODUCTION

Brown and Caldwell conducted field activities associated with the June 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 June 10, 1999. Brown and Caldwell conducted additional field activities during the period of June 28 – July 2, 1999 pursuant to the work plan for groundwater delineation submitted to the New Mexico Oil Conservation Division (NMOCD) on March 19, 1999 and approved by the NMOCD on May 19, 1999. Pertinent regulatory correspondence is included in Appendix A. This report presents a summary of the groundwater sampling event, a description of the groundwater delineation field activities, and a summary of the analytical results.

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 groundwater remediation system, and previous sampling events is presented on Table 1. Expansions of the biosparging system were performed in March/April 1997 and February/March 1998.

Groundwater samples collected from existing monitor wells at the facility in June 1999 were analyzed for the quarterly monitoring constituents specified in NMOCD GW-072. Two wells were installed at the facility in June/July 1999. Groundwater samples from these wells, and an existing off-site well that had not previously been included in the quarterly sampling program for the BJ Services Hobbs, New Mexico facility, were analyzed for the New Mexico Water Quality Control Commission (WQCC) constituents. 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. Three existing monitor wells were plugged and abandoned in June/July 1999, as directed by NMOCD.

2.0 FIELD ACTIVITIES AND RESULTS

On June 10, 1999, Brown and Caldwell purged and sampled existing groundwater monitor wells at and adjacent to the BJ Services Hobbs facility to determine concentrations of dissolved-phase hydrocarbons in groundwater. Brown and Caldwell also sampled an existing off-site well, OW-4, for the first time on June 10, 1999. Sampling of well OW-4 was performed in accordance with the work plan for groundwater delineation approved by the NMOCD on May 19, 1999 (see Appendix A). The locations of these wells are shown in the site map presented as Figure 1.

On June 29 – July 2, 1999, Brown and Caldwell installed, developed, and sampled two monitor wells at the BJ Services facility in accordance with the previously referenced NMOCD-approved work plan for groundwater delineation. The locations of these wells, MW-12D and MW-13, are also shown in Figure 1. Three existing monitor wells (MW-2, MW-6, and MW-11) were located, plugged and abandoned (P&Ad) during the period of June 28 – July 1, 1999, as directed by NMOCD. These wells were not sampled prior to being P&Ad.

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

2.1 Monitor Well Installation Activities

Brown and Caldwell installed two on-site monitor wells at the BJ Services Hobbs facility in late June and early July 1999 in accordance with the NMOCD-approved work plan included within Appendix A.

Monitor well MW-12D was installed at a location immediately east of monitor well MW-12 in order to evaluate possible vertical gradients in dissolved-phase constituent concentrations. Monitor well MW-13 was installed at a location to the northeast of monitor well MW-6 in order to investigate potential groundwater impact downgradient of the easternmost lateral of the biosparging system.

The monitor well borings were completed using hollow stem auger drilling techniques. Soil cuttings were classified in accordance with the Unified Soil Classification System. The boring logs and well construction diagrams for monitor wells MW-12D and MW-13 are presented in Appendix B. The soil borings were completed as monitor wells.

Monitor well MW-12D was constructed with 10 feet of well screen. In accordance with the NMOCD-approved work plan, the screen in monitor well MW-12D was set at a depth of approximately 20 feet to 30 feet below the observed top of the saturated zone at the MW-12/12D location. The top of the saturated zone in monitor well MW-12 was measured at a depth of 57.5 feet below ground surface (bgs) prior to drilling the MW-12D boring, so well MW-12D was screened at a depth of 77.5 feet to 87.5 feet bgs. Monitor well MW-12 is screened at a depth of 50 feet to 65 feet bgs. The screens in adjacent monitor wells MW-12 and MW-12D were set at different depths to facilitate evaluation of possible vertical gradients in constituent concentrations.

Monitor well MW-13 was constructed with 15 feet of well screen. Prior to initiating drilling operations, the top of the saturated zone at the MW-13 location was anticipated to be at approximately 56 feet bgs based on water level measurements in nearby wells. The screen in monitor well MW-13 was set such that approximately 5 feet of well screen was situated above the top of the water table and approximately 10 feet of well screen was situated below the top of the water table. Straddling of the observed top of the saturated zone was performed to ensure that the top of the saturated zone is within the screened interval of the well throughout seasonal fluctuations of the water table. The screened interval in monitor well MW-13 is from 51 feet to 66 feet bgs.

Monitor wells MW-12D and MW-13 were equipped with a 2-foot sediment sump and a sealing bottom cap. The total depth of monitor well MW-12D was measured at 88.57 feet below the top of casing of the well. The total depth of monitor well MW-13 was measured at 66.35 feet below the top of casing of the well. Two-inch diameter 0.010-inch machine-slotted well screen and 2-inch diameter Schedule 40 PVC riser pipe were used in the construction of both of the monitor wells. The top of the riser pipe extended to approximately 6 inches below existing grade in both of the monitor wells.

The annular area surrounding the wells was backfilled as follows:

- 20/40 grade filter sand was installed from the total depth of the boring to approximately 2 feet above the top of the well screen;
- A hydrated bentonite seal ranging in thickness from 21 feet in monitor well MW-12D to 2 feet in monitor well MW-13 was installed atop the sand filter; and
- The remainder of the annular area was backfilled with cement/bentonite grout using a tremie pipe.

The wells were equipped with a water-tight cap and were completed as flush-mount completions. Monitor well MW-12D was constructed with a 4-foot by 4-foot by 3-inch thick concrete pad sloping away from the well and surrounded by four bumper posts.

Monitor well MW-13 was drilled through the concrete floor of the facility's acid dock drum storage area. An approximate 2-foot by 2-foot square was cut around the well. The top of the protective steel well vault was set approximately 2 inches above the concrete floor of the drum storage area. Concrete was added to the annular area between the PVC riser pipe and the protective steel well vault. The annular area between the well vault and the floor of the drum storage area was filled with reinforced cement. The surface of the concrete was sloped from the exterior of the protective steel well vault to the concrete floor of the drum storage area.

The wells were developed by surging and bailing. Water from monitor well MW-12D was essentially free of suspended sediment after removal of approximately 65 gallons of water. Monitor well MW-13 was developed for a period in excess of 1 hour. After removal of approximately 20 gallons, water produced from well MW-13 was of low to moderate turbidity upon completion of development activities.

The elevation of the top of the PVC casing in each of the wells was determined relative to an existing on-site monitor well using field surveying techniques.

Soil cuttings generated during the installation of monitor wells MW-12D and MW-13 were separately containerized in 55-gallon drums that were stored at the acid dock drum storage area pending laboratory analysis of representative soil samples and evaluation of disposal options.

2.2 Plugging and Abandonment Activities

Flush-mounted monitor wells MW-2 and MW-11 had been covered during grading operations conducted at the facility and had not been sampled since January 1994 and September 1997, respectively. These wells were located using a Schoenstadt magnetometer, which reacted to the protective steel well vaults and steel covers of these wells.

Monitor wells MW-2, MW-6, and MW-11 were plugged and abandoned by pumping a cement/bentonite grout mixture from the total depths of the wells to the ground surface.

2.3 Groundwater Measurements and Sampling

Existing monitor wells MW-1, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-10, MW-11A, MW-12, and OW-4 were sampled on the June 10, 1999. New monitor wells MW-12D and MW-13 were sampled on July 2, 1999. A site map depicting the locations of the monitor wells is presented as Figure 1.

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 on 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 the wells to remove at least three well volumes of groundwater. A submersible pump was used during purging operations conducted on June 10,

1999. Monitor wells MW-12D and MW-13 were purged with a dedicated disposable bailer on July 2, 1999. Field parameter measurements for pH, conductivity, oxidation-reduction (redox) potential, dissolved oxygen (DO), and temperature were collected after each well volume was purged. 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 C. The field screening results for groundwater samples are presented on Table 3.

Groundwater samples obtained on June 10, 1999 were collected directly after completion of purging operations through the submersible pump discharge. Groundwater samples from monitor wells MW-12D and MW-13 were collected with a dedicated disposable bailer upon completion of purging operations. 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 (DI) water. Purge water generated from existing monitor wells was discharged to the on-site water reclamation system for re-use for other purposes by BJ Services. Development and purge water from new monitor wells MW-12D and MW-13 was containerized in 55-gallon drums that were stored at the acid dock drum storage are pending laboratory analysis of water from these wells and evaluation of disposal options. Excess water generated during equipment cleaning operations was discharged to the on-site water reclamation system for re-use for other purposes by BJ Services.

2.4 Results of Groundwater Analyses

Groundwater samples collected during this sampling event from existing monitor wells MW-1, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, MW-10, MW-11A, and MW-12 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. Monitor wells OW-4, MW-12D, and MW-13 had not previously been sampled as part of the quarterly sampling program for the BJ Services Hobbs facility. Groundwater samples from these wells were therefore analyzed for the following constituents:

- Volatile organic compounds (VOCs) by EPA Method 8260;
- Semivolatile organic compounds (SVOCs) by EPA Method 8270;
- Polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8310;
- RCRA metals using the EPA 3010A/6010B/7000 Series methodology;
- Major anions (chloride by Method 325.3; fluoride by Method 300.0; nitrate (as N) by Methods 300.0 and 353.3; and sulfate by Methods 300.0 and 375.4);
- Major cations (calcium, magnesium, potassium, and sodium by Method 6010B);
- Carbonate (as CaCO₃) and bicarbonate (as CaCO₃) by Method SM 4500-CO2D; and
- Dissolved methane/ethylene/ethane by Method RSK/SOP 147.

Four additional monitor wells (MW-5, MW-10, MW-11A and MW-12) were sampled for methane/ethylene/ethane, nitrate, and sulfate to evaluate natural attenuation processes.

The laboratory analytical reports and chain-of-custody records for the groundwater samples collected during the June/July 1999 field activities are included in Appendix D. It should be noted that monitor well OW-4 was designated as well OSW-4 in the pertinent analytical report and chain-of-custody record presented in Appendix D.

Current and cumulative analytical results for BTEX, TPH-D, and TPH-G are presented in Table 4.

Current and cumulative analytical results for groundwater quality parameters as well as detected VOCs, SVOCs, PAHs and RCRA metals are presented in Table 5. The analytical results for P:\Wp\BJSERV\12832\051r.doc

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nitrate, sulfate, and dissolved methane analyses performed on groundwater samples from monitor wells MW-5, MW-10, MW-11A, MW-12, MW-12D, MW-13, and OW-4 to evaluate natural attenuation processes are presented in Table 6.

BTEX constituent concentrations in excess of applicable laboratory detection limits were reported in eight of the 13 groundwater samples collected during this sampling event. Benzene concentrations were below the New Mexico 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 June/July 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 has not been detected in monitor well MW-1 since September 1998. Benzene concentrations in the off-site monitor well, MW-9, have not exceeded 0.01 mg/L since March 1997.

The decrease in benzene concentration from 0.049 mg/L in monitor well MW-12 (screened at a depth of 50 feet to 65 feet bgs) to less than 0.005 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 within the aquifer.

Benzene concentrations in MW-6 decreased substantially following the startup of the biosparging system in March 1995, but were been erratic after December 1996. Monitor well MW-6 was located immediately adjacent to (i.e., within approximately 5 feet east of) a subsequently installed biosparging system air injection/extraction well, AV-17. Monitor well MW-6 was therefore P&Ad in July 1999 and was replaced by monitor well MW-13, which is located approximately 30 feet east of MW-6. 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. Application of increased air flow to biosparging system Lateral No. 1, located upgradient of MW-13, is therefore recommended.

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

Chloride was detected at a concentration of 496 mg/L in monitor well MW-13 and at a concentration of 266 mg/L in well OW-4. Both of these detections exceed the New Mexico WQCC chloride standard of 250 mg/L, which applies to domestic water supply wells. Chloride data from this sampling event and the preceding March 1999 sampling event were used to construct the chloride isoconcentration map presented as Figure 5. The data presented in Figure 5 indicate that there was an apparent source of chloride impact to groundwater associated with the former field waste tanks that were removed in March 1997. Chloride impact to groundwater is also present in the monitor well MW-6/MW-13 area and in the vicinity of monitor well MW-8. The chloride concentrations of 314 mg/L in monitor well MW-12 and 266 mg/L in well OW-4 indicate the presence of a decreasing chloride concentration gradient in an eastward direction, suggesting that chloride impact at concentrations exceeding the New Mexico WOCC chloride standard of 250 mg/L is limited in a downgradient direction. The decrease in chloride concentration from 314 mg/L in monitor well MW-12 (screened at a depth of 50 feet to 65 feet bgs) to 195 mg/L in monitor well MW-12D (screened at a depth of 77.5 feet to 87.5 feet bgs) indicates that chloride impact is limited vertically within the aquifer. Therefore, no further investigation into the occurrence of chloride in groundwater in the vicinity of the facility is recommended.

The New Mexico WQCC fluoride standard of 1.6 mg/L was exceeded in wells MW-12D, MW-13, and OW-4 during the June/July 1999 sampling event.

Naphthalene was detected at a concentration of 0.034 mg/L in the groundwater sample collected from monitor well MW-13 on July 2, 1999. This detection is slightly in excess of the New Mexico WQCC standard of 0.03 mg/L for PAHs, expressed as total naphthalene plus monomethylnaphthalenes. Naphthalene is the only PAH constituent detected during the groundwater monitoring history of the facility. Wells located downgradient of well MW-13 displayed naphthalene concentrations of 0.006 mg/L (monitor well MW-10), 0.019 mg/L (well P:\Wp\BJSERV\12832\051r.doc

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MW-12), 0.006 mg/L (well MW-12D), and less than 0.001 mg/L (wells MW-11 and OW-4) during this or the preceding March 1999 groundwater sampling events. This data indicates that the extent of PAH impact in excess of the New Mexico WQCC standard is limited in a downgradient direction and that naphthalene concentrations decrease with depth within the uppermost aquifer at the facility.

There were no other constituents detected at concentrations in excess of applicable New Mexico WQCC standards during the June/July 1999 groundwater sampling event.

2.5 Natural Attenuation Evaluation

Natural attenuation is planned to be the primary remediation mechanism for the 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, MW-11A, and MW-12 have displayed continuous decreases from September 1998 to the present.

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, 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:

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

DO concentrations measured in monitor wells MW-10, MW-11A, and MW-12 are depressed relative to background. DO concentrations in these wells ranged from 0.32 mg/L to 0.74 mg/L (see Table 3). These concentrations are less than the DO concentrations ranging from 1.66 mg/L to 6.30 mg/L measured in monitor wells MW-5, MW-7, and MW-8, which are upgradient or cross-gradient wells believed to exhibit background conditions.

The concentration of BTEX constituents in downgradient well OW-4 is substantially less than the BTEX concentrations measured in monitor wells MW-10, MW-11A, and MW-12. The only BTEX constituent detected in well OW-4 was xylene, at a concentration of 0.0044 mg/L. The DO concentration in well OW-4 is 6.42 mg/L, which is comparable to background DO concentrations.

No BTEX constituents were detected in monitor well 12D, where the DO concentration of 4.00 mg/L is comparable to background DO concentrations.

The observed concentrations of DO 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-11A, and MW-12. These concentrations are less than the background nitrate concentration of 4.73 mg/L measured in monitor well MW-5 (see Table 6). The depletion of nitrate in monitor wells MW-10, MW-11A and MW-12 provides secondary evidence that natural attenuation of hydrocarbons is occurring at the facility.

The nitrate concentration of 2.1 mg/L in monitor well MW-12D is depressed relative to background, but is higher than the nitrate concentration (< 0.1 mg/L) in adjacent monitor well MW-12. BTEX constituents were detected at a concentration of 50.4 ug/L in MW-12, which is screened in the uppermost portion of the aquifer, but were not detected in MW-12D, which is screened in a deeper portion of the aquifer. The correlation between increased BTEX concentration and depletion of nitrate in the monitor well MW-12/MW-12D area also provides secondary evidence that natural attenuation of hydrocarbons is occurring at the facility.

BTEX constituents were detected at a very low concentration of 0.0044 mg/L in well OW-4. The nitrate concentration of 3.96 mg/L in OW-4 is comparable to the nitrate concentration of 4.73 mg/L observed in background well MW-5. The correlation between low BTEX concentration observed in well OW-4 and nitrate concentration at or near

background also suggests that natural attenuation of hydrocarbons is occurring 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 1.5 mg/L to 5 mg/L in monitor wells MW-10, MW-11A, MW-12, MW-12D, MW-13, and OW-4 (see Table 3). Ferrous iron was not detected in any other monitor wells at the facility.

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

Ferrous iron was detected at a concentration of 2 mg/L in groundwater from monitor well MW-12 and at a concentration of 1.4 mg/L in groundwater from monitor well MW-12D. The elevated concentration of ferrous iron in the upper portion of the aquifer, where BTEX constituents are present, relative to lower in the aquifer, where no BTEX constituents were detected, also suggests that ferric iron is acting as an electron acceptor during natural attenuation of hydrocarbons at the facility.

The presence of ferrous iron in monitor well MW-13 suggests that ferric iron may be serving as an electron acceptor during the biodegradation of hydrocarbons downgradient of the former fuel island 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 34.2 millivolts (mV) to 83.1 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 -127.3mV to -152.5 mV. The negative redox values in monitor wells MW-10, MW-11A and MW-12 indicate that electron acceptors other than dissolved oxygen (e.g., nitrate and 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 concentrations of methane are elevated in former field waste tanks area wells MW-10 and MW-11A relative to the methane concentrations in background well MW-5 and downgradient well OW-4 (see Table 6), 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 June/July 1999 groundwater sampling event may also provide evidence that natural attenuation of hydrocarbons is occurring. The three wells that displayed the highest benzene concentrations (MW-13, MW-10, and MW-12) displayed elevated alkalinity levels relative to all wells at the facility except monitor well MW-7.

Sulfate data presented in Table 6 displays no discernable trend, indicating that sulfate in not being utilized during intrinsic bioremediation.

Therefore, 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 wells MW-10 and MW-11A, as indicated by elevated dissolved methane concentrations.

It is recommended that monitoring for natural attenuation evaluation parameters continue in the former field waste tanks area.



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 June/July 1999 groundwater sampling event display declines 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, March 1999 and June/July 1999 sampling events. Total BTEX concentrations have dropped from 30.6 mg/L to 0.029 mg/L between December 1997 and June/July 1999. TPH concentrations decreased from 82 mg/L to 1.08 mg/L during this time period.

Benzene concentrations have decreased from 0.240 mg/L to 0.0017 mg/L in monitor well MW-3 and from 0.230 mg/L to less than 0.001 mg/L in monitor well MW-4 between December 1997 and June/July 1999. Similarly, total BTEX concentrations have decreased from 1.930 mg/L to 0.0408 mg/L in monitor well MW-3 and from 4.250 mg/L to 0.024 mg/L in monitor well MW-4 between December 1997 and June/July 1999. TPH concentrations in monitor well MW-3 dropped from 5.89 mg/L to 0.18 mg/L 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.

A graph showing the calculated dissolved-phase benzene mass in the western plume versus time is presented in Figure 6. The western plume is located in the area of monitor wells MW-1, MW-3, MW-4, and MW-13. 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.

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16

Benzene and total BTEX concentrations remain elevated in the downgradient portion of the western plume, however, as indicated by the data for monitor wells MW-6 and MW-13 presented in Table 4. Decreased hydrocarbon concentrations were observed in the central portion of the western plume after installation of deep injection wells AI-20 through AI-24 in February 1998, but there have been no deep injection wells installed in the downgradient area of 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 at in the downgradient area of the western plume, are as follows:

Well	Screened Interval (ft below grade)	Screened Interval (ft MSL)	Filter Pack (ft below grade)	Filter Pack (ft MSL)
AV-16	58.8	3585.4	55.5	3588.7
AV-17	58	3586.2	55.7	3588.5
AV-18	58	3586.2	52.2	3592.0
AV-19	57.9	3586.3	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 wells AV-16 through AV-19 therefore ranged from approximately 0.5 to 3.0 feet below the top of the saturated at the time that these wells were installed. Groundwater elevations have declined since November 1995, however, as indicated graphically in Figure 7. Based on data from monitor wells MW-1, MW-6, MW-7, and MW-8 collected on July 2, 1999 (see Table 2), the current depths of submergence of wells AV-16 through AV-19 range from approximately 2.9 feet above to 0.6 feet below the top of the saturated zone. Therefore, in addition to increasing air flow to Lateral No. 1, Brown and Caldwell recommends that air flow to wells AV-18 and AV-19 be shut off, and that all of the air directed to Lateral No.1 be injected through wells AV-16 and AV-17.

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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 June/July 1999 sampling event was 140 parts per million by volume (ppmv).

The TPH concentration of 140 ppmv measured during the June/July 1999 sampling event shows a substantial drop from the 1500 ppmv TPH discharge rate observed during the March 24, 1998 groundwater sampling event. The June/July 1999 TPH discharge rate of 140 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 P:\Wp\BJSERV\12832\051r.doc

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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 June/July 1999.

The VOC emissions rate calculated for the June/July 1999 groundwater sampling event was 0.12 pound per hour (lb/hour). This emission rate is below the regulatory limit of 10 lb/hour for VOCs. The June 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 0.11 lb/hour and 0.33 lb/hour during the time period of June 1998 through June/July 1999.

A cumulative summary of analytical results for air emissions monitoring is included in Table 7. 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 system modification. The subsequent decrease in mass transfer, in concert with plume mass calculations shown in Figure 6, indicate that the overall contaminant mass has been reduced by operation of the biosparging system.

4

4.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on information obtained during the June/July 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, continue to decline since installation of deep injection wells AI-20 through AI-24 in February 1998.
- Benzene concentrations in all monitor wells at the facility except MW-10, MW-12, and MW-13 are below the New Mexico WQCC standard of 0.01 mg/L for benzene.
- Impact to groundwater by chloride at concentrations in excess of the New Mexico WQCC chloride standard of 250 mg/L appears to be limited in a downgradient direction.
- No BTEX or TPH constituents were 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. The chloride concentration in MW-12D is less than the New Mexico WQCC standard of 250 mg/L. Comparison of this data to BTEX, TPH, and chloride concentrations in adjacent monitor well MW-12, which is screened in the uppermost portion of the aquifer, suggests that hydrocarbon and chloride impact to groundwater, where present at the facility, is limited to the uppermost portion of the aquifer.
- Natural attenuation processes appear to be operating to reduce hydrocarbon concentrations in monitor wells MW-10 and MW-12, which are located in the vicinity of the former field waste tanks that were removed in March 1997.

4.2 Recommendations

- Adjust the air injection rate to the easternmost lateral of the biosparging system in order to increase remedial pressure in the recalcitrant area of the west plume in the vicinity of monitor well MW-13, with air flow directed to wells AV-16 and AV-17 only.
- 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-12D, and OW-4.

DISTRIBUTION

June/July 1999 Groundwater Sampling Report BJ Services Company, U.S.A. Hobbs, New Mexico

September 29, 1999

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Oil Conservation Division

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Santa Fe, New Mexico 87505

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Post Office Box 1980 Hobbs, New Mexico 88240

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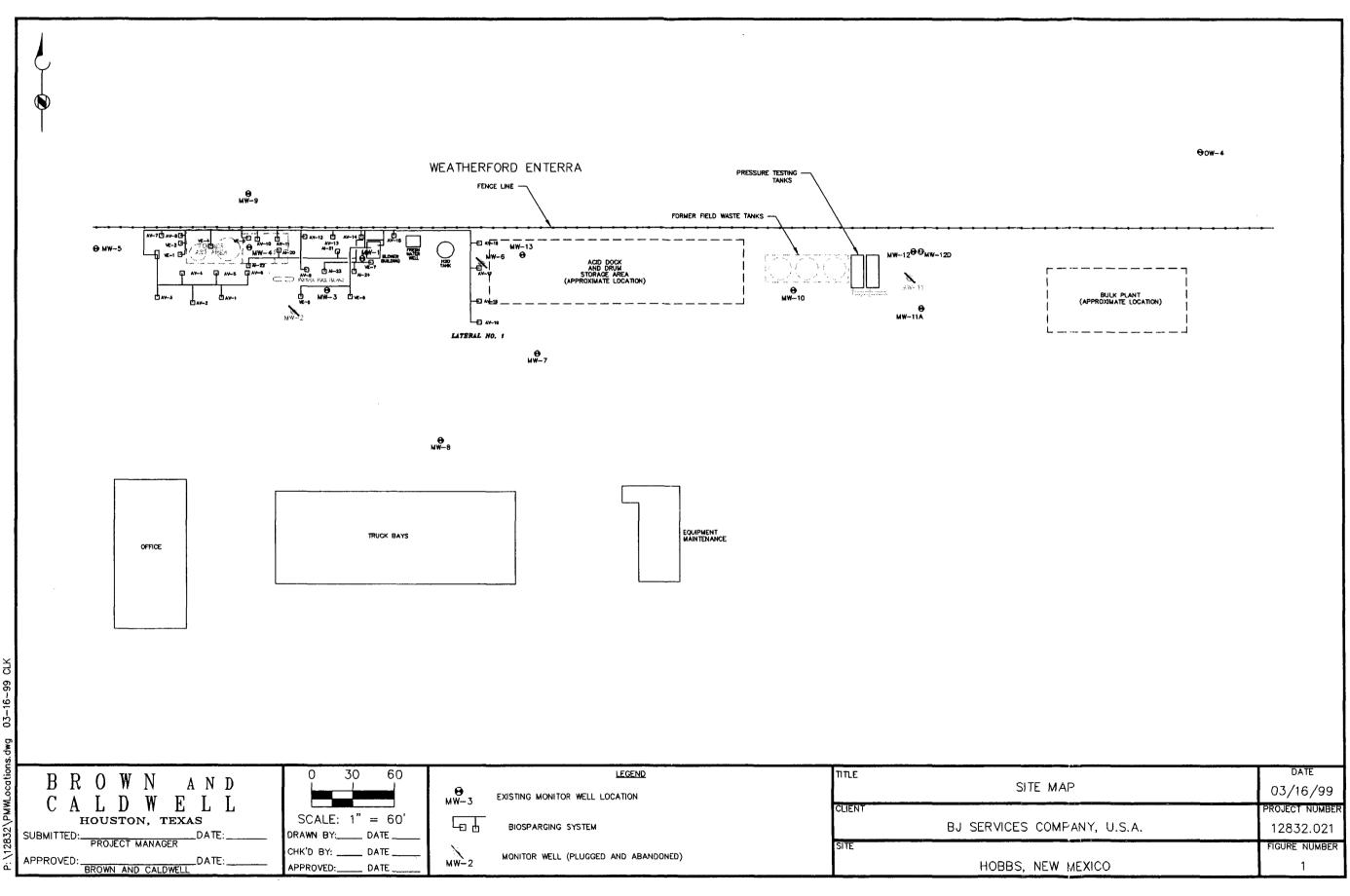
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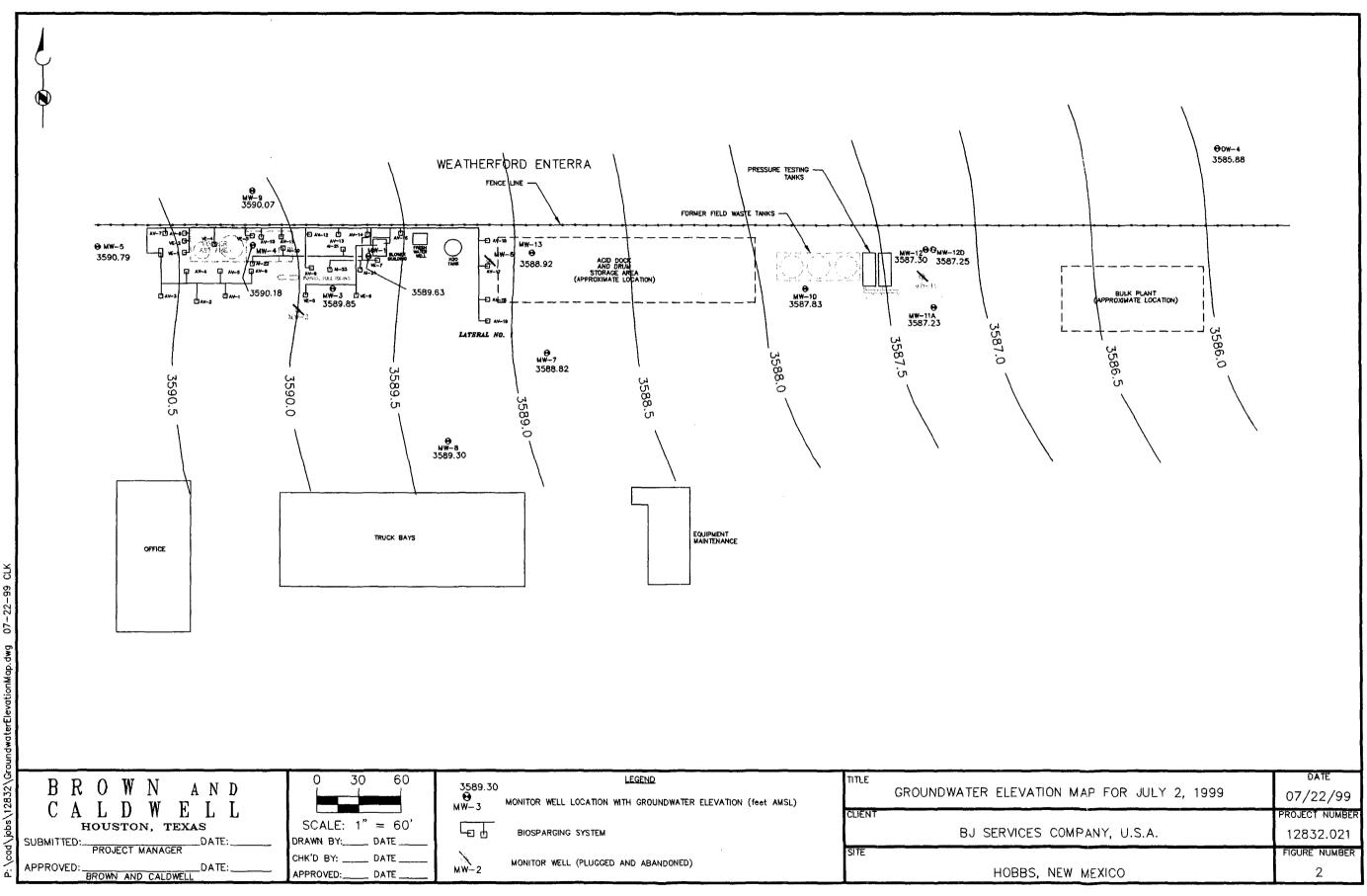
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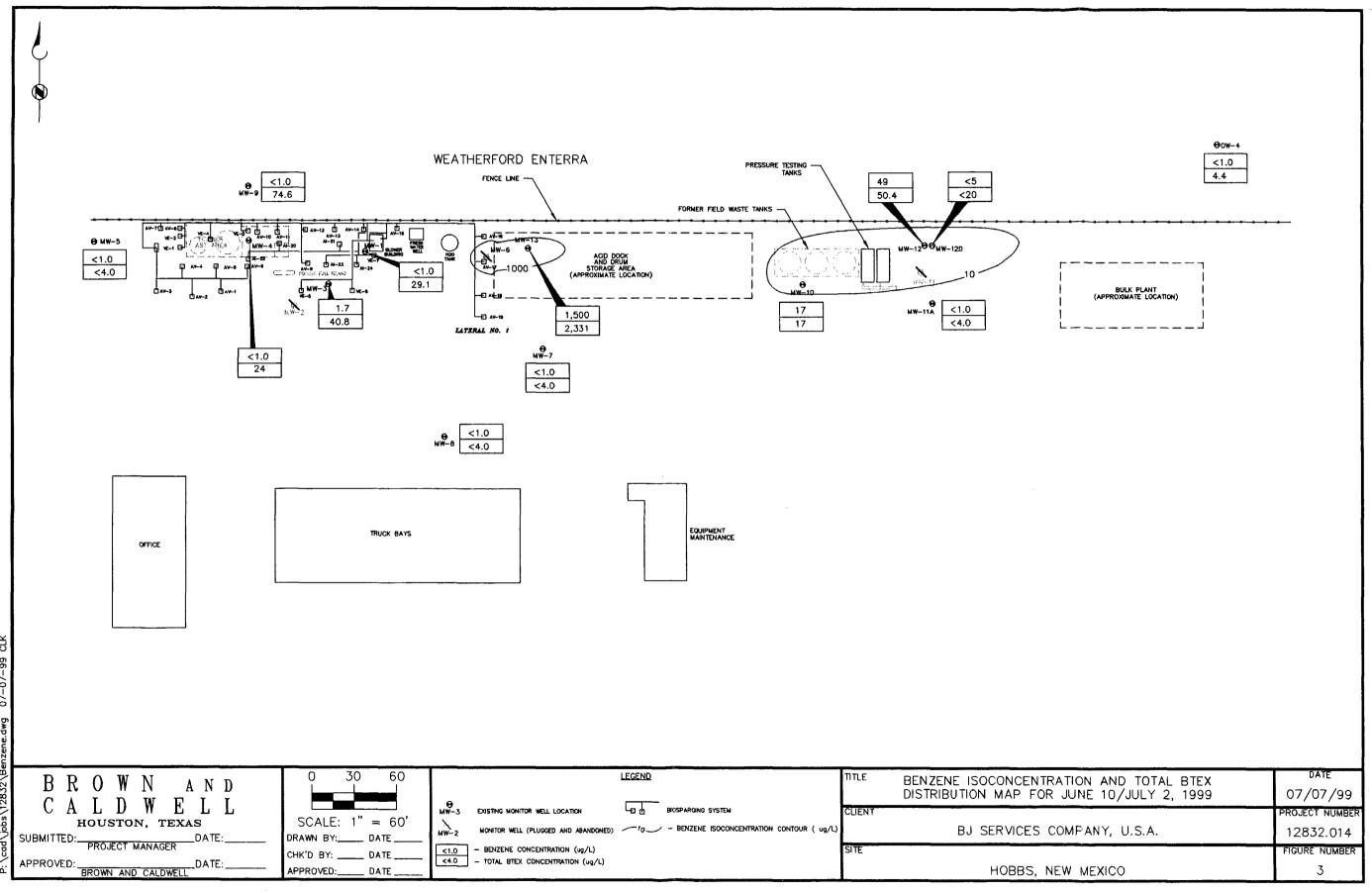
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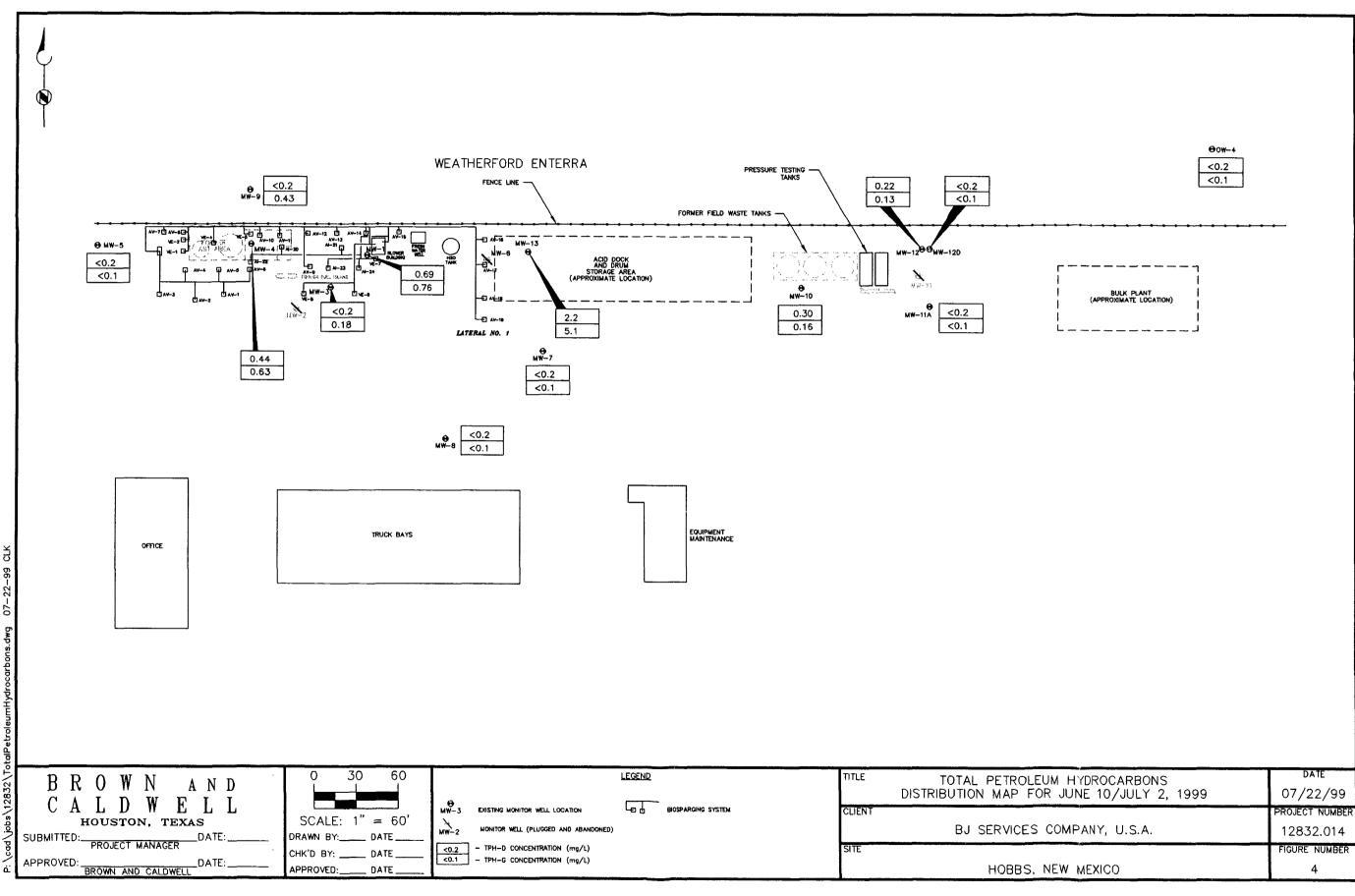
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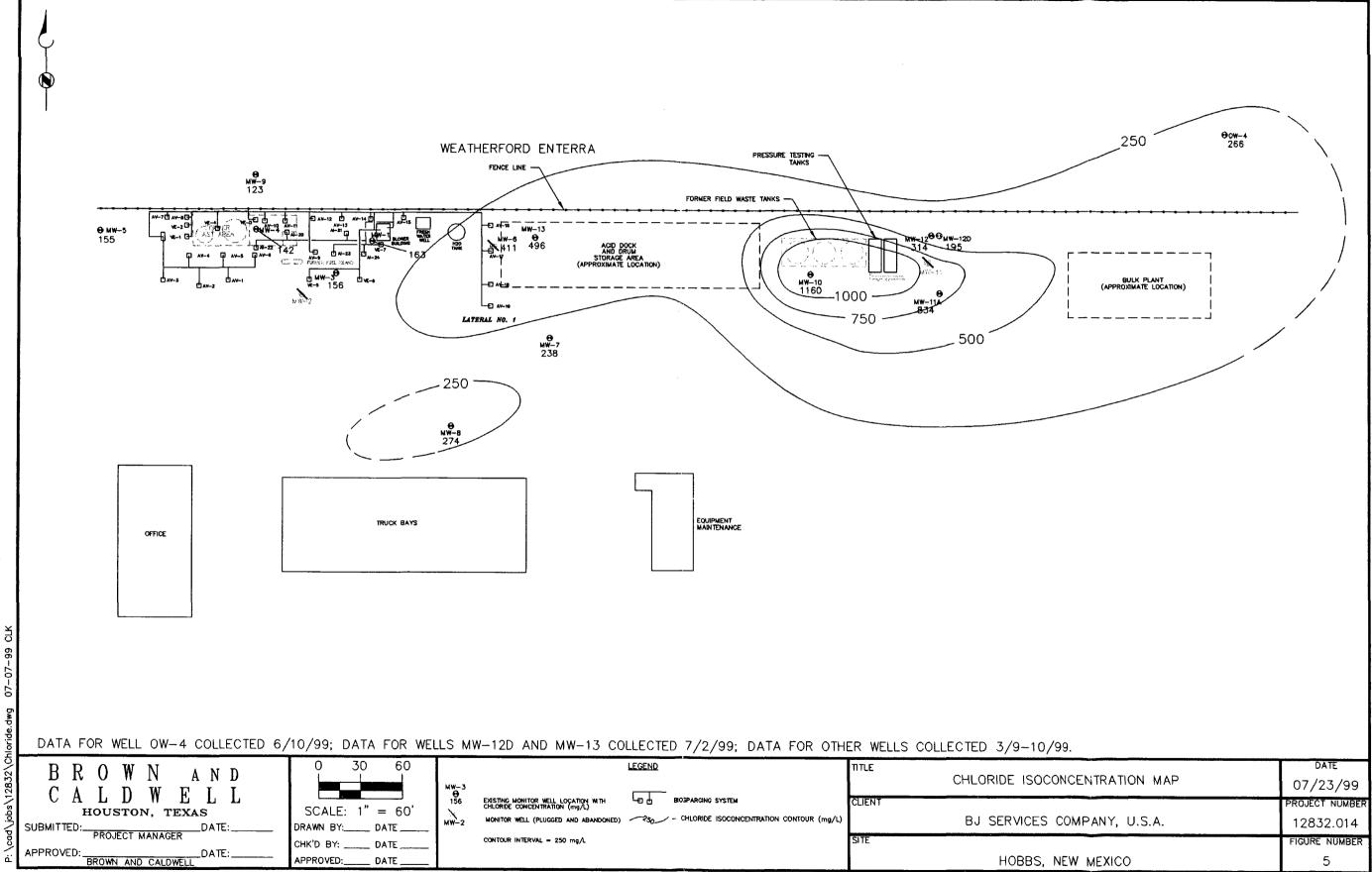


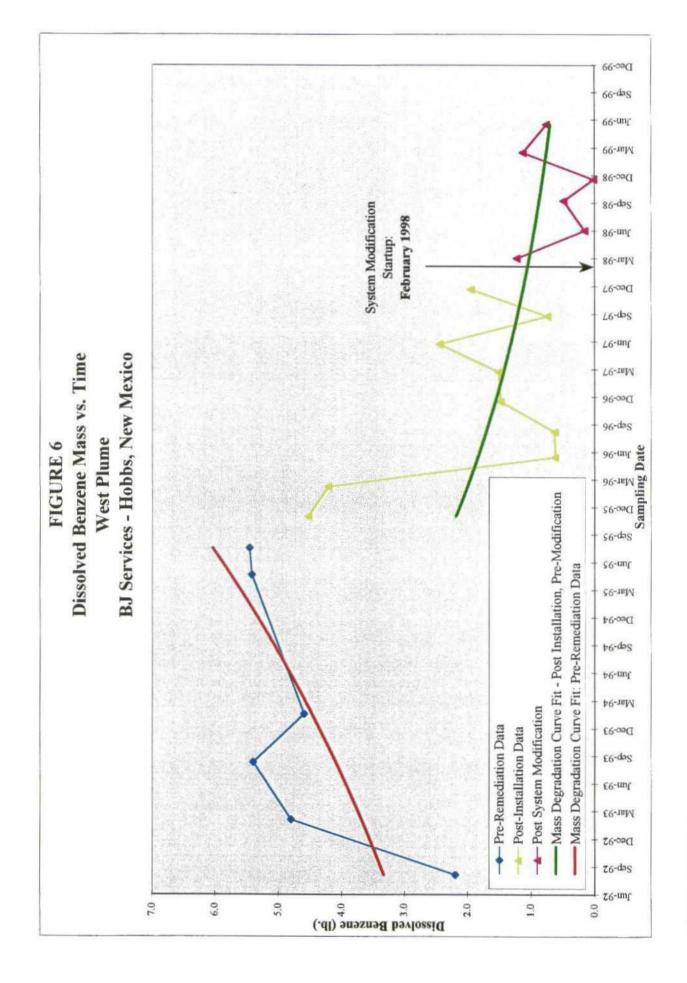
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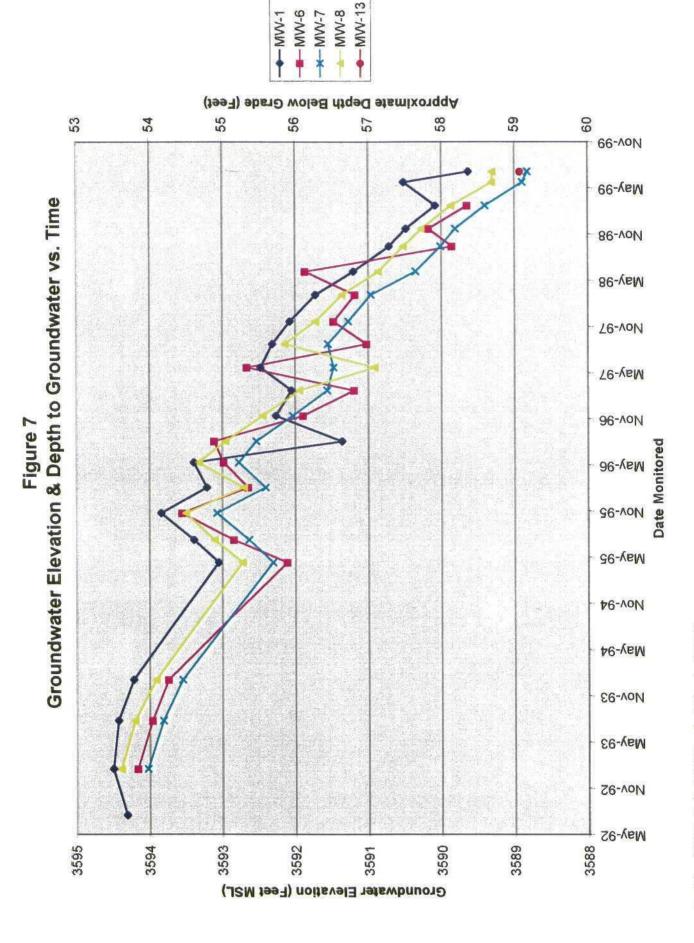












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TABLES

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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 handaugured 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 as well as installation, development, and sampling of monitor wells MW-12D and MW-13.

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	
MW-2						
	3,647.59	8/10/92	52.82	0.00	3,594.77	(1)
	3,644.84	2/9/93	49.60	0.00	3,595.24	
	3,644.84	8/18/93	49.71	0.00	3,595.13	
	3,644.84	1/26/94	49.97	0.00	3,594.87	
		5/3/95				(4)

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

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-3	-					
	3,647.68	8/10/92	52.99	0.00	3,594.69	(1)
	3,647.68	2/9/93	52.72	0.00	3,594.96	
	3,647.68	8/18/93	52.82	0.00	3,594.86	
	3,647.68	1/26/94	53.05	0.00	3,594.63	
	3,647.68	5/3/95	54.31	0.00	3,593.37	
	3,645.00	7/31/95	51.24	0.00	3,593.76	
	3,645.00	11/14/95	51.10	0.00	3,593.90	
	3,645.00	2/23/96	51.68	0.00	3,593.32	
	3,645.00	5/31/96	51.45	0.00	3,593.55	
	3,645.00	8/23/96	51.55	0.00	3,593.45	
	3,645.00	12/2/96	52.23	0.00	3,592.77	
	3,645.00	3/12/97	52.67	0.00	3,592.33	(3)
	3,645.00	6/12/97	52.68	0.00	3,592.32	
	3,645.00	9/11/97	52.71	0.00	3,592.29	
	3,645.00	12/10/97	52.89	0.00	3,592.11	
	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	

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	

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	ν-/
	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	
MW-6	-,-				2,000	
	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	(0)
	3,644 <i>.</i> 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	3,591.47	
	3,644.74	6/23/98	52.88	0.00		
		9/30/98			3,591.86	
	3,644.74		54.89 54.57	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	

Table printed: 22-Jul-99

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	

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	

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
/W-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	

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	
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)
MW-11A			7/10/44			
	3,644.24	3/23/98	54.79	0.00	3,589.45	(6)
	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	

Table printed: 22-Jul-99

Page 8 of 9

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-12						
	3,644.29	3/23/98	54.72	0.00	3,589.57	(6)
	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	
MW-12D		Port Constitution of Constitut				
	3,644.38	7/2/99	57.13	0.00	3,587.25	
MW-13						
	3,645.52	7/2/99	56.60	0.00	3,588.92	
OW-4						
	3,644.06	7/2/99	58.18	0.00	3,585.88	

- (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 and is assumed detroyed after January, 1994
- (5) MW-11 could not be located and is assumed detroyed after September 12, 1997.
- (6) TOC elevations for MW-11A and MW-12 estimated relative to TOC elevation for MW-10.

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

r T		r i				Ī	Dissolved	Ferrous	
Monitor	Date	Well	рΉ	Temperature	Conductivity	Redox	Oxygen	Iron	Alkalinity
Well	Measured	Volume	P	oC	(umhos)	(mV)	(mg/L)	(mg/L)	(mg/L)
MW-1	6/10/99	0	7.58	24.60	969.0	102.9	3.20	NM	NM
''' ''	0/10///	1	7.42	22.96	999.0	102.5	1.75	NM	NM
1				1		l			
]]		2	7.29	21.08	967.0	104.9	1.19	NM	NM
1 1000	06410400	3	7.32	20.60	946.0	100.6	0.71	0	160
MW-3	06/10/99	0	7.59	24.32	1330.0	-48.2	3.55	NM	NM
		1	7.02	21.70	1206.0	-16.3	1.80	NM	NM NM
{		2 3	6.98	21.96	1184.0	-1.8	1.66	NM	340
NOV 4	06/10/00		6.97	22.51	1194.0	3	1.51	0 NM	
MW-4	06/10/99	0	7.68	26.21	1094.0	18.4	4.70		NM
		1	7.18	21.41	965.0	-8.2	2.11	NM	NM NM
		2 3	7.1	22.01	964.0	6.2	1.34	NM 0	240
MW-5	06/10/99	0	7.12 8.07	22.27	985.0	16.7 33.7	0.75	NM	NM
MW-3	00/10/99	1	7.60	20.99	1150 1199	49.7	4.21 7.11	NM NM	NM
1		1 2	7.80	20.60	1174	72.1	6.56	NM NM	NM
		3	7.31	20.19	1174	83.1	6.30	0	280
MW-7	06/10/99	0	7.95	26.81	1726	1.4	6.17	NM	NM
101 44 - 7	00/10/99	1	7.93	22.86	1544	43.0	1.66	NM	NM
		2	NM	NM	NM	43.0 NM	NM	NM	NM
		3	NM	NM NM	NM NM	NM	NM	0	770
MW-8	06/10/99	0	7.85	25.48	1009	13.2	4.38	NM	NM
1 1111-0	00/10/22	1	8.03	23.83	1368	20.6	3.11	NM	NM
		2	7.59	25.19	1440	34.2	1.85	0	300
1		3	D	D	D	D D	D	NM	NM
MW-9	06/10/99	0	7.56	24.49	1178.0	3.8	3.88	NM	NM
		1	7.16	23.6	1125.0	49.8	3.13	NM	NM
		2	7.09	23.81	1139.0	66.1	2.75	NM	NM
ļ		3	7.08	23.86	1138.0	69.4	1.91	0	320
MW-10	06/10/99	0	7.75	27.51	2671	-104.9	2.10	NM	NM
		1	7.01	24.48	2801	-109.6	1.71	NM	NM
		2	6.9	23.46	2519	-119.3	1.10	NM	NM
		3	6.9	22.58	2303	-150.7	0.56	2.0	770
MW-11A	06/10/99	0	7.03	22.99	2626	-102.2	1.61	NM	NM
		1	6.88	21.5	2618	-104.3	0.86	NM	NM
		2	6.79	21.41	2852	-115.7	0.47	NM	NM
		3	6.8	21.37	3085	-123.9	0.32	5	380
MW-12	06/10/99	0	7.26	24.05	1415	-146.6	1.62	NM	NM
{	!	1	7.11	22.93	1407	-156.5	0.96	NM	NM
l	l	2	7.05	23.27	1417	-157.8	0.75	NM	NM
		3	6.98	23.52	1551	-153.8	0.74	2	770
MW-12D	07/02/99	1	7.57	21.32	1255	-330.6	4.12	NM	NM
	1	2	7.62	21.46	1266	-359.6	4.60	NM	NM
		3	7.56	20.11	1220	-442.5	4.00	1.4	385
MW-13	07/02/99	1	7.25	19.47	2150	-324.8	3.17	NM	NM
	1	2	7.25	19.57	2084	-303.4	3.72	NM	NM
	06/12/22	3	7.24	19.40	2074	-320.2	3.67	3.6	770
OW-4	06/10/99	0	7.65	23.97	1494.00	25.50	7.25	NM	NM
	l	1	6.81	21.63	1491.00	96.50	6.52	NM	NM
	1	2	6.76	20.90 20.74	1445.00	111.10	6.45	NM 2.00	NM 200
L		3	6.76	20.74	1436.00	114.60	6.42	2.00	280

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

Cummulative Analytical Results for Groundwater Samples

Hobbs, New Mexico Facility

BJ Services Company, U.S.A.

MW-1	Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
8/10/92 Regular 5550 12090 2160 7370 NA NA NA R/19/93 Regular 2100 6500 1300 7400 NA NA NA R/19/93 Regular 1930 4580 672 2390 NA NA NA NA S/19/93 Regular 1930 4580 672 2390 NA NA NA NA S/19/95 Regular 390 1300 230 800 NA 5.7 S/11/15/95 Regular 390 1300 230 800 NA 5.7 S/11/15/95 Regular 1560 3700 620 2200 NA 21 11/15/95 Regular 1560 3700 620 2200 NA 21 11/15/95 Regular 1100 1700 380 990 NA 7.5 Regular 1100 1700 380 990 NA 7.5 Regular 1100 1700 380 990 NA 17 12/19/6 Regular 5600 9600 2100 9600 100 64 31/19/7 Regular 5500 9700 2600 2200 8200 22 62 62 62 62 62 62	Well	Date	Type		microgran	ns per liter, ug/l		milligrams pe	r liter, mg/L
2993 Regular 2100 6500 1300 7400 NA NA NA 172794 Regular 3200 7300 1200 3700 NA NA NA 172794 Regular 1930 4580 672 2390 NA NA NA 172794 Regular 1930 4580 672 2390 NA NA NA NA 172794 NSP NSP	MW-1								
		8/10/92	Regular	5550	12090	2160	7370	NA NA	NA
1/27/94 Regular 1930		2/9/93	Regular	2100	6500	1300	7400	NA	NA
S7/3/95 Regular NSP NSP NSP NSP NA NSP		8/19/93	Regular	3200	7300	1200	3700	NA	NA
81/195 Regular 390 1300 230 800 NA 5.7		1/27/94	Regular	1930	4580	672	2390	NA	NA
11/15/95 Regular 880 1800 300 970 NA 6.8		5/3/95	Regular	NSP	NSP	NSP	NSP	NA	NSP
2/23/96 Regular 1500 3700 620 2200 NA 21		8/1/95	Regular	390	1300	230	800	NA	5.7
S/31/96 Regular 1100 1700 380 990 NA 7.5		11/15/95	Regular	880	1800	300	970	NA	6.8
R/23/96 Regular 1800 3300 570 2100 NA 17		2/23/96	Regular	1500	3700	620	2200	NA	21
12/2/96		5/31/96	Regular	1100	1700	380	990	NA	7.5
3/12/97 Regular 5500 9700 2600 8200 22 62	·	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
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 9.2 9.5 3.6 12/10/98 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 0.6/10/99 Duplicate <1.0 <1.0 7.9 1110 0.66 0.84 0.6/10/99 Duplicate <1.0 1.1 <1.0 28 0.53 0.55 0.55 0.6/10/99 Duplicate <1.0 1.8 <1.0 41 0.69 0.76 0		6/12/97	Regular	5300	34000	7500	27000	180	160
3/24/98 Regular 4800 7200 1200 2400 4.2 38		9/12/97	Regular	1800	4400	1000	3000	23	21
6/23/98 Regular 53 680 580 1400 1.4 9.2		12/10/97	Regular	7600	12000	2800	8200	11	71
09/30/98 Regular 3.2 90 2.80 970 2.5 3.6 12/10/98 Regular <1.0 1.5 17 110 1.4 0.31 0.31 0.310/99 Regular <1.0 <1.0 8.2 110 0.62 0.85 0.310/99 Duplicate <1.0 <1.0 7.9 110 0.66 0.84 0.610/99 Regular <1.0 1.1 <1.0 28 0.53 0.55 0.55 0.6710/99 Duplicate <1.0 1.8 <1.0 41 0.69 0.76 0.76 0.76 0.76 0.76 0.79 0.76 0.		3/24/98	Regular	4800	7200	1200	2400	4.2	38
12/10/98 Regular <1.0		6/23/98	Regular	53	680	580	1400	1.4	9.2
MW-2 Regular <1.0 <1.0 8.2 110 0.62 0.85 03/10/99 Duplicate <1.0 <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 MW-2	Ŀ	09/30/98	Regular	3.2	90	280	970	2.5	3.6
MW-2 Duplicate <1.0 <1.0 7.9 110 0.66 0.84		12/10/98	Regular	<1.0	1.5	17	110	1.4	0.31
MW-2 Regular 06/10/99 Duplicate <1.0 1.8 <1.0 41 0.69 0.76	1	03/10/99	Regular	<1.0	<1.0	8.2	110	0.62	0.85
MW-2		03/10/99	Duplicate	<1.0	<1.0	7.9	110	0.66	0.84
MW-2¹ 8/10/92 Regular 2/9/93 14.9 < 4		06/10/99	Regular	<1.0	1.1	<1.0	28	0.53	0.55
8/10/92 Regular 14.9 <4 <4 <4 <4 NA NA NA		06/10/99	Duplicate	<1.0	1.8	<1.0	41	0.69	0.76
2/9/93 Regular <2 <2 <2 <5 <6 NA NA NA NA NA NA NA N	MW-2 1		1	ŀ]		
MW-3 Regular 100 12 3 13 NA NA NA NA NA NA NA N	ļ		Regular	1	1		i		
MW-3 Regular Segular Segular			_			Į.	1		
MW-3 8/10/92 Regular 304.9 2099 6760 1586 NA NA 2/9/93 Regular 130 < 10		li .	_					i	
8/10/92 Regular 304.9 2099 6760 1586 NA NA 2/9/93 Regular 130 < 10		1/27/94	Regular	< 1	1.2	2	2.5	NA	NA
2/9/93 Regular 130 <10 <10 190 NA NA NA NA NA NA NA N	MW-3	1							.,,
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				1				l	l
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11/15/95 Regular 250 1000 180 440 NA 2.9	1	1	-				ľ		
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 12		1			L	i	1		
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	ŀ	1		F	i e		1		
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	į.		-	l .	1		1	1	1
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	1		-		1		i		
3/12/97 Regular 370 2000 960 1400 1.8 11	1		1 -		E .	l .			
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	l		1 -	B .				1	
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	ŀ		_	1	1		l	I	
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	1		l		1	l .	1	I	i .
3/24/98 Regular 140 630 360 310 0.56 3.9	1	1		I .	1	E .	1	1	
6/23/98 Regular 09/30/98 100 720 350 490 0.40 4.9 09/30/98 Regular 12/10/98 42 470 450 530 1.0 3.8 12/10/98 Regular 13 220 160 290 1.3 0.43	ł	i		i .	1	1		1	
09/30/98 Regular 42 470 450 530 1.0 3.8 12/10/98 Regular 13 220 160 290 1.3 0.43	ŀ	1	-	Į.				I	
12/10/98 Regular 13 220 160 290 1.3 0.43	j	1				II.		1	1
			_		L	i	1		l .
1 03/10/99 Kegular 3.2 7.4 42 32 0.2 0.44		li .		L	1	1	1		1
06/10/99 Regular 1.7 3.1 <1.0 36 <0.20 0.18	Į.			•	1		1		

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

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Type		microgran	s per liter, ug/l		milligrams pe	r 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
MW-5	06/10/99	Regular	<1.0	<1.0	12	12	0.44	0.63
W W-5	8/10/92	Danulas	< 4	< 4	< 4	<4	NA	NA
	2/9/93	Regular	<2	<2	< 2	<6	NA NA	NA NA
l	8/10/93	Regular Regular	< 2	< 2	< 2	< 6	NA NA	NA NA
l	1/27/94	Regular	8.7	29.9	4	11.3	NA NA	NA NA
	5/3/95	Regular	3.7	5.3	0.92	4.6	NA 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
1	8/23/96	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	< 0.1
i .	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
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
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
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-6 ¹]		
1	8/10/92	Regular	NS	NS	NS	NS	NA	NS
	2/9/93	Regular	7000	19000	3100	7200	NA	NA
1	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 (2)
1	8/1/95	Regular	8300	12000	2500	5100	NA	60
1	11/15/95	Regular	8900	17000	2900	5500	NA	57
	2/23/96	Regular	8100	10000	2300	4000	NA	58
	5/31/96	Regular	83	150	15	51	NA	0.57
	5/31/96	Duplicate	87	160	13	47	NA	0.52
	8/23/96	Regular	31	28	9.4	7.9	NA T	0.46
L	12/2/96	Regular	< 1	< 1	<1	1.7	5.6	< 0.1

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

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре		microgran	ns per liter, ug/l		milligrams p	er liter, mg/L
MW-6 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	ť
	12/10/98	Regular	7.6	I				3.3
	03/10/99			6.6	1.7	5.8	2.0	< 0.1
MW-7	03/10/99	Regular	2500	930	590	1400	11.0	13
IVI VV - /	9/10/02	Danislan	NIC	NC	NO			
	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	< l	< l	< 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	< i	< 0.1	< 0.1
	12/10/97	Regular	< l	< 1	< 1	< 1	< 0.2	< 0.1
	3/23/98	Regular	< 1	<1	< 1	< 1	< 0.2	< 0.1
	6/23/98	Regular	< 1	< l	< 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
MW-8	00,10,72	Regula	VI.0	\ \	\1.0	\1.0	₹ 0.20	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	8/10/92	Regular	NS	NS	NS	NS	NA NA	NS
	2/9/93	Regular	< 2	<2	< 2	< 6	NA NA	NA NA
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA NA	NA NA
	1/27/94	Regular	<1	<1	<1	<1	NA NA	NA NA
	5/3/95	Regular	3	4.9	0.75	3.7		
	8/1/95	_	ı	1		i	NA NA	NA - 0 001
	1	Regular	3.1	1.2	0.47	1.6	NA	< 0.001
	8/1/95 11/15/95	Duplicate	3.6	1.5	0.51	1.5	NA	< 0.1
		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	< l	1.8	< 0.1	< 0.1
	6/12/97	Regular	i >	< 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	1
MW-9	00/10/99	regulai	\ \\ \cdot \.0	<1,0	<1.0	<1.0	<0.20	<0.1
111 11 - J	4/22/93	Regular	570	380	< 50	870	NA	NA.
					. 5.30			

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

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре		microgran	ns per liter, ug/l	Ť	milligrams pe	
MW-9	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	0.80	1
	6/23/98	Regular	2.4	22	10	26 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
MW-10	00/10/2	i regulai		1.0	1.0		10.20	0.45
	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
	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
MW-11 1	1	1		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

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

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре		microgran	ns per liter, ug/l		milligrams p	er liter, mg/L
MW-11 1	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						1		
	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
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
MW-12D								Ì
	07/02/99	Regular	< 5	< 5	< 5	< 5	< 0.20	< 0.10
MW-13	1			1		1		\
	07/02/99	Regular	1500	23.0	750	58	2.2	5.1
OW-4				1				1
	06/10/99	Regular	<1.0	<1.0	<1.0	4.4	< 0.2	<0.10

¹ Well plugged and abandoned 7/1/99 NA=Not Analyzed NS=Not

NS=Not Sampled

NSP=Not Sampled due to Phase Separated Hydrocarbons

Summary of Detected Analytes for PAHs, Metals, VOCs, SVOCs and Groundwater Quality Parameters Hobbs, New Mexico Facility BJ Services Company, U.S.A. Table 5

									Monitor Wells	ells						
Analyte Name	Sample Date	MW-1	MW-3	MW-4	MW-5	9-MM	MW-7	MW-8	6-MM	<i>№</i> -10	MW-11	MW-11A	MW-12	MW-12D	MW-13	OW-4
Alkalinity	mg/L															
Bicarbonate, as CaCO3												į		;		;
	8/1/95	380	430	490	290	0.09	2	360	220	250	290	K :	K :	Y :	¥ ;	ζ.,
	8/23/96	310	310	210	270	120	9	780	330	220	430	Y Z	ď Z	ď.	Š.	Ϋ́Z ;
	3/23-24/98	286	214	175	247	180	309	760	306	557	Y Y	319	451	¢ Z	e Z	K :
	3/9-10/99	92	309	186	283	286	358	317	333	278	Y Y	335	386	۷ ۲	Y X	Y :
	6/10-7/2/99	A N	N A	N A	A A	Y Y	NA A	Ϋ́	Y Y	Y Y	Y Y	A'N	Y Z	700	520	316
Carbonate					;	,			9	9	9	ž	<u>-</u>	2	2	Ž
	8/1/95	× 10	v 10	<u>0</u> v	< 10	- 0 V	- 10 - 10	01 >	01 >	01 >	2 5	¢ ;	<u> </u>	2 2	<u> </u>	1 2
	8/23/96	< 10	< 10	< 10	< 10	× 10	> 10	< 10	01 >	< 10	01 >	Y Y	ď Z	Y.	K Z	YZ ;
	3/23-24/98	-	~	-	-		-	-	7	-	NA	-	7	Ϋ́	¥ Z	Y Y
	3/9-10/99	⊽	⊽	7	7	⊽	~	7	7	⊽	N A	⊽	⊽	Ϋ́Z	A'A	Ϋ́Z
	6/10-7/2/6	Y Y	NA A	Ϋ́	NA	Y Y	¥ Z	N A	Ϋ́	AN	AN AN	NA A	Y Y	7	⊽	7
Hardness-Total as CaCO3							(ç	Ş			1000	0091	Ž	Z	A Z
	3/23-24/98	430	430	275	342	0440	0/9	/40	010	06+1	ζ :	300	30			
	3/9-10/99	250	440	310	340	640	780	089	370	720	Y X	0511	460	e Z	K Z	ć.
Hydroxide					;		9	•	9	5	9	2	2	Z	Ž	Ą Z
	8/1/95	× 10	v 10	0 >	0I v	01 >	01 >	2 >	21 >	21.	2	¢ ;	9 3	: ;		
	8/23/96	< 10	× 10	< 10	× 10	< 10	01 >	or >	× 10	v 10	× 10	Y Y	Y X	K Z	e Z	Y Z
	ŧ						*****									
Methane	mg/L	,100	,			.000	- 200	0.030	70007	100	¥	0.14	< 0.0012	Ϋ́	Ϋ́	N A
	3/23-24/98	< 0.0012	× 0.0012	7100.0 >	210000	7100.0	20.07	i v	1000	0.035	Z	0.094	<0.0012	X	Y.	YZ.
	3/9-10/99	K Z	¥ ;	ď :	<0.0012	¥ ;	V ;	<u> </u>	· ·	660.0	: 5		2	\$1000	0.0017	<0.0012
	6/10-7/2/99	Y Z	e Z	ď Z	Y Z	ď Z	e Z	K Z	¥.	ď.	Ç.	Ć.	5			
Anions	mg/L															
Chloride	ì															
	8/1/95	160	150	310	130	380	310	350	110	2200	3400	NA	A'A	Ϋ́	Y Y	Y Y
	8/23/96	130	140	100	66	210	250	360	140	2000	2900	A V	A'A	ΥZ	N A	Y Z
	3/23-24/98	212	506	126	151	183	223	364	164	2390	NA A	940	1200	۷ Z	Υ Y	Y Z
	3/9-10/99	163	156	142	155	411	238	274	123	1160	Y Y	834	314	K Z	Z Y	Υ Z
	6/10-7/2/99	Ϋ́	¥Z	Ϋ́ X	NA V	Ϋ́	N.	A A	Ϋ́ V	Ϋ́	AN	V.	A A	195	496	266
Fluoride					,						;		ç	V.	2	Z
	3/23-24/98	6:0	1.2	1.2	9.0	=	. S	6.0	£	7.0	¥ ;	6.7	1 :	C *		2
	3/9-10/99	1.54	1.46	1.5	1.38	1.79	1.56	4	48.	4.95	ď ;	3.08	0.0	¥ .	יייי ני	1.45
	6/10-1/5/99	Ϋ́	Υ Z	Y Z	Y Y	Υ V	٠ د د	ď Z	ď Z	۲ ۲	ď.	Š.	<u> </u>	60.1	77:-7	
Nitrate (Nitrogen as N)														-		
Middle (Middle as M)	8/1/95	4.7	5.6	15	28	1.3	9.2	=	38	< 0.1	5.5	NA	A N	NA	N A	Ϋ́Z
	8/23/96	=	7.6	7.6	12	< 0.5	10	9.8	24	<.5	=	A A	NA	NA	ΑN	Y Y
	3/23-24/98	1.78	3.07	2.59	3.87	69.0	3.92	1.84	4.27	0.07	NA	< 0.05	< 0.05	٧ Z	V V	Y Z
	3/9-10/99	0.7	2.1	2.6	X A	<0.1	3.3	0.7	3.7	Y Y	Ϋ́	<0.1	<0.1	N A	Ϋ́	Y Z
	6/10-1/2/99	N A	NA AN	NA A	A N	Y X	A A	NA A	Y X	Y.	N.	AN A	A A	2.1	2.4	3.96
Sulfate												ž	ž	Ž	Ź	ĄN
	8/1/95	951	051	710	730	- /:0	180	<u>-</u>	061	ner ner	067	Ę.	_ <u>{</u>		-	

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page 1 of 4

Summary of Detected Analytes for PAHs, Metals, VOCs, SVOCs and Groundwater Quality Parameters Hobbs, New Mexico Facility BJ Services Company, U.S.A. Table 5

									Monitor Wells	ells						
Analyte Name	Sample Date	MW-1	MW-3	MW-4	MW-5	9-MM	MW-7	8-WM	MW-9	MW-10	MW-11	MW-11A	MW-12	MW-12D	MW-13	OW-4
	8/23/96	130	150	150	140	85	08	091	180	120	130	NA	AN	NA	NA	NA
	3/23-24/98	130	180	160	190	230	310	250	230	320	Ϋ́	061	240	A'N	AN A	NA A
	3/9-10/99	196	162	178	195	72	246	240	146	223	Ϋ́	227	193	A N	Ϋ́Z	Z Y
	6/10-7/2/99	Ϋ́	A.	Y V	A A	AN	NA V	NA A	ΥN	NA	NA V	Ϋ́	Ϋ́Z	249	334	192
Cations	mg/L															
	8/1/95	120	120	220	091	320	300	300	180	610	490	Ϋ́	Z A	NA	V V	N.
	8/23/96	120	130	68	110	62	270	230	190	390	440	AN	AN	A'N	A'N	A'N
	3/23-24/98	129	122	62	109	45	208	215	142	417	A'N	259	388	Ą Z	A A	NA A
	3/9-10/99	80.2	129	8.06	116	141	233	197	122	214	A'N	308	148	Y Z	NA A	NA
	6/10-1/2/99	Ϋ́	Ϋ́	NA	X A	N A	A N	AN	Y Y	NA	AN A	NA	Ϋ́	113	389	141
Magnesium																
	8/1/95	34	36	28	27	72	42	46	43	130	130	A A	V.	۲ Z	NA A	Ϋ́
	8/23/96	120	32	21	18	28	2	48	4	84	120	Ϋ́	Y Y	Y Z	A A	٧X
	3/23-24/98	36	30	81	20	42	47	52	36	130	NA	96	108	۲ ۲	Y.	Ϋ́
	3/9-10/99	19.7	31.5	20.4	21.6	62.2	54.4	47.7	28.5	43	A'A	101	32.1	Y Y	A A	Ϋ́
	6/10-1/5/99	Ϋ́	Ϋ́	A A	NA A	NA A	A N	A'A	AN	NA A	Y.	AN A	YN,	16.6	83.9	44.3
Potassium									•			:	;	;	;	;
	8/1/95	2.4	5.6	3.5	4.2	m	3.4	~	- -	32	94	Y Y	Υ X	ď Z	Y.	K :
	8/23/96	2.4	۳	2.2	3.1	2.4	3.7	3.9	5.6	41	53	ΝΑ	AN	Ą.	Y Y	۷ Z
	3/23-24/98	× 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	70	Y V	30	92	× X	N A	Y Z
	3/9-10/99	ы	4	3	4	4	6	4	3	15	Y Y	21	101	۷ Z	Y Y	Ϋ́
	6/10-1/5/99	A A	AN	Y Y	X A	Z	A N	AN.	A A	ΝΑ	A'N	NA	AN	99	9	3
Sodium																;
	8/1/95	100	93	140	110	130	95	45	86	099	2000	Y Y	Y Y	۷ Z	Y Z	Y X
	8/23/96	100	110	88	120	120	96	100	83	096	2600	Y V	AN A	۷ Z	Y Y	Υ V
	3/23-24/98	113	126	109	130	100	92	101	118	1090	A V	312	381	۲ Z	Y Y	Y N
	3/9-10/99	126	135	124	155	141	110	115	122	856	Y X	225	180	۷ ۲	Y X	Y Y
	6/10-7/2/99	NA A	N A	Ϋ́Z	NA A	Z A	N A	NA	Y Y	A A	A A	A A	A V	121	165	103
Metals	mg/L												_	-		
Arsenic					•										:	;
	8/1/95	0.0076	0.0043	< 0.002	0.0059	0.028	0.0033	0.0034	0.0055	0.015	9800.0	Y X	Υ Z	₹ Z	K Z	V.
	8/23/96	0.0078	9900'0	0.0059	0.0067	810.0	0.0036	0.0033	0.0044	0.028	0.011	ΥN	AN A	¥ Z	Y Z	ď Z
	3/23-24/98	0.007	0.007	0.008	0.007	0.013	< 0.005	< 0.005	0.005	0.035	AN A	0.019	0.013	Y Y	Y Y	K Z
	3/9-10/99	0.013	600.0	0.012	0.005	0.02	900:0	0.005	0.007	0.026	NA V	0.036	990.0	Y Y	A A	NA V
	6/10-1/2/66	Ν	AN	Y Y	Ϋ́Z	NA A	V V	NA A	Y Y	Ϋ́	A A	NA A	NA	0.022	0.008	<0.005
Barium								•								
	8/1/95	690.0	0.38	0.34	0.049	Ξ	690'0	0.075	0.089	0.37	0.2	NA	AN	Y Y	A V	Y Z
	8/23/96	0.064	0.24	690:0	0.038	0.29	0.061	990.0	0.089	0.26	0.2	NA	NA	Y Z	Y Y	Y X
	3/23-24/98	0.11	0.182	0.044	0.044	0.208	0.059	0.074	990:0	0.287	NA	0.163	0.157	NA V	Ϋ́	NA A
	3/9-10/99	0.058	0.059	0.045	0.054	0.555	0.076	0.052	0.043	0.17	Y X	0.174	0.144	N A	Ϋ́	Y Y
	6/10-7/2/99	Ϋ́Α	A N	NA V	ď Z	Y X	AN A	Ą.	Y Y	Y X	Y X	Y.	K K	0.155	0.333	0.062
Cadmium	30/1/0	1000	100.0	69000	1000	100	1000	50	100.0	1000	1000	7	2	A Z	Ą	Y Z
	56/11/93	100.0	100.00	2500.0	100.0	100.0	0.00	100.0	100.00	100.0	100.0	5 5	(<u> </u>	C . Z	: 2	. ×
	8/53/96	10:0 > -	10:0>	10:0>	10:0 >	0.0 >	10:0>	10.0 >	10:0 >	10.0 >	10.0 >	- V	- V	- VX	- K	¥.

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Summary of Detected Analytes for PAHs, Metals, VOCs, SVOCs and Groundwater Quality Parameters Hobbs, New Mexico Facility

BJ Services Company, U.S.A. Table 5

									Monitor Wells	ells						
Analyte Name	Sample Date	MW-1	MW-3	MW-4	MW-5	9-WM	MW-7	8-WM	6-WM	MW-9 MW-10	MW-11	MW-11A MW-12	MW-12	MW-12D	MW-13	OW-4
	3/23-24/98	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	AN	< 0.005	< 0.005	NA	NA	ΥN
	3/9-10/99	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	Ϋ́	<0.005	<0.005	AN AN	Ϋ́	Y Y
	6/10-7/2/99	A N	Z Z	N A	Ϋ́Z	Ą	A N	A X	A'N	Y Y	Ϋ́Z	¥ Z	Ϋ́Z	<0.005	<0.005	<0.005
Chromium	9	č	ć	Č	Š	9	· ·	6				2	Ž	2	Ž	82
	8/53/96	10:0 >	0.00	0.07	50.0	600	100	0.07	10.00	1000	S Z	< 0.01	< 0.01	, v	. Y	Y X
	96/67-67/6	70.0	7 6	10.0	10:07	7 5	5 6	100	500	1000	Z	10.0	0.07	×	Z.	Ϋ́
	6/10-7/2/99	Y Z	V V	Y Y	V V	Y A	, AN	ĄZ	N A	AN	Z Z	Ą	Ϋ́Z	0.02	0.02	<0.01
Mercury																
	8/23/96	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	Ϋ́	ΑN	N A	A'N	Ϋ́
	3/23-24/98	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0003	< 0.0002	< 0.0002	NA V	< 0.0002	< 0.0002	V.	Y Y	Y Y
	3/9-10/99	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	NA	<0.0002	<0.0002	AN	NA A	N A
	6/10-7/2/99	N A	N A	Ϋ́	A N	Š	A A	Υ V	A A	NA	Ϋ́	Y Y	Y X	<0.0002	<0.0002	<0.0002
PAHs Naphthalene	ηg/L															
	8/1/95	< 5	210	1700	<5	470	< 5	< 5	15	92	< 5	Y Y	Y Y	ΑN	Y Y	Ϋ́
	8/23/96	230	110	440	< 5	< 30	< 5	< 5	< 84	> 76	< 5	N A	Y Y	NA	A A	NA V
	3/23-24/98	130	23	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	4	8 0	Ϋ́	8.0	=	NA	Ϋ́	Y.
	3/9-10/99	10	œ	170	0.1	091	©.1		7	9	N.	Ç0.1	19	٧X	A A	Y Y
	6/10-7/2/99	NA	NA	Y Y	NA	Y Y	Y Y	× Z	Ϋ́	NA	Y Y	N A	NA	9.0	34	<0.1
VOCs	µg/L									-						
Acetone											;			;		,
	3/23-24/98	N A	ΑN	ΑN	Ϋ́	N N	Z V	Y Z	Y Y	Y V	Y.	001>	901	ď.	K S	A
	6/10-7/5/99	AN	Ϋ́	Ϋ́	NA	V V	Y Y	Y Y	Y Y	V V	Y Y	Y Y	Y Z	130	00 V	×100
sec-Butylbenzene		;	;	:	;		;				Ž	Ž	2	42	A Z	V
	3/23-24/98	Υ Z	Y X	Y Z	Υ Z	ď Z	ď Z	ď.	K .	¥ Z	K :	¥ ;	V	Ç.	ξ.	9
:	6/10-7/2/99	V	Y Z	Y Y	NA A	Y Y	Y Z	۷ ۲	Y.	Ϋ́	Y Z	Y Y	Y Z	<>	S	۲ ک
Isopropylbenzene						;	;	;	;	•	;	;			Ž	7
	3/23-24/98	Y :	¥ :	Y :	¥ :	¥ ;	ď;	٠ د د	¥ ;	Y :	Y :	¥ ;	¥ 2	¥ V	<u> </u>	V
	6/10-2/2/99	۷ Z	e Z	ď Z	Š.	ď Z	ď Z	ď Z	K Z	¥ Z	¥.	Y.	<u>.</u>	<u> </u>	5	7
Naphinalene	3/23-24/98	Y.	ž	Ϋ́	Š	Y Z	V V	V Z	NA	V V	Y Y	Ą Z	V.	¥ Z	A X	ΝΑ
	6/10-1/5/99	Y.	A A	AN	NA	Y Y	A'N	Y X	A A	NA	Y Z	Ϋ́	A	< 5	190	< 5
n-Propylbenzene									,-							į
	3/23-24/98	A'A	Ϋ́ V	X A	Y Y	NA VA	AN AN	Y Y	Y Y	V A	Y Z	Y V	۲ Z	Y Y	Y S	Υ '
:	6/10-7/2/99	V.	Ϋ́	Y Y	Y Y	Ϋ́	A A	Υ Z	¥	Y Y	Y Z	Y Z	Υ Z	< >	8	ç
1,2,4-Trimethylbenzene	3/72 74/08	Ž	Ž	7	Ž	ž	Ą		∀ 2	∀ 2	× Z	ď Z	Ą.	Ž	Ϋ́Z	A'A
	3/23-24/98	<u> </u>	¢ ;	C :	C :	Ç ;	£ ;	5	· ·					. ,	03	۷, ۱
: : :	6/10-7/2/99	Y Z	Y Z	Y Z	A A	Y X	Y Z	Y Z	Y X	ξ Z	K Z	ď Z	ď Z	Ç	6	Ç
1,3,3-1 rimetnyibenzene	3/23-24/98	AN	N A	N A	Ą Z	Y Y	Ą	A'N	Y Z	ď Z	Ą Z	Ϋ́	A N	Ϋ́	Ϋ́	Y Y
	6/10-7/2/99	ΝA	ΝA	A A	Ϋ́	NA A	Ϋ́	× ×	NA A	Y Z	NA	NA A	N.	< 5	93	< 5
Methyl t-butyl ether																
,	-	-	•	•	•	•	•	•	•		•	•				

page 3 of 4

Table 5

Summary of Detected Analytes for PAHs, Metals, VOCs, SVOCs and Groundwater Quality Parameters BJ Services Company, U.S.A. Hobbs, New Mexico Facility

									Monitor Wells	/ells						
Analyte Name	Sample Date	MW-1	MW-3	MW-4	MW-5	9-MM	MW-7	8-WM	6-WM	MW-10	MW-11	MW-11A	MW-12	MW-12D	MW-13	OW-4
	3/23-24/98	ΑN	NA	AN	Α̈́	A'N	N.A	NA	NA	NA	NA	NA	NA	٧Z	NA	V V
	6/10-7/2/99	A A	Ϋ́	NA A	A N	N A	ΝΑ	N A	Y Y	NA A	N A	AZ A	A'N	< 10	25	< 10
SVOCs	µg/L															
2,4-Dimethylphenol	_															;
	8/1/95	< 50	26	< 500	< 5	42	<>	< 5	< 5	<5	< 5	Y Y	Ϋ́	Ϋ́	A A	₹ Z
	8/23/96	NA	AN	AA	Z Y	A N	NA NA	NA	Ϋ́	NA	Ϋ́	NA	N V	A'A	AN	Y Y
	6/10-1/5	Ν	ΝΑ	NA A	Ϋ́	Y Y	NA	NA	AA	Y.	NA A	NA A	Ϋ́	<\$	99	\$
2-Methylnaphthalene																;
	8/1/95	280	62	1500	<\$	150	<5	<>	36	23	< 5	Ϋ́Α	Y Y	Ϋ́	Y V	₹ Z.
	8/23/96	Υ	A'N	AN	Ϋ́Z	A'A	Y Z	Ϋ́Z	A'N	Ϋ́Z	A'N	Ϋ́Z	٧Z	٧Z	۷ Z	۷ Z
	6/10-1/2/99	AN	Ϋ́Α	NA A	NA A	NA A	Ϋ́	NA A	N A	Ν	Ϋ́	Ϋ́	ΑN	< 5	29	\$
2-Methylphenol																
	8/1/95	< 50	92	< 500	< 5	< 30	<5	<5	< 5	< >	< 5	۲ Z	Ϋ́	٧Z	Y Y	₹ Z
	8/23/96	ΥN	Ν	AA	Y.	Y Y	AA	A A	Y Z	N A	A'N	NA A	Ϋ́Α	ΥZ	V V	Ϋ́Z
	6/10-1/2/99	ΑN	Ϋ́	NA A	Y Z	A N	NA V	V V	Y Y	۷ Z	Ϋ́	NA A	Ϋ́	< 5	< 5	\$
4-Methylphenol																
	8/1/95	< 80	< 20	> 800	* V	150	8° V	% V	% >	& V	« V	Ϋ́	Y Z	Y.	۷ Z	Y.
	8/23/96	NA	NA	AN	NA A	ΝΑ	AN	NA	NA	N A	ΑN	NA	A A	V.	A V	ΥZ
	6/10-7/2/99	NA	Ϋ́	Ϋ́	NA	NA	N.	ΑN	NA	NA	Ϋ́	ΑN	Y V	< 5	< 5	\$
Bis(2-ethylhexyl)phthalate														į	;	3
	8/1/95	750	< 20	10000	04	< 40	<7	<7	<7	<7	<7	Υ X	Š Z	V V	K Z	Ϋ́Α
	8/23/96	NA	NA A	ΑN	NA A	NA	AN	N A	Y Y	NA	Ϋ́	NA	Ϋ́	Ϋ́Z	Y Y	ΥΥ
	6/10-1/5/99	A N	ΑΝ	A'A	Y Y	N A	A N	NA	ΥA	AN A	ΝΑ	Š.	ΑN	< 5	<5	\$
Phenol								•								;
	8/1/85	< 50	< 10	< 500	< 5	< 30	< 5	< 5	< > <	8.2	< 5	ΥZ	ΑΝ	Y V	ď Z	Y.
	8/23/96	NA	NA	NA V	NA	NA A	Ϋ́	NA A	Ϋ́	NA	NA	NA	N A	Y Y	V V	Y Y
	6/10-7/2/99	NA	NA	AA	NA	NA	NA	NA	NA	NA	NA	NA	ΑN	Ş	9	Ş

MW-2 not operative after May 3, 1995; MW-11 not operative after September 1997; MW-2, MW-6, and MW-11 P&A'd 7/1/99. NA= Not Analyzed. PAHs = Polynuclear Aromatic Hydrocarbons.

Table 6 Laboratory Analytical Results for Natural Attenuation Evaluation Parameters

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

			4	Dissolved Methane
	Date	Nitrate ¹ (mg/L)	Sulfate ¹ (mg/L)	(mg/l)
MW-10	6/23/98	< 0.1	325	0.55
	9/30/98	<0.1	204	0.81
	12/10/98	<0.1	180	0.091
	2/0/00	<0.1	142	0.025
	3/9/99	NA ²	223 ³	0.035
	6/10/99	<0.1	181	0.036
MW-11A	6/23/98	<0.1	225	0.11
	9/30/98	0.4	196	0.043
	12/10/98	0.7	188	0.033
	2/10/00	<0.1	164	0.004
	3/10/99	<0.12	227 ³	0.094
	6/10/99	<0.1	219	0.019
MW-12	6/23/98	<0.1	240	< 0.0012
	9/30/98	<0.1	168	< 0.0012
	12/10/98	<0.1	202	< 0.0012
	2/10/00	<0.1	137	40,0012
	3/10/99	<0.12	193 ³	<0.0012
	6/10/99	<0.1	217	<0.0012

1=By EPA Method 300, except as noted

2=By EPA Method 353.3

3=By EPA Method 375.4

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

							Discharge	Benzene	Total BTEX	TPH
Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH	Rate,	Emission	Emission	Emission
Number	Date		parts per	parts per million by volume,	Д		scfm	Rate, lb/hr	Rate, lb/hr	Rate, 1b/hr
Extraction-1	9/19/95	790	1100	340	920	9700	132.47	1.235	5.943	16.31
Effluent-1	9/20/95	066	2500	260	1600	16000	135.76	1.575	10.939	27.37
Effluent-2	9/28/95	13	28	9	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	9	44	12	40	066	124.68	0.009	0.189	1.56
Effluent 042496-01	4/25/96	4	37	10	36	006	118.34	0.005	0.147	1.29
Effluent 053196-01	5/31/96	3.7	40	10	33	029	124.11	0.005	0.158	1.04
Effluent 082396-01	8/23/96	ζ,	12	ζ,	\$	200	126.18	0.007	0.047	0.31
Effluent 120296-01	12/2/96	7	7	⊽	⊽	Ą	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	T1/2/97	⊽	6.3	2.4	9.8	65	109.90	0.001	0.028	0.08
Monitor 970912 (1)	9/12/97	ΝΑ	Ϋ́	NA	ΑN	340	105.40	AN	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	N A	NA	NA	NA	1500	108.97	NA	NA	1.91
Monitor 980622 (1)	6/22/98	NA	NA	NA	NA	190	108.16	NA	AN	0.24
Monitor 980930 (1)	86/08/6	AN	NA	NA	N A	200	123.74	NA	NA	0.33
Monitor 981210 (1)	12/10/98	NA A	NA	NA	NA A	180	111.14	Y Y	Y Y	0.24
Monitor 990310 (1)	3/10/99	Y Y	Ϋ́	NA	NA A	80	111.14	NA A	NA	0.11
Monitor 990610 (1)	6/10/9	Y Y	ΝA	NA	NA	140	73.68	NA	NA	0.12
Designation and a second for 12/02/06 commission arous second	20/00/01	aling original	n patolicologo on	the detector	The cotine	moiocioni III	Design of OOI 18/hr DTEV		10 01 1b/hr and TPU /0 01 1b/hr	01 lb/hr

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

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

APPENDIX A

Regulatory Correspondence

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



JAN 28 1999

OIL CONSERVATION DIVISION 2040 South Fachers Street Santa Fe, New Mexico 87005 (505) 927-7131

File 12832.02/

January 21, 1999

Certified Mail Return Receipt NO. P 288 259 092

Mr. Rick N. Johnson BJ Services Company, U.S.A. (BJSC) 8701 New Trails Drive The Woodlands, Texas 77381

Re: GROUNDWATER CONTAMINATION INVESTIGATIONS

BJ Services Hobbs facility GW-072

2708 West County Road

Hobbs, NM

Dear Mr. Johnson:

New Mexico Oil Conservation Division (NMOCD) has reviewed BJ Services March, June and September 1998 Groundwater Sampling Reports and has determined that additional contamination delineation is required in the following areas:

* Former Underground Field Waste Tanks:

The above reports show there is petroleum hydrocarbons (i.e. benzene), and chloride contamination in groundwater in this area that exceeds the New Mexico Water Quality Control Commission (WQCC) standards. The extent of contamination has not been completely defined. Therefore, please provide to NMOCD for approval a work plan to identify and delineate the extent of all groundwater contamination constituents which exceed the WQCC ground water standards. The plan shall include nested wells to address vertical migration of contaminants due to possible density gradients.

In addition, please provide a plan to locate and properly plug the monitor well MW-11.

* Former AST/MW-6 Area:

The September 1998 Groundwater Sampling Report reflected that groundwater is migrating in a east-northeasterly direction. Presently there are no monitoring wells located northeast of the MW-6 area. Please provide to NMOCD for approval a work plan to identify and delineate the extent of all groundwater contamination constituents that exceed the WQCC standards in this area.

In addition, please provide a plan to locate and properly plug the monitor well MW-2.

Rick N. Johnson January 21, 1999 Page 2

Please provide the above information to this office and a copy to the OCD Hobbs office by March 22, 1999 for NMOCD approval.

If you require any further information or assistance please do not hesitate to write or call me at (505-827-7155).

Sincerely Yours,

Mayne | her

Wayne Price-Environmental Bureau

cc: OCD Hobbs

file: O/onvr../word/way../bj072

1415 Louisiana, Suite 2500 Houston, TX 77002

Tel: (713) 759-0999 Fax: (713) 308-3886

March 19, 1999



Mr. Wayne Price
Environmental Bureau
New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division
2040 South Pacheco Street
Santa Fe, New Mexico 87006

Subject:

Work Plan for Groundwater Delineation

BJ Services Company U.S.A. - Hobbs Facility: GW-072

2708 West County Road Hobbs, New Mexico

Dear Mr. Price:

Attached please find a work plan for a delineation of groundwater conditions at the BJ Services Company, U.S.A. Hobbs, New Mexico facility, as requested in the January 21, 1999 correspondence¹.

If you have any questions regarding the information presented herein, please feel free to contact Mr. Robert Jennings or me at (713) 759-0999.

Sincerely,

BROWN AND CALDWELL

Susan Rida Co

Richard Rexroad, P.G.

Project Manager

RNJ/RLR:uak

cc: NMOCD - Hobbs, New Mexico Office

Jo Ann Cobb, BJ Services Company, U.S.A.

¹ Letter From W. Price (NMOCD) to R. Johnson (BJ Services) dated 1-21-99: subject: BJ Services Company U.S.A. – Hobbs Facility: GW-072, 2708 West County Road Hobbs, New Mexico

Work Plan for Groundwater Delineation at BJ Services Facility, Hobbs, New Mexico

I. Technical Understanding

A. Former Underground Field Waste Tanks Area

The New Mexico Oil Conservation Division (NMOCD) desires delineation of the extent of groundwater constituents that exceed New Mexico Water Quality Control Commission (WQCC) standards in the area of the former underground field waste tanks, including evaluation of potential vertical migration of constituents due to possible density gradients.

Based on data from the March, June, and September 1998 groundwater sampling events, the concentrations of the following constituents exceed WQCC standards in one or more wells in the former underground field waste tanks area:

- Benzene;
- · Chloride; and
- Fluoride.

Groundwater flow in this area is in a generally eastward direction. Groundwater is first encountered in this area at a depth of approximately 55 feet below grade.

B. Former AST/MW-6 Area

NMOCD desires identification and delineation of groundwater constituents that exceed WQCC standards to the northeast of monitor well MW-6.

Based on data from the March, June, and September 1998 groundwater sampling events, the only constituent that exceeds WQCC standards in the former AST area is benzene. Groundwater flow in this area is in a generally eastward to northeasterly direction. Groundwater is first encountered in this area at a depth of approximately 52 feet below grade. Concentrations of benzene in monitor well MW-6 decreased substantially following startup of the biosparging system at the facility in November 1995. Benzene concentrations in MW-6 ranged from 7 mg/L to 11 mg/L prior to November 1995, but dropped to less than 0.1 mg/L during the period from May 1996 to March 1997. Benzene concentrations in MW-6 have been erratic since March 1997, and have exceeded WQCC standards during four quarterly sampling events since then.

II. Monitor Well Installation Locations

A. Former Underground Field Waste Tanks Area

BJ Services proposes to utilize an existing monitor well (OW-4) at a location approximately 200 feet east of existing monitor wells MW-11A and MW-12 to define the lateral extent of constituents exceeding WQCC standards, as shown in Figure 1. (This well is on an adjacent property and should be made available by the current landowner.)

BJ Services proposes to install a monitor well (MW-12D) adjacent to existing monitor well MW-12 to evaluate the potential for vertical migration of constituents due to possible density gradients. Monitor well MW-12 was selected as the existing monitor well to be twinned because it has the highest concentrations of chloride and benzene in the former underground field waste tank area, based on data from March, June, and September 1998. Details pertaining to well installation and construction activities for this and other proposed monitor wells are presented in Section III.

B. Former AST/MW-6 Area

BJ Services proposes to utilize existing monitor well OW-4 to evaluate groundwater conditions in the area northeast of monitor well MW-6.

Monitor well MW-6 was installed prior to August 1992. In November 1995, Brown and Caldwell completed installation and startup of a biosparging system designed to remove hydrocarbon constituents from groundwater and soil in the former AST area. As previously discussed, benzene concentrations in MW-6 decreased substantially following the startup of the biosparging system, but have been erratic since March 1997. Monitor well MW-6 is located immediately adjacent to (i.e., within approximately 5 feet of) a subsequently installed biosparging system air injection/extraction well, AV-17. It is believed that the close proximity of monitor well MW-6 to air injection/extraction well AV-17 may bias the results obtained from MW-6, due to the effects of continuous air introduction and extraction from AV-17 up until shortly prior to commencement of quarterly groundwater sampling activities at MW-6. Therefore, BJ Services plans to install a monitor well (MW-13) to the northeast of monitor well MW-6, beyond the zone of influence of existing air injection and extraction wells, as shown in Figure 1, in order to accurately characterize groundwater conditions in this area. Monitor well MW-6 will be plugged and abandoned in conjunction with installation of its replacement well, MW-13.

III. Monitor Well Installation Activities

The monitor wells described in Section II will be installed by a driller who is licensed in the State of New Mexico, under the supervision of Brown and Caldwell. Hollow stem auger and/or air rotary drilling techniques will be used as appropriate to the subsurface conditions encountered. The boreholes will be logged and classified in accordance with the Unified Soil Classification System (USCS). The occurrence of the approximate top of the saturated zone will be noted during drilling activities.

The boreholes for proposed monitor well MW-13 will be advanced to a depth sufficient to allow for installation of approximately 10 feet of well screen below the top of the saturated zone. The depth to water will be verified after reaching the proposed total depth of the boring, prior to commencement of monitor well construction activities. The well will be constructed using a total of 15 feet of well screen. The well screen will extend approximately 5 feet above the top of the saturated zone in order to account for seasonal fluctuations of the water table.

The thickness of the uppermost aquifer at the facility is not known. Monitor well MW-12 is screened in the uppermost 10 feet of the aquifer. Therefore, the borehole for monitor well MW-12D will be drilled to a sufficient depth to allow for installation of a well with a 10-foot screen to be set approximately 20 to 30 feet below the top of the saturated zone. If an aquitard is encountered prior to reaching this depth, however, then the well will be set such that the lowermost 10 feet of the aquifer is screened. Additional nested wells could be installed in the future, if warranted based on the results of groundwater sampling of proposed monitor well MW-12D.

The monitor wells will be constructed of 2-inch diameter Schedule 40 PVC. The monitor wells will be equipped with a sealing bottom cap, an approximate 2-foot sediment sump, and 10 to 15 feet of machine-slotted 0.010-inch slot well screen placed as described in the preceding paragraphs. Sufficient riser pipe will be added to extend the well to approximately 3 feet above the ground surface or approximately 6 inches below ground surface, depending on whether the well is to be completed as an above-grade or a flush-mount completion. The type of completion will be selected based on the individual well locations and the types of industrial operations that are conducted in these areas. The annular area surrounding the wells will be backfilled as follows:

- A 20-40 graded filter sand will be installed from the total depth of the boring to approximately 2 feet above the top of the well screen;
- Approximately 2 feet of hydrated bentonite shall be installed atop the sand filter;
- The remainder of the annular area will be backfilled with cement/bentonite grout installed using a tremie pipe.

The depth of the filter pack and bentonite seal will be verified using a weighted tape measure or other appropriate measuring device.

The wells will be equipped with a locking cap. Wells completed as flush-mount wells will be equipped with a traffic-rated protective cover. Wells completed as above-grade wells will be equipped with a protective steel casing, surrounded by protective crash posts as necessary to isolate the well from vehicular traffic. A 4-foot by 4-foot by 3-inch thick concrete pad sloping away from the well shall be set around each well. The wells will be equipped with locking caps and a lock.

The monitor wells will be developed using a surge block and submersible pump or other appropriate methodology for a period of time not to exceed 1 hour per well or until water recovered from the well is free of suspended sediment.

Downhole equipment (e.g., augers, bits, drill rods, etc.) will be decontaminated prior to usage and after usage at each borehole location using a hot water pressure washer. Soil cuttings and development water will be stored in clean 55-gallon drums pending evaluation of disposal options. Drums will be labeled as to contents, source, and date of filling and will be moved to a designated storage location at the facility until analysis of waste characterization samples has been completed. A composite sample of soil cuttings from each borehole will be collected and analyzed for gasoline-and diesel-range petroleum hydrocarbons (TPH-G and TPH-D) by Method 8015. A composite soil sample from the drummed soils will also be analyzed for total RCRA metals using the SW3050B/6010B/7000 Series methodology. Disposal options for investigation-derived wastes will be evaluated after review of the analytical results for the soil cuttings and groundwater samples.

IV. Groundwater Elevation Measurement and Sampling

Groundwater samples will be collected from the monitor wells at the time of the next quarterly sampling event at the facility in June 1999. The static depth to groundwater in each new and existing well at the facility and the adjacent property will be measured prior to commencement of groundwater sampling operations. The elevation of the top of casing for the new monitor wells utilized during these sampling activities will be field surveyed by Brown and Caldwell personnel relative to a previously surveyed elevation of one or more of the existing monitoring wells. The horizontal locations of the wells relative to one another and to points of fixed reference will be determined using a measuring tape. This data will be used in mapping of groundwater flow direction, calculating groundwater gradient, and determining purge volumes to be removed prior to sampling.

Well purging will be performed using a submersible pump. The following parameters will be measured upon removal of each well volume:

- pH,
- · Conductivity, and
- Temperature.

Well purging will continue until a minimum of 3 well volumes have been removed and until measurements for the parameters listed above have stabilized, with stabilization being defined as consecutive readings within 10 percent of one another.

Groundwater samples collected from the new wells and OW-4 in June 1999 will analyzed, along with existing monitor wells at the facility, for TPH-D and TPH-G by EPA Method 8015 and benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8021. Samples from monitor wells MW-12D and OW-4 will also be analyzed for chloride and fluoride to delineate the extent of exceedances of WQCC standards in the area of the former underground field waste tanks.

Additional parameters will be measured in the field during well purging operations to evaluate the potential for natural attenuation of hydrocarbons. These parameters are as follows:

- Dissolved oxygen,
- Oxidation-reduction potential,
- Ferrous iron, and
- Alkalinity.

Laboratory analysis for nitrate and sulfate (Method 300.0) and dissolved methane/ethylene/ethane (Method RSK SOP 147/175) will be performed on samples from monitor well OW-4 to further evaluate the potential for natural attenuation of hydrocarbons at locations that are remote from the biosparging system.

Samples to be submitted for laboratory analysis will be placed in laboratory-supplied clean sample containers, labeled appropriately, placed on ice in sample containment cooler with adequate cushioning material, and forwarded to an analytical laboratory using strict chain-of-custody procedures.

V. Monitor Well Location and Plugging/Abandonment Activities

Monitor wells MW-2 and MW-11 have apparently been covered during grading activities at the facility. Brown and Caldwell will use a magnetometer or other metal-detecting device capable of detecting the ferrous manhole covers and collars of these flush-mounted wells in an attempt to locate these wells. If located, these wells and existing monitor well MW-6 will be plugged and abandoned by a driller licensed in the State of New Mexico. Plugging and abandonment will

consist of pumping cement/bentonite grout down the well casing by means of a tremie pipe until the grout mixture fills the well casing and flows to the ground surface.

VI. Notification and Reporting

Brown and Caldwell will notify the central and district offices of the NMOCD a minimum of 48 hours prior to initiation of the monitor well installation and plugging and abandonment activities described herein. The results of these activities and groundwater sampling to be conducted in June 1999 will be reported to NMOCD in the June 1999 quarterly sampling report.



NEW MEXICO ENERGY, MINERALS & NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION 2040 South Pechago Street Sunta Fe, New Mexico 87505 (606) 927-7131

File 12832

May 19, 1999

CERTIFIED MAIL RETURN RECEIPT NO. Z 559 573 597

Ms. Jo Ann Cobb BJ Services Company, U.S.A. 8701 New Trails Drive The Woodlands, Texas 77381 Post-IT Fax Note 7671 Data # of pages To Rick Rexeard From TAC-Co. Phone # Phone # Fax #

Re:

Work Plan for Groundwater Delineation

BJ Services Hobbs facility GW-072

2708 West County Road

Hobbs, NM

Dear Ms. Cobb:

The New Mexico Oil Conservation Division (NMOCD) is in receipt of BJ Services Company, U.S.A. (BJSC) March 19, 1999 work plan for the above captioned facility. NMOCD hereby approves of the plan subject to the following conditions:

- The initial round of sampling for each prospective new monitoring point(s) and/or well(s) shall
 include analyzing for the complete New Mexico Water Quality Control Commission (WQCC)
 regulation water contaminants utilizing EPA approved methods, thereafter BJSC may propose
 analyzing for constituents of concern.
- BISC shall notify the OCD Santa Fe office and the OCD District office at least 48 hours in advance
 of all scheduled activities such that the OCD has the opportunity to witness the events and/or split
 samples during OCD's normal business hours.

Please be advised that NMOCD approval of this work plan does not relieve BJSC of liability should their operations fail to adequately investigate and remediate contamination that poses a threat to ground water, surface water, human health or the environment. In addition, NMOCD approval does not relieve BJSC of responsibility for compliance with any other federal, state, or local laws and/or regulations.

If you require any further information or assistance please do not hesitate to write or call me at (505-827-7155).

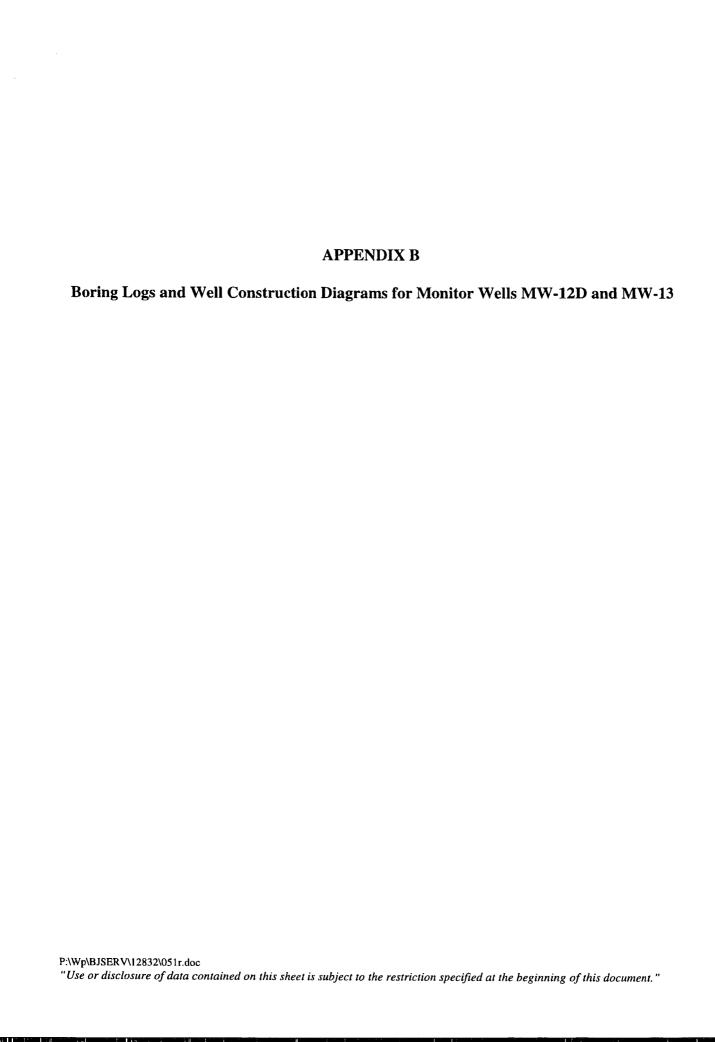
Sincerely Yours.

Wayne Price-Pot. Engr. Spec. Environmental Bureau

cc: QCD Hobbs Office

MAY 2 4 1999





BJ Services Company, U.S.A. 12832.021 Sheet 1 of 3 Project Name: Project Number: Approved: R. Rexroad Project Location: Hobbs, New Mexico Logged By: R. Rexroad Drilling Contractor: 6/30/99 Alliance Environmental, Inc. Date Started: 6/30/99 Date Finished: Total Boring Depth to Static 57.0 Drilling Equipment: Mobile B-61 Driller: J. Harold 92.0 Water: (feet) Depth: (feet) Borehole Diameter: 8.5" Drilling Method: **Hollow Stem Auger** 3857.30 Ground Elevation: 3858 TOC Elevation: Diameter and Type Sampling Method: Cuttings of Well Casing: 2" Schedule 40-PVC Comments: Filter Material: 20/40 Silica Sand Slot Size: 0.01 **Bailer** and Surge Development Method: Sampled Interval Depth to Water **USC Soil Type** Recovery (feet) Monitoring Well Depth (feet) Description Sample ID Remarks Lithology FILL, Sand with gravel Locking Well Cap (Below grade completion.) CL SILTY CLAY (CL), Dark grayish brown, slightly moist, grading to light grayish brown sandy clay at approximately 2 fbg. CL SANDY SILTY CLAY (CL), Whitish, with caliche, slightly moist, soft. Cement Grout SILTSTONE, very fine grained, semi-indurated. 2" Diameter Blank PVC Casing SAND (GP), whitish, fine grained, contains rounded ŀ∙*Q*′ siltstone gravel to approximately 1/2 inch in diameter, low moisture content. SANDSTONE, Medium brown, very fine grained, dry. 14-GP SAND (GP), whitish, fine grained, contains rounded siltstone gravel to approximately 1/2 inch in diameter, 100, low moisture content. 16 Increased pebble content. 20 Pebbles up to 1 inch diameter present below 20 fbg. 22. 24 SANDSTONE, Very fine grained, well indurated. SAND (GP), Whitish, fine grained, less pebbles than GP above (rounded siltstone gravel to approximately 1/2 Por 26 inch in diameter), low moisture content. 0 (28 SP SAND (SP), Pinkish-brown, with scattered rounded gravel, to approximately 3/4 inch in diameter. 30-

		-		
Мο	nite	orina	Wel	l:

MW-12D

Projec	et Na	ame:	В,	J Services Company, U.S.A.			Pro	oject Numl	ber: 12832.021 Sheet 2 of 3
Depth (feet)	Depth to Water USC Soil Type		Lithology	Description	Readings	Sampled Interval	Recovery (feet)	Sample ID	Monitoring Well Remarks
36 - 38 - 38 - 38 - 38 - 38 - 38 - 38 -	Dept	OSO	Litho Litho	2 inch to 3 inch layer of of pebbles at 36 fbg. Light pinkish brown, moist, well sorted, generally subrounded quartzose grains. Moist at 53.5 fbg. Wet at 57.5 fbg.		Samp	Reco	Samp	55.0

Mo	nite	ring	⋅We	II:

MW-12D

Projec	t Na	ame:	<u>B</u> ,	J Services Company, U.S.A.		Proj	ect Num	ber: 12832.021 Sheet 3 of 3
Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description Sample Samp	 Sampled Interval	Recovery (feet)	Sample ID	Monitoring Well Remarks
76 - - - 78 -								76.0Bentonite Seal 20/40 Silica Sand Filter Pack
80 - 82 - 82 - 84 - 84 - 84 - 84 - 84 - 84								2" Diameter 0.01" Slotted PVC Well Screen.
86 — - - - - - - - - - - - - - - - - - - -								2" Diameter Schedule 40-PVC Sediment Sump
92—								
								·

BJ Services Company, U.S.A. 12832.021 Sheet $\underline{1}$ of $\underline{2}$ Project Name: Project Number: Logged By: R. Rexroad Project Location: Hobbs, New Mexico Approved: R. Rexroad Alliance Environmental, Inc. Date Started: 6/29/99 6/29/99 **Drilling Contractor:** Date Finished: **Total Boring** Depth to Static 56.0 Drilling Equipment: Mobile B-61 Driller: J. Harold Depth: (feet) 69.0 Water: (feet) Borehole Diameter: 8.5" 3588.92 Drilling Method: **Hollow Stem Auger** TOC Elevation: Ground Elevation: Diameter and Type Sampling Method: Cuttings 2" Schedule 40-PVC of Well Casing: Well drilled through floor of Acid Dock Drum Storage Comments: Filter Material: 20/40 Silica Sand Slot Size: 0.01 Area **Bailer and Surge** Development Method: Sampled Interval Depth to Water USC Soil Type Recovery (feet) Monitoring Well Depth (feet) Description Sample ID Remarks Lithology CONCRETE 6 to 8 inches thick. Locking Well Cap ML SANDY CLAYEY SILT (ML) Medium/dark grayish brown, moist, no odor. Well completed as flush-mounted well. Top of protective steel casing is approximately 2 inches above the level of the concrete floor of the SM SILTY SAND (SM) Grades to medium brown, moist, acid dock drum storage area. Top of PVC casing is approximately 6 inches below the top of protective Conglomerate consisting of rounded to subrounded steel casing. Floor of acid dock sandstone and chert pebbles alternating coarse to fine drum storage area is approximately conglomerates to 9.5 fbg (>1 inch to 1/4 inch 6 to 8 inches thick. diameter.) CL SILTY CLAY (CL), Light brown, soft, moist, no odor. 12-Grades to medium brown Sandy Silty Clay (CL) at 12 fbg. Grades to: 14-SANDY CLAY (CL), Dark brownish gray, poorly lithified, cemented weakly. Increasing sand content with depth. 16 18 SP SAND (SP), Light brown, fine to very fine grained, well 20sorted, slightly moist. 22 -Dry at 22 fbg. 24 26 28 Cement Grout 30-SANDSTONE, Light brown, well cemented. 32 GM

Sheet <u>2</u> of <u>2</u> BJ Services Company, U.S.A. 12832.021____ Project Name: Project Number: _ Sampled Interval Recovery (feet) Depth to Water USC Soil Type Monitoring Well Remarks Depth (feet) Description Sample ID Lithology SP SAND (SP), Light brown, dry, fine to very fine grained, well sorted, subangular to subrounded grains, no odor. 40 2" Diameter Blank PVC Casing 42-46 48-Bentonite Seal 49.0 51.0 52-Moist at 52.5 fbg. 20/40 Silica Sand Filter Pack 56-Wet at 56 fbg. 58-60-2" Diameter 0.01" Slotted PVC Well Screen 62-66.0 2" Diameter Schedule 40-PVC Sediment Sump 68.0

APPENDIX C

Groundwater Sampling Forms

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

WELL ID: MW-

Project Nu	imber: 1283	32	٦	Task Number:	0/9	-	Date:	6.13.	7 7
Casing Diar	meter	Purge Equip	ment		·	Geochemical	Parameters		
	inches		_			Ferrous iron:		<i>C</i>	mg/
Total Depth	of Well from TOC	Å	0~~p			Discolated and		1.5	
Static Wate		Sample Equ	ipment			Dissolved oxy	gen:		mg/
	58.02 feet	P	~~~p			Nitrate:			mg
Product Lev	vel from TOC	J							
enath of W	feet Vater Column	Anatytical Fr	uinment /nH	DO, Redox, filtr	ation etc.)	Alkalinity:		160	mg
	·48			och kit	auon, 610.)	Sulfate:		_	mg
Welf Volum	ne	7	13+, r.	NOS KI					9
/	gai					Sample Time:	:	15:10	
Screened II	nterval (from GS) ムリ・く								
	feet feet				······	Note: 2" well=	: .167 gal/ft.,4	"well=.667ga	wit.
Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visua	l Description	1
اد <i>!\$ا</i> م	_	7.55	2460	565	102.9	340	Class	•	
15:03	1.0	7.42	22.56	999	157	1.75	CLOV		
15:15	2.0	7.29	21.08	967	1249	1.19	clour		
1558	3.0	7.32	2240	946	1226	0.71	Clear		
)5'.10	4-0	7,33	77.45	540	79.8	2.85	Clar		
Comme	ents:	Ç	ll oct o	d dy	olilute	Sayl	e fr.~	- priv	<u>-/</u>
	<u> </u>								

r			T .						
PPE Worn	: 5Loves		Sampler's	Signature:	,				
1 '	n of Purge Water:	dC							

WELL ID: MW-3

Groundwater Sampling Field Data Sheet

Project Nu	ımber: 129	432	· 1	Task Number:	7014	-	Date:	6.10.	99
Casing Dia	meter	Purge Equip	ment			Geochemical I	Parameters		
	inches	3 , ,	p~f	,		Ferrous iron:		C	mg/l
	62 feet	Sample Equ	a			Dissolved oxygen:		1. 2	mg/l
Static Water	55.17 leet	Sample Equ	pinent			Aliaman		-	
Product Lev	vel from TOC		punk)		Nitrate:			mg/l
l ength of V	feet Vater Column	Analytical F	ruinment (nH	DO Radov filtr	ation etc.)	Alkalinity:		340	mg/l
1 -	5-83 leat		quipment (pH, DO, Redox, filtration, etc.)			Sulfate:			mg/l
	Greened Interval (from GS) 45-62					Sample Time:		14.25	
1 .	. 62					Note: 2" well=	167 gal/ft. 4*	well= 667ga	l/ft.
	100.	1				11101012 11011			<u></u>
Time	Gallons Removed	pН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual	Description	
14:15		7.59	24.32	<i>13</i> 30	48.2	3.55	(l rec		
14:18	1.0	7.02	21.70	1206	_/6.3	1.80	Clear		
14:21	2.0	6.98	21.96	1154	-1.8	1.66	clar		
14.23	3.0	6.77	22.51	1194	3.0	1.51	Class		
141.25	4.0	6-6,8	22-35	1209	69	1.33	<11.		
Comme	ents:			<u> </u>					
PPE Worn			Complete	Cianotura					
IFFE WORN	gloves		Sampler's	oignaturė:					
Disposition	of Purge Water:	ock		A	J.			_	

WELL ID: MW-4

Groundwater Sampling Field Data Sheet

Project Nu	umber: 1283.) .	. 7	Task Number:	314)	-	Date:	6.10.	17
Casing Dia	meter	Purge Equip	ment		÷	Geochemical I	Parameters		
)inches		gar			Ferrous iron:		<u> </u>	mg/l
: ,	of Well from TOC					Dissolved oxygen:		1.0	mg/l
1	er from TOC ・ろ、	Sample Equ				Nitrate:	_	mg/li	
Product Lev	vel from TOC		, m. p			, maio		3.11.	9
Length of V	feet Vater Column	Analytical Ed	quipment (pH	, DO, Redox, filtra	ation, etc.)	Alkalinity:		240	_mg/l
Well Volum	6.43 feet	75	IS HU	小人大计		Sulfate:			mg/l
	/ 【 gal					Sample Time:	:	16:00	
45 -	nterval (from GS)					Note: 2" well=	.167 gai/ft.,4	*well=.667ga	l/ft.
Time	Gallons Remoyed	рΗ	Temp	Conductivity	Redox	Dissolved Oxygen	Visua	d Description	
15 ¦Ss	_	7.68	2621	1254	18.4	4.70	5°, LT \	4	
15:53	1.0	7.18	21-41	765	-8.1	ふり	Clav		
15'.55	2.0	7,10	2.2-01	564	6.2	1.34	Cleck		
15:57	7.0	71/2	みなよつ	945	16.7	0,75	cl-v-		
11:33	410	7.11	22-15	SES	16.1	2.58	در ،ب	,	
Comme	ents:							a	
					-				
					·			- · · · - · · · · · · · · · · · · · · ·	
				······	- 				
			Sampler's	Signature:					
	יe Water:							-	

WELL ID: MW-5

Ground	dwater Sam	pling Fi	eld Data	Sheet	-				
Project Nu	umber: 1253	2	٦	Гask Number:	214	<u>-</u>	Date:	612.55	Î
Casing Dia	meter	Purge Equip	ment			Geochemical	Parameters		
	1 inches	1				Ferrous iron:		O	mg/l
	of Well from TOC	P	L-p						
	6470 feet	-				Dissolved oxy	gen:	テス	mg/l
Static Wate	r from TOC 56.91	Sample Equ	ipment						
	1661	P	~~p			Nitrate:			mg/l
Product Lev	vel from TOC					Alkalinity:		250	mg/l
Length of V	Vater Column	Analytical E	quipment (pH,	DO, Redox, filtr	ation, etc.)	Truncaminy.			11191
	7.79 feet	75	E Uncl	kir		Sulfate:		<u> </u>	mg/l
Well Volum	_	1	25 / 1/1/0.	, , , ,					
Screened in	1-3 gai					Sample Time:	:	11:50	<u> </u>
45-						Note: 2" well=	: .167 gal/ft.,4	well=.667ga	l∕ft.
Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual	Description	
14:45	 .	6.57	22.38	1150	33.7	421	an		
11.47	1.3	760	20.99	1199	48.7	7-11	Class		
11:48	۷. ۵	7.31	20.60	1774	72-1	6.56	Clas		
11:50	3.0	7.20	22.19	1/40	83.1	6.30	clar		
Comme	ante:								
				····			 		
		 1				······································			
PPE Worn			lct	Cih					
	e Ekobes		Sampler's	oignature:					
	of Purge Water:		1	1	1				
1	ciel doc	K	<u> </u>					-	

Groundwater Sampling Field Data Sheet

Project Nu	ımber: 128	32	ר	Task Number: _	014	-	Date:	6.10.	15
Casing Diar	meter	Purge Equip	ment			Geochemical	Parameters		
	2 inches		•			Ferrous iron:		0	mg/l
Total Depth	of Well from TOC	P	J-A						 '
! !	61.5 feet					Dissolved oxy	gen:	1.5	mg/l
		Sample Equ	_]			
	55.66 leet	P	11MP			Nitrate:			mg/l
Product Lev	vel from TOC	•				İ			
	feet					Alkalinity:		770	mg/l
_	Vater Column			, DO, Redox, filtra	ation, etc.)				
· ر Well Volum	: 54 feet	451	, Hach	トナ		Sulfate:			mg/l
WEII VOIUM	- - 3	,	-					27111	
Screened li	gai nterval (from GS)					Sample Time:		10:45	
	6-60 feet					Note: 2" well=	167 gal/ft 4	"well- 667ca	1/ft
	reet	L				INOIS. E WEIL	yarı.,4		w.11.
Time	Gallons Removed	pН	Temp	Conductivity	Redox	Dissolved Oxygen	Visua	I Description	
10:35	-	7.95	26.51	1726	1-4	617	Silty		
15:37	1.0	7.30	12·81	1544	43	1.66	C(21/		
Comme									
	<u>u</u>	rell c	Jay @	1.0 500	<u> </u>		÷		
						·			
L									
	タいしCun of Purge Water:		Sampler's	Signature:	N				
1 1	and do	dl	1	<u> </u>	00				

WELLID: MW-4

Project N	umber: ルゲ	_		Task Number:	264		Date:	6.12.5	9
Casing Dia	meter	Purge Equip	ment		<u></u>	Geochemical	Parameters		
	2 inches		_			Ferrous iron:		0	mg/l
1	of Well from TOC	P)~~P						
, .	7.32 leet					Dissolved oxy	gen:	2- U	mg/l
l	er from TOC	Sample Equ	ipment			1		180	
5	5.56 feet	PI	INP			Nitrate:		3,00	mg/l
Product Le	vel from TOC							300	
	feet			·		Alkalinity:			mg/l
1 -	Water Column	Analytical Ed	quipment (pH	, DO, Redox, filtr	ation, etc.)				
Well Volum	, 7 G feet	YSI	Mach	k.T		Sulfate:			mg/l
1	ne		•			-		. 12	
<u> </u>	nterval (from GS)					Sample Time:		11:20	
3	5-60					N-4- Ol	407 1/6 4	h	1 #4
	feet	<u> </u>			 	Note: 2" well=	.167 gavπ.,4	well=.56/ga	<i>ι</i> /π.
Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visua	l Description	
11:15	-	785	25.48	1339	13.2	438	clar		
11:17	1.0	8.33.	73.83	1368	20.6	3.11	((4,7		
11:25	2.0	7.59	25-15	1440	344	1.85	(ln/		
Comme	ents:								
PPE Worn	n: Staires n of Purge Water:	lt,	Sampler's	Signature:	12			_	

WELL ID: MW-9

Project Nu	ımber: 12.83	<u> </u>		Task Number:	074	-	Date:	6.12.9	C_i
Casing Dia	meter	Purge Equip	oment			Geochemical	Parameters		
	inches	00	·~+			Ferrous iron:			mg
,	of Well from TOC	1	,						
	feet from TOC	Sample Equ	vinment.			Dissolved oxy	gen:	2-6	mg
	Dild					Nitrate:		_	
	70% feet vel from TOC	Poor	~ ~			iviliale.			mę
	feet					Alkalinity:		320	mg
Length of V	Vater Column			, DO, Redox, filtr	ation, etc.)				
Well Volum		152	uhlach i	KH		Sulfate:			m
Well Woldin	1.0					CIo Fina		16:45	
Screened l	gal nterval (from GS)					Sample Time:		10.00	
4	5-60 teet					Note: 2" well=	.167 gal/ft.,4	well=.667ga	l/ft.
Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxygen	Visua	I Description	
16:35		7.56	24-49	1178	3.8	3.88	Cleir		
16:37), a	7.16	23·6v	112.5	49.8	3-13	der		
16240	2.0	7-09	23.81	1139	66.1	2.75	clar		
16:42	3, 0	7.28	23.86	1138	69.4	1.51	Cla-		
16:45	4.0	ک ۱	23.37	רפט	753	0.58	clar		
Comme	ents:		· · · · · · · · · · · · · · · · · · ·						•
				<u></u>					

		-							
PPE Worn	· sloves		Sampler's	Signature:					
	of Purge Water:		4		2				

WELL ID: MW-10

Groundwater Sampling Field Data Sheet

Groun	uwater Sam	pility Fi	eiu pala	Sneet					
Project N	umber: 2832	<u> </u>	7	Task Number:	24		Date:	6.12-9	٩
Casing Dia	meter	Purge Equip	ment			Geochemical	Parameters		
	ک inches					Ferrous iron:		2.0	mg/l
Total Depth	of Well from TOC	l I	11-p			r cirous iion.			,,,,,,, ,
, .	62.5 teet					Dissolved oxy	gen:	0.5	mg/l
Static Wate	er from TOC	Sample Equ	ipment		:				
	56.60 leet		pump			Nitrate:			mg/l
Product Le	vel from TOC	,	, ,						
L	leet					Alkalinity:		770	mg/l
_	Vater Column	Analytical E	quipment (pH,	, DO, Redox, filtr	ation, etc.)				
	6.3 feet	1	I, HA	1-24		Sulfate:		-	mg/l
Well Volum	ne	13		× 1					-
	/. O gal					Sample Time:	:	13:05	
Screened I	nterval (from GS)								
4	6-62 1001					Note: 2" well=	.167 gal/ft.,4"	well=.667ga	l/ft.
Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual	Description	
n:55		7.75	27-51	2671	-104.9	2.10	clair		
12157	1. 5	7.01	2448	2801	-109.6	1.77	clas		
/3°20	20	6:60	入3.46	2519	-119.3	1.10	clror		
13:05	3540	650	12.28	2303	_ 1527	2.56	<i>څلاونې</i> ۔	···	
								40 1002	
Comme	ents:		·	······································				· · · · · · · · · · · · · · · · · · ·	
							, , , , ,		
						· · · · · · · · · · · · · · · · · · ·			
			 			- ·			
L				····	·				
PPE Worn	· 61 . 02	·····	Sampler's	Signature:					
	gloves		1	^					
	n of Purge Water:			1	12				
Ac	id did	_						-	

BROWN AND CALDWELL WELLID: MW-11A

Project Nu	ımber: 12 83	٠,٢).	Task Number:	014		Date:	6-12.8	9
Casing Dia	meter	Purge Equip	ment			Geochemical	Parameters		
	Z inches	t	9000			Ferrous iron:		5.0	mg/
Total Depth	of Well from TOC	1				Dissolved oxygen:		0.1	mg/
Static Wate	r from TOC	Sample Equ	ipment			Dissolved Oxy	yen.		
56.94 teet			purp			Nitrate:			mg/
Product Lev	vei from TOC		•			Alkalinity:		350	mg
-	Vater Column	Analytical E	quipment (pH	, DO, Redox, filtr	ation, etc.)	,			
Well Volum	56 reet	7:	SIJAL	ich Kit		Sulfate:			mg
		_				Sample Time:		は:30	
	nterval (from GS)								
45-	6A feet					Note: 2" well=	.167 gal/ft.,4	well=.667ga	I/ft.
Time	Gallons Removed	pН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual	Description	
かね	_	7.53	22-45	2626	-102-2	1.61	Class		
D 133	1.0	6.68	21.51	2618	-104.3	0.86	cleur		
12:26	2-4	675	2/41	2852	-115.7	0.47	Cleur		
12:28	3.0	6.80	21.37	3085	-123-8	2.32	ودمہ		
12:3,	4.0	6-81	21.45	3120	-127.3	0.31	42/		
Comme	ents:								
	· · · · · · · · · · · · · · · · · · ·						 	· /···	
			•						
			<u> </u>				····		
									
PPE Worn	gloves		Sampler's	Signature:					
1 '	n of Purge Water:				2/1				
A	d do	dC			1 6h	>		_	

WELLID: MW-DZ

Groundwater Sampling Field Data Sheet

Project N	umber: 128	_	ora Data	Task Number:	014		Date:	6-12-9	۹		
Casing Dia	meter -	Purge Equip	ment			Geochemical	Parameters				
Total Denti	inches		J~~P			Ferrous iron:		えい mg/l			
(.)						Discolated access		J. J.			
Static Water from TOC Sample Eq			ipment			Dissolved oxy	g en .		mg/l		
56.57 feet			p~~e			Nitrate:			mg/l		
	feet					Alkalinity:		770	mg/l		
1	4. 33 feet		quipment (pH. SIJ HIAC)	, DO, Redox, filtr	ation, etc.)	Sulfate:		<u> </u>	mg/l		
	2-67 Screened Interval (from GS)						Sample Time:				
45-65 feet							Note: 2" well= .167 gal/ft.,4"well=.667gal/ft.				
Time	Gallons Removed	pН	Temp	Conductivity	Redox	Dissolved Oxygen	Visual	Description			
1340	_	7.26	2405	1415	- 146.6	1.62	lap				
13:43	1.0	7-11		1457	-156.5	0.96	clar				
, 3:45	2.0	7.05	23.27	1417	-1578	2.75	clear				
13140	3.0	6.98	23.52	1551	-153-3	2.74	das				
13:50	4.0	6.97	23.59	1564	-152.5	スフス	clar				
Comme	ents:						·				
				-							
						 					
							.w.,				
	っof Purge Water:		Sampler's		3 12			· ·			
AL	· d dod	<		1t	7/4			-			

Groun	lowater	Sampiin	y rieiu				_			
Project N	lumber:	1783	2	-	Task Number	0.2	<u>-</u>	Date	e: <u>7-</u> 7	-9
Casing Dia	meter		Purge Equi	pment			Equipment C	alibration - T	ime	
	2								·	
		inches	1	bail	er		Lee	= Attac	had She	et
Total Depti	h of Well from		barre				pH J		at	_ <u>*c</u>
	88.57	loot	j]			
Static Water	er from TOC		Sample Eq	ipment			pH	=	41	℃
	56.99	, ,	ĺ				Ì			
Product Le	vei from TOC		1	buile			Conductivity			
	Ô	•	j	Dalle	1		Conductance			
	Water Colum	foot	Appheioni E	ouioment (nH	, DO, Redox, filti	ration etc.)	Standard:		µmhos/cm at	25° C
-	• 4		Analytical E	quipment (pr	, 50, 11660x, mil		1			
	31.58	feet	YST	Morle	1 600X	L	Measured Value:		_ jumhos/cm at:	25° C
Ve ll Volun			' -	,						
,	5.05	cal	1 Hach	Test	Kit(alk	calinity	Dissolved Oxygen			
	nterval (from		' ' ' ' '	/ / /	~	* / /	•	'. Neter Calibrated t	o:	mgf
	-87.5	="		DO, Fe+2)						
1 (12	0113	feet	<u> </u>				<u> </u>			
	Well	Galions	i		l	1	Dissolved			
Time	Volume	Removed	pH	Temp	Conductivity	Redox	Oxygen	Visua	l Description)
9 19	1	5.1	7.57	21.32	1255	-330.6	4.12	cle	a +	
<i>?93</i> 6	2	10.2	7.62	21.46	1266	-359.6	4.60	clear	/s/. c/	004
0953	3	15.3	7.56	40 II	1220	-442,5	4.00	51. (loudy	<u> </u>
3eochem	nical Param	eters		Comments:						
1	Ferrous Iron:	1,4	mg/L		ALKAI	IN174.	= 385 /	na/L a	s Caca	JZ
Dissol	ved Oxygen:	July ,	RE 9/2/	29						<u>フ</u>
	Nitrate:	Lab	mg/L							
	Sulfate:	Lal	1							

PPE Worn: Level D	Sampler's Signature:
Disposition of Purge Water.	Marrond

lab

Level D

Disposition of Purge Water:

ATUMMED

Sulfate:

PPE Wom:

WELL ID: MW-13

Groun		Samplin	_			071		Date: 7/2/29	
Project N	lumber:	1283	-,	-	Task Number	: 001	-	Date: 1147	
Casing Dia	meter		Purge Equi	pment		· · · · · · · · · · · · · · · · · · ·		alibration - Time	
	2	inches	bailer				on see attacled		
	h of Well from] "	WIII-			pH >	= 5 Ment v	
6	Ce. 35	foot	1					N.	
Static Wat	er from TOC		Sample Equ	uipment			рн	≡ al ℃	
56-60 roa			,	1.					
Product Le	Product Level from TOC			miler			Canductivity		
O feet						Conductance Standard:	µmhos/cm at 25° C		
_	Water Column	n	Analytical E	quipment (pH	, DO, Redox, filt	ration, etc.)			
	.75	feet	Y.	SI MO	odel 60	OXL	Measured Value:	umhos/cm at 25° C	
	Well Volume			·	11 1 Z 10.	1			
	156	gal	1		Kit (alk	1/	Dissolved Oxygen DO Meter Calibrated to: mg		
Screened i	nterval (from	GS)	Hach	Test Ki	t(Fe+i	(00)			
51-	46	feet		· 			ļ		
Time	Well	Gallons	pH	Temp	Conductivity	Redox	Dissolved	Visual Description	
	Volume	Removed		<u> </u>	,		Oxygen		
1/27	1	2	7.25	19.4°	250	374	3.17	Lt. Brown, SI. Cloudy	
1/37	ス	4	7.2,-	19.57	2084	33.4	X.3.75	as above	
1147	3		7.5%	19.40	2084 2084	,35° 5	3.6>	as above	
Geocherr	ical Param	eters		Comments:					
!	Ferrous Iron:	3.6	m g/ L	Ulka	linity =	770 M	g/L as	CaCOz	
Dissol	ved Oxygen:	3.¥	mg/L		1				
	Nitrate:	lab	mg/Li						

Sampler's Signature:

Roynoul

Acid Jock

WELLID: OSW-11

Project Nu	umber: 128	_		Task Number:	อกป		Doto	6.12	.99
- rioject Ni	imber. 123).k.	'	ask Number:	3751	-	Date		
Casing Dia	meter	Purge Equip	ment			Geochemical	Parameters		
	inches	P	pump				Ferrous iron:		mg/l
Total Dept	Total Depth of Well from TOC								
	61.5 feet				Dissolved oxy	gen:	2.0	mg/l	
Static Wate			ipment						
Dra di sal I -	SB. O.3 feet		/~P			Nitrate:			mg/
Product Le	vel from TOC							280	
l ength of V	leet Vater Column	Analytical F	quioment (nH	DO, Redox, filtra	ation etc.)	Alkalinity:			mg/l
	3.47 feet		, Hach		211011, BIG.)	Sulfate:			mg/l
Well Volum), 3							10071	
ļ	yar					Sample Time:		17.35	
	nterval (from GS) ハルック feet						407 - 184 4		
WIL	M. Ko M feet	1				Note: 2" well=	.167 gavπ.,4	well=.66/ga	ivn.
Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvgen	Visua	l Description	·····
1720	ن	7.65	23.57	1454	25.5	7.25	Clev		
17:24	1.5	6.51	21.63	1451	96.5	6.52	CLEN		
17:28	3, 0	6.76	22.90	1445	111.1	6.45	clas	· · · · · · · · · · · · · · · · · · ·	
17:32	4.5	6.76	2274	1436	114.6	6.42	clar		
17:35	6,0	6.27	20.76	1417	1/7.9	6.38	clav		
Comme	ents:								
<u> </u>				···			 		
	, <u></u>								
				·					
		-							
PPE Worn	5 Laucs		Sampler's	Signature:					
Disposition	of Purge Water:		1	1	/				

Milco Safety Rental

Equipment Report Card

for

YSI Model 600XL S/N 657

Inc.

This equipment has been inspected prior to its shipment and the following items and general, observable condition have been described.

Please review this instrument upon its arrival to confirm the contents of this report. Should you recognize a deviation, please call 800-775-1738 to report your findings.

All items on this report will be reviewd upon the unit's return to MSR, Inc. Any damage, lost items or unreasonable and unusual maintenance required to restore the unit to its reported condition will require additional charges to the customer.

1. 610 D Console	
2. Sonde	х
3. Sonde Moisture Container	х
4. Charger for 610 D	х
5. Connector cable 8 ft	х
	х
7. Adapter-Console to Computer	
9. Blank Plug	
10. Zocholt Calastia	
11. pH Buffer4.0pH7.0pH10.0pH	
12. Conductivity Standards uS/cm	
13. Manual(s)	х
14. Flow Thru Sampler	х
15. DO Membranes and solution	х
16. Cigarette adapter	x
General Description: Unit Calibrated: 6/29/99 Description: Unit Calibrated: 6/29/99 Description: Unit Calibrated: 6/29/99 Description: Unit Calibrated: 6/29/99	
2. Conductivity Standard: 1,413 uS	
3. ORP Calibrated with Zobell Solution: 231mV @ 25C	
1. DO Calibrated in air @ 760mm Hg	
Inspector tb Date 6/29	9/99

D

APPENDIX D

Laboratory Analytical Reports for Groundwater Samples

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





June 28, 1999

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

The following report contains analytical results for the sample(s) received at Southern Petroleum Laboratories (SPL) on June 11, 1999. The sample(s) was assigned to Certificate of Analysis No. (s) 9906478 and analyzed for all parameters as listed on the chain of custody.

Please note that your sample ID's: MW-9, MW-12, MW-3, MW-1, Dup and the trip blank #3 sample have low concentrations of Toluene detected. This analyte was not present in the method blank. There has been a recent problem with Toluene showing up in the trip blank and samples. SPL has performed many internal studies and have concluded that the glue used on the sample bottle labels have high concentrations of toluene. SPL has taken corrective actions to prevent any further occurrences.

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).

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

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

Southern Petroleum Laboratories

Bernadette A. Fini

Senior Project Manager





Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 99-06-478

Approved for Release by:

Bernadette A. Fini, Senior Project Manager

Joel Grice Laboratory Director

Idelis Williams
Corporate Quality Assurance Director

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory. The results relate only to the samples tested.

Results reported on a Wet Weight Basis unless otherwise noted.

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

ertificate of Analysis No. H9-9906478-01

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 10:45:00

SAMPLE ID: MW-7 DATE RECEIVED: 06/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99	% Recovery 80 73		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND ND ND ND	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR Date: 06/15/99	% Recovery 90 90		
Total Petroleum Hydrocarbons-Diesel	ND	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/17/99 08:51:00	% Recovery 32		

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



ertificate of Analysis No. H9-9906478-02

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 11:20:00

SAMPLE ID: MW-8 DATE RECEIVED: 06/11/99

PARAMETER ANALYTICAL	DATA RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/16/99	% Recovery 83 73		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND ND ND ND	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR Date: 06/16/99	% Recovery 90 93		
Total Petroleum Hydrocarbons-Diesel	ND	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/17/99 09:37:00	% Recovery 58		

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

ertificate of Analysis No. H9-9906478-03

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 11:50:00

SAMPLE ID: MW-5 DATE RECEIVED: 06/11/99

ANALYTICAL	DATA			
PARAMETER	RES	ULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics		ND	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99	% Reco	very 97 73		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS		ND ND ND ND ND	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR Date: 06/15/99	% Reco	very 83 90		
Total Petroleum Hydrocarbons-Diesel		ND	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/17/99 10:22:00	% Reco	very 64		

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



ertificate of Analysis No. H9-9906478-03

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-5

DATE SAMPLED: 06/10/99 11:50:00

DATE RECEIVED: 06/11/99

ANALYTICAL DATA PARAMETER RESULTS DETECTION UNITS LIMIT Methane ND 0.0012 P mq/L Ethylene ND 0.0032 P mg/L Ethane ND 0.0025 P mg/L RSKSOP-147 Analyzed by: JDR Date: 06/24/99 12:48:00 Nitrate (as N) 4.73 0.1 mg/L N Method 300.0 * Analyzed by: ELS

Date: 06/11/99 16:53:00

Sulfate 209 4.0 mg/L

Method 300.0 *
Analyzed by: ELS

Date: 06/11/99 11:00:00

ND - Not detected.

(P) - Practical Quantitation Limit

PROJECT NO: 12832

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

DATE: 06/25/99

er@ificate of Analysis No. H9-9906478-04

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE:

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 06/10/99 16:45:00

SAMPLE ID: MW-9

DATE RECEIVED: 06/11/99

ANALYTICAL I	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.43	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99	% Recovery 100 77		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND 1.8 1.8 71 74.6		ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR/ Date: 06/16/99	% Recovery 87 97		
Total Petroleum Hydrocarbons-Diesel	ND	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR	% Recovery 70		

(P) - Practical Quantitation Limit ND - Not detected.

Date: 06/17/99 11:07:00

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

er@ificate of Analysis No. H9-9906478-05

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

DATE: 06/25/99

PROJECT NO: 12832 PROJECT: BJ-Hobbs

MATRIX: WATER SITE:

DATE SAMPLED: 06/10/99 12:30:00 SAMPLED BY: Brown and Caldwell SAMPLE ID: MW-11A DATE RECEIVED: 06/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION	UNITS
Gasoline Range Organics	ND	LIMIT 0.10 P	mg/L
Surrogate	% Recovery		
4-Bromofluorobenzene	87		
1,4-Difluorobenzene	77		
Method 8015B *** for Gasoline			
Analyzed by: DR			
Date: 06/15/99			
BENZENE	ND	1.0 P	ug/L
TOLUENE	ND	1.0 P	ug/L
ETHYLBENZENE	ND	1.0 P	ug/L
TOTAL XYLENE	ND	1.0 P	ug/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		ug/L
Surrogate	% Recovery		
1,4-Difluorobenzene	87		
4-Bromofluorobenzene	93		
Method 8021B ***			
Analyzed by: DR Date: 06/15/99			
Total Petroleum Hydrocarbons-Diesel	ND	0.20 P	mg/L
			J , -
Surrogate	% Recovery		
n-Pentacosane	64		
Method 8015B *** for Diesel			

Analyzed by: APR

Date: 06/17/99 11:52:00

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

ertificate of Analysis No. H9-9906478-05

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

SITE:

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-11A

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 06/10/99 12:30:00

DATE RECEIVED: 06/11/99

		ANALYTICAL	DATA				
PARAMETER				RESULTS	DETI LIM	ECTION IT	UNITS
Methane				0.019	0.0012	P	mg/L
Ethylene				ND	0.0032	P	mg/L
Ethane				ND	0.0025	P	mg/L
RSKSOP-147							
Analyzed by:							
Date:	06/24/99	01:00:00					
Nitrate (as N))			ND	0	. 1	mq/L N
Method 300.0							٥,
Analyzed by:	ELS						
	06/11/99	16:53:00					
Sulfate				219	4	. 0	mg/L
Method 300.0	*				_		
Analyzed by:							
	06/11/99	11:00:00					

(P) - Practical Quantitation Limit ND - Not detected.

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

ertificate of Analysis No. H9-9906478-06

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 06/10/99 13:05:00

SAMPLE ID: MW-10 DATE RECEIVED: 06/11/99

ANALYTICAL	DATA				
PARAMETER		RESULTS	DETE LIMI	CTION T	UNITS
Gasoline Range Organics		0.16	0.10	P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99	% R	ecovery 87 73			
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS		17 ND ND ND 17	1.0 1.0 1.0	P P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR Date: 06/15/99	% R	ecovery 90 90			
Total Petroleum Hydrocarbons-Diesel		0.30	0.20	P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/18/99 12:38:00	% R	ecovery 72			

(P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9906478-06

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE:

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 06/10/99 13:05:00

SAMPLE ID: MW-10

DATE RECEIVED: 06/11/99

AL DATA			
	RESULTS	DETECTION	UNITS
		LIMIT	
	0.036	0.0012 P	mg/L
	ND	0.0032 P	mg/L
	ND	0.0025 P	mg/L
			_
	ND	0 1	mg/L N
	·	0.1	mg/b I
	181	4.0	mg/L
	101	2	5/
	AL DATA	RESULTS 0.036 ND ND	RESULTS DETECTION LIMIT 0.036 0.0012 P ND 0.0032 P ND 0.0025 P ND 0.01

(P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

ertificate of Analysis No. H9-9906478-07

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 13:50:00

SAMPLE ID: MW-12 DATE RECEIVED: 06/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.13	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99	% Recovery 80 80		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	49 1.4 ND ND 50.4		ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR Date: 06/15/99	% Recovery 103 90		
Total Petroleum Hydrocarbons-Diesel	0.22	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/18/99 01:23:00	% Recovery 64		

(P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

ertificate of Analysis No. H9-9906478-07

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE:

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 06/10/99 13:50:00

SAMPLE ID: MW-12

DATE RECEIVED: 06/11/99

ANALYTICAL DATA PARAMETER RESULTS DETECTION UNITS LIMIT Methane ND 0.0012 P mg/L Ethylene ND 0.0032 P mg/L Ethane ND 0.0025 P mg/L

RSKSOP-147

Analyzed by: JDR

Date: 06/24/99 01:32:00

Nitrate (as N) ND0.1 mg/L N Method 300.0 *

Analyzed by: ELS

Date: 06/11/99 16:53:00

Sulfate 217 4.0 mg/L

Method 300.0 * Analyzed by: ELS

Date: 06/11/99 11:00:00

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

ertificate of Analysis No. H9-9906478-08 PHONE (713) 660-0901

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

DATE: 06/25/99

PROJECT: BJ-Hobbs
PROJECT NO: 12832
SITE:
MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 14:25:00

SAMPLE ID: MW-3 DATE RECEIVED: 06/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.18	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99	% Recovery 83 70		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	1.7 3.1 ND 36 40.8	1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR/ Date: 06/16/99	% Recovery 87 97		
Total Petroleum Hydrocarbons-Diesel	ND	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/18/99 02:08:00	% Recovery 58		

⁽P) - Practical Quantitation Limit ND - Not detected.

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



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

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 16:00:00

SAMPLE ID: MW-4 DATE RECEIVED: 06/11/99

	<u> </u>		
ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.63	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99	% Recovery 107 107		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND 12 12 24	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR/ Date: 06/16/99	% Recovery 97 93		
Total Petroleum Hydrocarbons-Diesel	0.44	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/18/99 02:53:00	% Recovery 64		

⁽P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE ertificate of Analysis No. H9-9906478-10 PHONE (713) 660-0901

HOUSTON, TEXAS 77054

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 MATRIX: WATER SITE:

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 15:10:00

SAMPLE ID: MW-1 DATE RECEIVED: 06/11/99

## ANALYTICAL DATA PARAMETER				
Surrogate Recovery 4-Bromofluorobenzene 97 1,4-Difluorobenzene 97 1,4-Difluorobenzene 97 1,4-Difluorobenzene 97 1,4-Difluorobenzene 97 97 97 97 97 97 97 9	ANALYTICAL	DATA		
Surrogate Range Organics Surrogate Recovery	PARAMETER	RESULTS		UNITS
Surrogate	Casalina Banga Organias	0 55		/T
4-Bromofluorobenzene 97 1,4-Difluorobenzene 73 Method 8015B *** for Gasoline Analyzed by: DR Date: 06/15/99 BENZENE ND 1.0 P ug/L TOLUENE 1.1 1.0 P ug/L ETHYLBENZENE ND 1.0 P ug/L TOTAL XYLENE 28 1.0 P ug/L TOTAL VOLATILE AROMATIC HYDROCARBONS 29.1 ug/L Surrogate 8 Recovery 1,4-Difluorobenzene 87 4-Bromofluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate 8 Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	Gasoline Range Organics	0.55	0.10 P	mg/L
1,4-Difluorobenzene	Surrogate	% Recovery		
Method 8015B *** for Gasoline Analyzed by: DR	4-Bromofluorobenzene	97		
Analyzed by: DR		. 73		
Date: 06/15/99				
BENZENE TOLUENE TOLUENE TOTAL XYLENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR				
TOLUENE TOLUENE ETHYLBENZENE ND 1.0 P ug/L TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS Surrogate 1.4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel Surrogate ND 1.0 P ug/L 28 1.0 P ug/L Wg/L Recovery 1,4-Difluorobenzene 87 4-Bromofluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 8 Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	Dace. 00/13/99			
TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS Surrogate 1.1 1.0 P ug/L 28 1.0 P ug/L 28 1.0 P ug/L 3/L 3/L Surrogate 8 Recovery 1,4-Difluorobenzene 4-Bromofluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate 8 Recovery 1.4-Difluorobenzene 97 Method 8021B *** Analyzed by: APR	BENZENE	ND	1.0 P	uq/L
TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 8 Recovery 1,5 Arecovery 1,4-Difluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 8 Recovery 1-Pentacosane 98 Method 8015B *** for Diesel Analyzed by: APR		1.1	1.0 P	
TOTAL VOLATILE AROMATIC HYDROCARBONS 29.1 ug/L Surrogate				
Surrogate		- -	1.0 P	
1,4-Difluorobenzene 87 4-Bromofluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate 8 Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	TOTAL VOLATILE AROMATIC HYDROCARBONS	29.1		ug/L
1,4-Difluorobenzene 87 4-Bromofluorobenzene 97 Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate 8 Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	Surrogate	% Recovery		
Method 8021B *** Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate % Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR		-		
Analyzed by: DR/ Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate % Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	4-Bromofluorobenzene	97		
Date: 06/16/99 Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate % Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR				
Total Petroleum Hydrocarbons-Diesel 0.53 0.20 P mg/L Surrogate % Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR				
Surrogate % Recovery n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	Date: 06/16/99			
n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	Total Petroleum Hydrocarbons-Diesel	0.53	0.20 P	mg/L
n-Pentacosane 68 Method 8015B *** for Diesel Analyzed by: APR	Surrogate	% Recovery	•	
Method 8015B *** for Diesel Analyzed by: APR	•			
	Method 8015B *** for Diesel	•		
Date: 06/18/99 03:39:00				
	Date: 06/18/99 03:39:00			

(P) - Practical Quantitation Limit ND - Not detected.

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



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

eruificate of Analysis No. H9-9906478-11

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 17:35:00

SAMPLE ID: OSW-4 DATE RECEIVED: 06/11/99

ANALYTICAL PARAMETER	DATA RESULTS	DETECTION	UNITS
PARAMETER	KESULIS	LIMIT	UNITS
Gasoline Range Organics	ND	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: YN Date: 06/17/99	% Recovery 87 77		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND ND 4.4 4.4	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: YN Date: 06/17/99	% Recovery 90 87		
Total Petroleum Hydrocarbons-Diesel	ND	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/18/99 05:55:00	% Recovery 36		

ND - Not detected.

(P) - Practical Quantitation Limit

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

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

ertificate of Analysis No. H9-9906478-11

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE:

MATRIX: WATER

SAMPLED BY: Brown and Caldwell SAMPLE ID: OSW-4

DATE SAMPLED: 06/10/99 17:35:00

DATE RECEIVED: 06/11/99

		ANALYTICAL	DATA			
PARAMETER			D.1.1 11	RESULTS	DETECTION LIMIT	UNITS
Methane Ethylene Ethane RSKSOP-147 Analyzed by: Date:	JDR 06/24/99	01:41:00		ND	0.0012 P 0.0032 P 0.0025 P	mg/L mg/L
Chloride Method 325.3 Analyzed by: Date:		14:30:00		266	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		09:00:00		3.45	0.1	mg/L
Nitrate (as N) Method 300.0 Analyzed by: Date:	*	12:59:00		3.96	0.1	mg/L N
Sulfate Method 300.0 Analyzed by: Date:		11:00:00		192	4.0	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

⁽P) - Practical Quantitation Limit

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

ertificate of Analysis No. H9-9906478-11 PHONE (713) 660-0901

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

DATE: 06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 17:35:00

SAMPLE ID: OSW-4 DATE RECEIVED: 06/11/99

ANALYTICAL DATA					
PARAMETER		RESULTS	DETECTION LIMIT	UNITS	
Silver, Total Method 6010B *** Analyzed by: PB Date: 06/15/99	08:18:00	ND	0.01	mg/L	
Arsenic, Total Method 6010B *** Analyzed by: EG Date: 06/15/99	11:16:00	ND	0.005	mg/L	
Barium, Total Method 6010B *** Analyzed by: PB Date: 06/15/99	08:18:00	0.062	0.005	mg/L	
Calcium, Total Method 6010B *** Analyzed by: PB Date: 06/15/99	08:18:00	141	0.1	mg/L	
Cadmium, Total Method 6010B *** Analyzed by: PB Date: 06/15/99	08:18:00	ND	0.005	mg/L	
Chromium, Total Method 6010B *** Analyzed by: PB Date: 06/15/99	08:18:00	ND	0.01	mg/L	

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



ertificate of Analysis No. H9-9906478-11

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

DATE: 06/25/99

PROJECT: BJ-Hobbs
SITE:

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 17:35:00

SAMPLE ID: OSW-4 DATE RECEIVED: 06/11/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Mercury, Total Method 7470 Analyzed by:	/***	11.07.00	ND	0.0002	mg/L
Potassium, Tot Method 6010B Analyzed by:	al ***	· × .	3	2	mg/L
Magnesium, Tot Method 6010B Analyzed by:	al ***		44.3	0.1	mg/L
Sodium, Total Method 6010B Analyzed by: Date:		08:18:00	103	0.5	mg/L
Acid Digestion Method 3010A Analyzed by: Date:	***		06/14/99		
Lead, Total Method 6010B Analyzed by: Date:		11:16:00	ND	0.005	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

er@ificate of Analysis No. H9-9906478-11

HOUSTON LABORATORY

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

Brown and Caldwell 1415 Louisiana Houston, TX 77002

ATTN: Rick Rexroad

DATE: 06/25/99

PROJECT: BJ-Hobbs .

SITE:

PROJECT NO: 12832 MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 06/10/99 17:35:00

SAMPLE ID: OSW-4

DATE RECEIVED: 06/11/99

	ANALYTICAL D	ATA		
PARAMETER		RESULTS	DETECTION	UNITS
Selenium, Tota Method 6010B Analyzed by: Date:	***	0.005	LIMIT 0.005	mg/L
Carbonate, as Method SM 450 Analyzed by: Date:	00-CO2D **	ND	1	mg/L
Bicarbonate, a Method SM 450 Analyzed by: Date:	00-CO2D **	316	1	mg/L
Method 3520C Analyzed by:		06/11/99		

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

ertificate of Analysis No. H9-9906478-11 PHONE (713) 660-0901

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

06/25/99

PROJECT: BJ-Hobbs

SITE:

SAMPLED BY: Brown and Caldwell

SAMPLE ID: OSW-4

PROJECT NO: 12832 MATRIX: WATER

DATE SAMPLED: 06/10/99 17:35:00

DATE RECEIVED: 06/11/99

AN	ALYTICAL DATA				
PARAMETER	RESU	JLTS	PQL*		UNITS
Naphthalene		ND	0.1		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT	8		LOWER	UPPER
	SPIKED	RECO	VERY	LIMIT	LIMIT
1-Fluoronaphthalene	0.50 ug/L		64	50	150
Phenanthrene d-10	0.50 ug/L		71	50	150

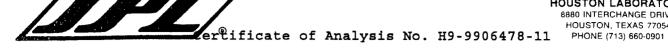
ANALYZED BY: KA DATE/TIME: 06/16/99 20:51:24 EXTRACTED BY: KLDATE/TIME: 06/14/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

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

06/25/99

PROJECT: BJ-Hobbs

SITE:

SAMPLED BY: Brown and Caldwell

SAMPLE ID: OSW-4

PROJECT NO: 12832

MATRIX: WATER DATE SAMPLED: 06/10/99 17:35:00

DATE RECEIVED: 06/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	ug/L
Bromobenzene	ND	5	ug/L
Bromochloromethane	ND	5	ug/L
Bromodichloromethane	ND	5	ug/L
Bromoform	ND	5	ug/L
Bromomethane	ND	10	ug/L
n-Butylbenzene	ND	5	ug/L
sec-Butylbenzene	ND	5	ug/L
. tert-Butylbenzene	ND	5	ug/L
Carbon tetrachloride	ND	5	ug/L
Chlorobenzene	ND	5	ug/L
Chlorodibromomethane	ND	5	ug/L
Chloroethane	ND	10	ug/L
Chloroform	ND	5	ug/L
Chloromethane	ND	10	ug/L
2-Chlorotoluene	ND	5	ug/L
4-Chlorotoluene	ND	5	ug/L
1,2-Dibromo-3-chloropropane	ND	5	ug/L
1,2-Dibromoethane	ND	5	ug/L
Dibromomethane	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
Dichlorodifluoromethane	ND	10	ug/L
1,1-Dichloroethane	ND	5	ug/L
1,2-Dichloroethane	ND	5	ug/L
1,1-Dichloroethene	ND	5	ug/L
cis-1,2-Dichloroethene	ND	5	ug/L
trans-1,2-Dichloroethene	ND	5	ug/L
1,2-Dichloropropane	ND	5	ug/L
1,3-Dichloropropane	ND	5	ug/L
2,2-Dichloropropane	ND	5	ug/L
1,1-Dichloropropene	ND	5	ug/L
Ethylbenzene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
Isopropylbenzene	ND	5	ug/L
p-Isopropyltoluene	ND	5	ug/L
Methylene chloride	ND	5	ug/L

METHOD: 8260 Water, Volatile Organics (continued on next page)



ertificate of Analysis No. H9-9906478-11

Brown and Caldwell

SAMPLE ID: OSW-4

	YTICAL DATA				
PARAMETER	RESULT		PQL*		UNITS
Naphthalene		ND	5		ug/L
n-Propylbenzene		ND	5		ug/L
Styrene		ND	5		ug/L
1,1,1,2-Tetrachloroethane		ND	5		ug/L
1,1,2,2-Tetrachloroethane		ND	5		ug/L
Tetrachloroethene		ND	5 5		ug/L
Toluene		ND	5		ug/L
1,2,3-Trichlorobenzene		ND	5		ug/L
1,2,4-Trichlorobenzene		ND	5		ug/L
1,1,1-Trichloroethane		ND	5		ug/L
1,1,2-Trichloroethane		ND	5		ug/L
Trichloroethene		ND	5		ug/L
Trichlorofluoromethane		ND	5		ug/L
1,2,3-Trichloropropane		ND	5		ug/L
1,2,4-Trimethylbenzene		ND	5		ug/L
1,3,5-Trimethylbenzene		ND	5		ug/L
Vinyl chloride		ND	10		ug/L
Xylenes (total)		ND	5		ug/L
1,2-Dichloroethene (total)		ND	5		ug/L
cis-1,3-Dichloropropene		ND	5		ug/L
trans-1,3-Dichloropropene		ND	5		ug/L
Acetone		ND	100		ug/L
2-Butanone		ND	20		ug/L
4-Methyl-2-Pentanone		ND	10		ug/L
2-Hexanone		ND	10		ug/L
Carbon Disulfide		ND	5		ug/L
Vinyl Acetate		ND	10		ug/L
2-Chloroethylvinylether		ND	10		ug/L
Methyl t-Butyl Ether		ND	10		ug/L
SURROGATES	AMOUNT	ૠ		LOWER	UPPER
	SPIKED	REC	OVERY	LIMIT	LIMIT
1,2-Dichloroethane-d4	50 ug/L		98	80	120
Toluene-d8	50 ug/L		100	88	110
4 Dromofluor-b	F 0/-				

ANALYZED BY: LT DATE/TIME: 06/12/99 16:38:00

METHOD: 8260 Water, Volatile Organics

NOTES: * - Practical Quantitation Limit ND - Not Detected

50 ug/L

104

86

115

NA - Not Analyzed

4-Bromofluorobenzene

COMMENTS:

8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

ertificate of Analysis No. H9-9906478-11 PHONE (713) 660-0901

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

06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 06/10/99 17:35:00

SAMPLE ID: OSW-4 DATE RECEIVED: 06/11/99

ANALYTICAI	ANALYTICAL DATA					
PARAMETER	RESULTS	PQL*	UNITS			
Acenaphthene	ND	5	ug/L			
Acenaphthylene	ND	5	ug/L			
Aniline	ND	5	ug/L			
Anthracene	ND	5	ug/L			
Benzo(a)Anthracene	ND	5	ug/L			
Benzo(b)Fluoranthene	ND	5	ug/L			
Benzo(k)Fluoranthene	ND	5	ug/L			
Benzo(a) Pyrene	ND	5	ug/L			
Benzoic Acid	ND	25	ug/L			
Benzo(g,h,i)Perylene	ND	5	ug/L			
Benzyl alcohol	ND	5	ug/L			
4-Bromophenylphenyl ether	ND	5	ug/L			
Butylbenzylphthalate	ND	5	\mathtt{ug}/\mathtt{L}			
di-n-Butyl phthalate	ND	5	ug/L			
Carbazole	ND	5	ug/L			
4-Chloroaniline	ND	5	ug/L			
bis(2-Chloroethoxy)Methane	ND	5	ug/L			
bis(2-Chloroethyl)Ether	ND	5	ug/L			
bis(2-Chloroisopropyl)Ether	ND	5	ug/L			
4-Chloro-3-Methylphenol	ND	5	ug/L			
2-Chloronaphthalene	ND	5	ug/L			
2-Chlorophenol	ND	5	ug/L			
4-Chlorophenylphenyl ether	ND	5	ug/L			
Chrysene	ND	5	ug/L			
Dibenz(a,h)Anthracene	ND	5	ug/L			
Dibenzofuran	ND	5	ug/L			
1,2-Dichlorobenzene	ND	5	ug/L			
1,3-Dichlorobenzene	ND	5	ug/L			
1,4-Dichlorobenzene	ND	5	ug/L			
3,3'-Dichlorobenzidine	ND	10	ug/L			
2,4-Dichlorophenol	ND	5	ug/L			
Diethylphthalate	ND	5	ug/L			
2,4-Dimethylphenol	ND	5	ug/L			
Dimethyl Phthalate	ND	5	ug/L			
4,6-Dinitro-2-Methylphenol	ND	25	ug/L			
2,4-Dinitrophenol	ND	25	ug/L			
2,4-Dinitrotoluene	ND	5	ug/L			
2,6-Dinitrotoluene	ND	5	ug/L			

METHOD: 8270C, Semivolatile Organics - Water (continued on next page)



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

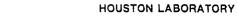
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Brown and Caldwell

SAMPLE ID: OSW-4

ANALYTICA	L DATA (cont	inued)	
	RESULTS	PQL*	UNITS
1,2-Diphenylhydrazine	ND	5	ug/L
bis(2-Ethylhexyl)Phthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Fluorene	ND	5	ug/L
Hexachlorobenzene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
Hexachloroethane	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
Indeno(1,2,3-cd)Pyrene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
Naphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
3-Nitroaniline	ND	25	ug/L
4-Nitroaniline	ND	25	ug/L
Nitrobenzene	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
4-Nitrophenol	ND	25	ug/L
N-Nitrosodiphenylamine	ND	5	ug/L
N-Nitroso-Di-n-Propylamine	ND	5	ug/L
Di-n-Octyl Phthalate	ND	5	ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Phenol	ND	5	ug/L
Pyrene	ND	5	ug/L
Pyridine	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L

METHOD: 8270C, Semivolatile Organics - Water (continued on next page)



ertificate of Analysis No. H9-9906478-11

Brown and Caldwell

SAMPLE ID: OSW-4

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	76	35	114
2-Fluorobiphenyl	50 ug/L	66	43	116
Terphenyl-d14	50 ug/L	64	33	141
Phenol-d5	75 ug/L	23	10	110
2-Fluorophenol	75 ug/L	39	21	110
2,4,6-Tribromophenol	75 ug/L	80	10	123

ANALYZED BY: YL

DATE/TIME: 06/14/99 19:50:00

EXTRACTED BY: KL

DATE/TIME: 06/11/99 08:00:00

METHOD: 8270C, Semivolatile Organics - Water NOTES: * - Practical Quantitation Limit

ND - Not Detected

NA - Not Analyzed

COMMENTS:



ertificate of Analysis No. H9-9906478-12

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

SITE:

SAMPLED BY: Brown and Caldwell

SAMPLE ID: Dup

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 06/10/99

DATE RECEIVED: 06/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.76	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: YN Date: 06/17/99	% Recovery 90 77		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND 1.8 ND 41 42.8	1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: YN Date: 06/17/99	% Recovery 83 93		
Total Petroleum Hydrocarbons-Diesel	0.69	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: APR Date: 06/18/99 06:40:00	% Recovery 62		

(P) - Practical Quantitation Limit ND - Not detected.

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



ertificate of Analysis No. H9-9906478-13

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

SITE:

SAMPLED BY: Provided by SPL

SAMPLE ID: Trip Blank #1 5/28/99

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 06/10/99

DATE RECEIVED: 06/11/99

PARAMETER	DATA RESULTS	DETECTION	UNITS
Gasoline Range Organics	ND	LIMIT 0.10 P	mg/L
Surrogate	% Recovery		
4-Bromofluorobenzene	83		
1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: YN Date: 06/17/99	73		
BENZENE	ND	1.0 P	ug/L
TOLUENE	ND	1.0 P	ug/L
ETHYLBENZENE	ND	1.0 P	ug/L
TOTAL XYLENE	ND	1.0 P	ug/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		ug/L
Surrogate	% Recovery		
1,4-Difluorobenzene	93		
4-Bromofluorobenzene	93		
Method 8021B ***			
Analyzed by: YN			
Date: 06/17/99			

ND - Not detected.

(P) - Practical Quantitation Limit

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



ertificate of Analysis No. H9-9906478-14

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

DATE: 06/25/99

PROJECT: BJ-Hobbs

SITE:

SAMPLED BY: Provided by SPL

SAMPLE ID: Trip Blank #2 5/28/99

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 06/10/99

DATE RECEIVED: 06/11/99

PARAMETER ANALYTICAL	DATA RESULTS	DETECTION	UNITS
Gasoline Range Organics	ND	LIMIT 0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gåsoline Analyzed by: YN Date: 06/17/99	% Recovery 83 77		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND ND ND ND	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8021B *** Analyzed by: YN Date: 06/17/99	% Recovery 93 93		

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

8880 INTERCHANGE DRIVE

er@ificate of Analysis No. H9-9906478-15 HOUSTON, TEXAS 77054

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

06/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: MATRIX: WATER SAMPLED BY: Provided by SPL **DATE SAMPLED:** 06/10/99 SAMPLE ID: Trip Blank #3 5/28/99 DATE RECEIVED: 06/11/99

ANALYTICAL DATA					
PARAMETER	RESULTS	PQL*	UNITS		
Benzene	ND	5	ug/L		
Bromobenzene	ND	5	ug/L		
Bromochloromethane	ND	5	ug/L		
Bromodichloromethane	ND	5	ug/L		
Bromoform	ND	5	ug/L		
Bromomethane	ND	10	ug/L		
n-Butylbenzene	ND	5	ug/L		
sec-Butylbenzene	ND	5	ug/L		
tert-Butylbenzene	ND	5	ug/L		
Carbon tetrachloride	ND	5	ug/L		
Chlorobenzene	ND	5	ug/L		
Chlorodibromomethane	ND	5	ug/L		
Chloroethane	ND	10	ug/L		
Chloroform	ND	5	ug/L		
Chloromethane	ND	10	ug/L		
2-Chlorotoluene	ND	5	ug/L		
4-Chlorotoluene	ND	5	ug/L		
1,2-Dibromo-3-chloropropane	ND	5	uq/L		
1,2-Dibromoethane	ND	5	ug/L		
Dibromomethane	ND	5	ug/L		
1,2-Dichlorobenzene	ND	5	ug/L		
1,3-Dichlorobenzene	ND	5	ug/L		
1,4-Dichlorobenzene	ND	5	ug/L		
Dichlorodifluoromethane	ND	10	ug/L		
1,1-Dichloroethane	ND	5	ug/L		
1,2-Dichloroethane	ND	5	ug/L		
1,1-Dichloroethene	ND	5	ug/L		
cis-1,2-Dichloroethene	ND	5	ug/L		
trans-1,2-Dichloroethene	ND	5	ug/L		
1,2-Dichloropropane	ND	5	ug/L		
1,3-Dichloropropane	ND	5	ug/L		
2,2-Dichloropropane	ND	5	ug/L		
1,1-Dichloropropene	ND	5	ug/L		
Ethylbenzene	ND	5	ug/L		
Hexachlorobutadiene	ND	5	ug/L		
Isopropylbenzene	ND	5	ug/L		
p-Isopropyltoluene	ND	5	ug/L		
Methylene chloride	ND	5	ug/L		
-			5,		

METHOD: 8260 Water, Volatile Organics (continued on next page)



ertificate of Analysis No. H9-9906478-15 PHONE (713) 660-0901

Brown and Caldwell

SAMPLE ID: Trip Blank #3 5/28/99

ANAL	YTICAL DATA	(cont	inued)		
PARAMETER	RESULT	S	PQL*		UNITS
Naphthalene		ND	5		ug/L
n-Propylbenzene		ND	5		ug/L
Styrene		ND	5		ug/L
1,1,1,2-Tetrachloroethane		ND	5		ug/L
1,1,2,2-Tetrachloroethane		ND	5		ug/L
Tetrachloroethene		ND	5		ug/L
Toluene		9	5		ug/L
1,2,3-Trichlorobenzene		ND	5		ug/L
1,2,4-Trichlorobenzene		ND	5		ug/L
1,1,1-Trichloroethane		ND	5		ug/L
1,1,2-Trichloroethane		ND	5		ug/L
Trichloroethene		ND	5		ug/L
Trichlorofluoromethane		ND	5		ug/L
1,2,3-Trichloropropane		ND	5		ug/L
1,2,4-Trimethylbenzene		ND	5		ug/L
1,3,5-Trimethylbenzene		ND	5		ug/L
Vinyl chloride		ND	10		ug/L
Xylenes (total)		ND	5		ug/L
1,2-Dichloroethene (total)		ND	5		ug/L
cis-1,3-Dichloropropene		ND	5		${ t ug/L}$
trans-1,3-Dichloropropene		ND	5		ug/L
Acetone		ND	100		ug/L
2-Butanone		ND	20		ug/L
4-Methyl-2-Pentanone		ND	10		ug/L
2-Hexanone		ND	10		ug/L
Carbon Disulfide		ND	5		ug/L
Vinyl Acetate		ND	10		ug/L
2-Chloroethylvinylether		ND	10		${\tt ug/L}$
Methyl t-Butyl Ether		ND	10		ug/L
SURROGATES	AMOUNT SPIKED	% REC	OVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	50 ug/L		96	80	120
Toluene-d8	50 ug/L		100	88	110
4-Bromofluorobenzene	50 ug/L		106	86	115

ANALYZED BY: LT DATE/TIME: 06/12/99 16:12:00

METHOD: 8260 Water, Volatile Organics

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



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

ertificate of Analysis No. H9-9906478-16 PHONE (713) 660-0901

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

06/25/99

PROJECT: BJ-Hobbs

SITE:

SAMPLED BY: Provided by SPL

SAMPLE ID: Trip Blank #4 5/28/99

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 06/10/99

DATE RECEIVED: 06/11/99

ANALYTICAL DATA					
PARAMETER	RESULTS	PQL*	UNITS		
Benzene	ND	5	ug/L		
Bromobenzene	N D	5	ug/L		
Bromochloromethane	ND	5	ug/L		
Bromodichloromethane	ND	5	ug/L		
Bromoform	ND	5	ug/L		
Bromomethane	ND	10	ug/L		
n-Butylbenzene	ND	5	ug/L		
sec-Butylbenzene	ND	5	ug/L		
tert-Butylbenzene	ND	5	ug/L		
Carbon tetrachloride	ND	5	ug/L		
Chlorobenzene	ND	5	ug/L		
Chlorodibromomethane	ND	5	ug/L		
Chloroethane	ND	10	ug/L		
Chloroform	ND	5	ug/L		
Chloromethane	ND	10	ug/L		
2-Chlorotoluene	ND	5	ug/L		
4-Chlorotoluene	ND	5	ug/L		
1,2-Dibromo-3-chloropropane	ND	5	ug/L		
1,2-Dibromoethane	ND	5	ug/L		
Dibromomethane	ND	5	ug/L		
1,2-Dichlorobenzene	ND	5	ug/L		
1,3-Dichlorobenzene	ND	5	ug/L		
1,4-Dichlorobenzene	ND	5	ug/L		
Dichlorodifluoromethane	ND	10	ug/L		
1,1-Dichloroethane	ND	5	ug/L		
1,2-Dichloroethane	ND	5	ug/L		
1,1-Dichloroethene	ND	5	ug/L		
cis-1,2-Dichloroethene	ND	5	ug/L		
trans-1,2-Dichloroethene	ND	5	ug/L		
1,2-Dichloropropane	ND	5	ug/L		
1,3-Dichloropropane	ND	5	ug/L		
2,2-Dichloropropane	ND	5	ug/L		
1,1-Dichloropropene	ND		ug/L		
Ethylbenzene	ND	5 5	ug/L		
Hexachlorobutadiene	ND	5	ug/L		
Isopropylbenzene	ND	5	ug/L		
p-Isopropyltoluene	ND	5	ug/L		
Methylene chloride	ND	5	ug/L		
-			,		

METHOD: 8260 Water, Volatile Organics (continued on next page)



8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054

ertificate of Analysis No. H9-9906478-16 PHONE (713) 660-0901

Brown and Caldwell

SAMPLE ID: Trip Blank #4 5/28/99

ANALY	TICAL DAT	A (conti	inued)		
PARAMETER	RESUI	LTS	PQL*	τ	UNITS
Naphthalene		ND	5		ug/L
n-Propylbenzene		ND	5		ug/L
Styrene		ND	5		ug/L
1,1,1,2-Tetrachloroethane		ND	5		ug/L
1,1,2,2-Tetrachloroethane		ND	5		ug/L
Tetrachloroethene		ND	5		ug/L
Toluene		ND	5		ug/L
1,2,3-Trichlorobenzene		ND	5		ug/L
1,2,4-Trichlorobenzene		ND	5		ug/L
1,1,1-Trichloroethane		ND	5		ug/L
1,1,2-Trichloroethane		ND	5		ug/L
Trichloroethene		ND	5 5		ug/L
Trichlorofluoromethane		ND			ug/L
1,2,3-Trichloropropane		ND	5 5		ug/L
1,2,4-Trimethylbenzene		ND	5		ug/L
1,3,5-Trimethylbenzene		ND	5		ug/L
Vinyl chloride		ND	10		ug/L
Xylenes (total)		ND	5		ug/L
1,2-Dichloroethene (total)		ND	5		${\tt ug/L}$
cis-1,3-Dichloropropene		ND	5		ug/L
trans-1,3-Dichloropropene		ND	5		ug/L
Acetone		ND	100		ug/L
2-Butanone		ND	20		ug/L
4-Methyl-2-Pentanone		ND	10		ug/L
2-Hexanone		ND	10		ug/L
Carbon Disulfide		ND	5		ug/L
Vinyl Acetate		ND	10		ug/L
2-Chloroethylvinylether		ND	10		ug/L
Methyl t-Butyl Ether		ND	10		ug/L
SURROGATES	AMOUNT	%		LOWER	UPPER
	SPIKED	REC	OVERY	LIMIT	LIMIT

SURROGATES	AMOUNT	AMOUNT %		UPPER
	SPIKED	RECOVERY	LIMIT	LIMIT
1,2-Dichloroethane-d4	50 ug/L	94	80	120
Toluene-d8	50 ug/L	96	88	110
4-Bromofluorobenzene	50 ug/L	104	86	115

ANALYZED BY: LT DATE/TIME: 06/12/99 17:04:00

METHOD: 8260 Water, Volatile Organics

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:

QUALITY CONTROL

DOCUMENTATION

3A WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: SPL

Contract:

Lab Code:

Case No.: 9906531 SAS No.:

SDG No.:

Matrix Spike - EPA Sample No.: Red #7

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
			=======================================	=====	=====
1,1-Dichloroethene	50	0	60	120	61-145
Trichloroethene	50	0	55	110	71~120
Benzene	50	0	53	106	76-127
Toluene	50	0	48	96	76-125
Chlorobenzene	50	0	47	94	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LI RPD	MITS REC.
=======================================	=======	=======================================	=====	=====	=====	=====
1,1-Dichloroethene	50	57	114	5	14	61-145
Trichloroethene	50	55	110	. 0	14	71-120
Benzene	50	52	104	2	11	76-127
Toluene	50	47	94	2	13	76-125
Chlorobenzene	50	46	92	2	13	75-130
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- # Column to be used to flag recovery and RPD values with an asterisk
- * Values outside of QC limits due to matrix interference

RPD: 0 out of 5 outside limits

Spike Recovery: 0 out of 10 outside limits

Data File: /var/chem/l.i/1990614.b/l165tl1.d

Report Date: 14-Jun-1999 17:37

SPL Houston Labs

RECOVERY REPORT

Client Name:

Sample Matrix: LIQUID

Lab Smp Id: METHSPIKE-8260W

Level: LOW

Data Type: MS DATA

SpikeList File: 8260_water.spk

Sublist File: 8260_lcs.sub Method File: /var/chem/1.i/1990614.b/18260aw.m

Misc Info: L165W1/L165B01/L165CW1

~7		and	~	_	 _	_	_	

Client SDG: 1990614

Fraction: VOA

Operator: LT

SampleType: METHSPIKE

Quant Type: ISTD

SPIKE COMPOUND	CONC ADDED ug/L ,	CONC RECOVERED ug/L	% RECOVERED	LIMITS
8 1,1-Dichloroethene	50	59	118.00	61-145
29 Trichloroethene	50	53	106.00	71-120
25 Benzene	50	52	104.00	76-127
37 Toluene	50	47	94.00	76-125
45 Chlorobenzene	50	47	94.00	75-130

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
\$ 21 1,2-Dichloroethane	50	49	98.00	80-120
\$ 36 Toluene-d8		48	96.00	88-110
\$ 56 Bromofluorobenzene		52	104.00	86-115

Page 3

ЗА WATER VOLATILE MATRIX SPIKE, MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: SPL

Cuntract:

Lab Code:

Case No.: 9906520 SAS No.:

SDG No.:

Matrix Spike - EPA Sample No.: DW-4

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
=======================================	=======	==========	=========	=====	=====
1,1-Dichloroethene	50	0	63	126	61-145
Trichloroethene	50	0	55	110	71-120
Benzene	50	0	54	108	76-127
Toluene	50	0	51	102	76-125
Chlorobenzene	50	0	50	100	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC L: RPD	IMITS REC.
	=======	=========		=====	=====	======
1,1-Dichloroethene	50	58	116	8	14	61-145
Trichloroethene	50	51	102	8	14	71-120
Benzene	50	50	100	8	11	76-127
Toluene	50	46	92	10	13	76-125
Chlorobenzene	50	46	92	8	13	75-130

- # Column to be used to flag recovery and RPD values with an asterisk
- * Values outside of QC limits due to matrix interference

RPD: 0 out of 5 outside limits Spike Recovery: 0 out of 10 outside limits

Data File: /var/chem l.i/l990612.b/l163tll.d Report Date: 14-June1399 11:05

SPL Houston Labs

RECOVERY REPORT

Client Name:

Sample Matrix: LIQUID

Client SDG: 1990612

Fraction: VOA

Lab Smp Id: METHSPIKE-8260W

Operator: LT

Level: LOW

Data Type: MS DATA

SampleType: METHSPIKE

SpikeList File: 8260 water.spk

Quant Type: ISTD

Sublist File: 8260 lcs.sub

Method File: /var/chem/l.i/1990612.b/18260aw.m

Misc Info: L163W1/L163B01/L163CW1

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
8 1,1-Dichloroethene	50	59	118.00	61-145
29 Trichloroethene	50	52	104.00	71-120
25 Benzene	50	52	104.00	76-127
37 Toluene	50	48	96.00	76-125
45 Chlorobenzene	50	47	94.00	75-130

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
\$ 21 1,2-Dichloroethane	50	48	96.00	80-120
\$ 36 Toluene-d8	50	50	100.00	88-110
\$ 56 Bromofluorobenzene	50	51	102.00	86-115

Page 3



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

page

Matrix: Aqueous Sample ID: VLBLK Reported on: 06/21/99 17:29 Analyzed on: 06/12/99 10:29 Batch: L990612104642

Analyst: LT

METHOD 8260 L163B01

Compound	Result	Detection Limit	Units
Dichlorodifluoromethane	ND	10	ug/L
Chloromethane	ND	10	ug/L
Vinyl Chloride	ND	10	ug/L
Bromomethane	ND	10	ug/L
Chloroethane	ND	10	ug/L
'richlorofluoromethane	ND	5	ug/L
Acetone	ND	100	ug/L
,1-Dichloroethene	ND	5	ug/L
Methylene Chloride	ND	5	ug/L
Carbon Disulfide	ND	5	ug/L
trans-1,2-Dichloroethene	ND	5	ug/L
1,1-Dichloroethane	ND ND	5 10	ug/L
Vinyl Acetate	ND	20	ug/L
2-Butanone cis-1,2-Dichloroethene	ND		ug/L
1,2-Dichloroethene (total)	ND ND	5	ug/L ug/L
1,2-Dichloropropane	ND	5 5	ug/L
romochloromethane	ND		ug/L
hloroform	ND	5 5	ug/L
.,1,1-Trichloroethane	ND	5	ug/L
1,2-Dichloroethane	ND	5	ug/L
1,1-Dichloropropene	ND	5 5	ug/L
Benzene	ND	5	ug/L
Carbon Tetrachloride	ND	5	ug/L
1,2-Dichloropropane	ND	5	ug/L
Trichloroethene	ND ND	5	ug/L
Dibromomethane	ND	5	ug/L
Bromodichloromethane	ND	5	ug/L
:-Chloroethylvinylether	ND.	10	ug/L
-Methyl-2-Pentanone	ND	10	ug/L
is-1,3-Dichloropropene	ND	5	ug/L
rans-1,3-Dichloropropene	ND	5	ua/L
Toluene	ND	5	ug/L
1,1,2-Trichloroethane	ND.	5 5	ug/L
Notes		••	•



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

page

Reported on: 06/21/99 17:29 Analyzed on: 06/12/99 10:29 Analyst: LT Matrix: Aqueous
Sample ID: VLBLK

Batch: L990612104642

METHOD 8260 L163B01

:ompound	Result	Detection Limit	Units
,3-Dichloropropane	ND	5	ug/L
-Hexanone	ND	10	ug/L
Dibromochloromethane	ND	5	ug/L
1,2-Dibromoethane	ND	5	ug/L
Tetrachloroethene	ND	5	ug/L
Chlorobenzene	I ND	5	ug/L
1,1,1,2-Tetrachloroethane	ND	5	ug/L
Ethylbenzene	ND	5	ug/L
Bromoform	ND	5	ug/L
Styrene	ND	5	ug/L
Xylene (Total)	ND	5	ug/L
1,1,2,2-Tetrachloroethane	ND	5	ug/L
1,2,3-Trichloropropane	ND	555555555555555555555555555555555555555	ug/L
Sopropylbenzene	ND	5	ug/L
Bromobenzene	ND	5	ug/L
M-Propylbenzene	ND	5	ug/L
:-Chlorotoluene	ND	5	ug/L
Chlorotoluene	ND	5	ug/L
1,3,5-Trimethylbenzene	ND	5	ug/L
cert-Butylbenzene	ND	5	ug/L
1,2,4-Trimethylbenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
sec-Butylbenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5 5	ug/L
p-Isopropyltoluene	ND	5	ug/L
.,2-Dichlorobenzene	ND	5	ug/L
n-Butylbenzene	ND	5	ug/L
1,2-Dibromo-3-Chloropropan	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5 5 5	ug/L
Naphthalene	ND	5	ug/L
Hexachlorobutadiene	ND.		ug/L
1,2,3-Trichlorobenzene	ND	5	ug/L
Methyl t-Butyl Ether	ND	10	ug/L

Notes



HOUSTON LABORATORY

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

page

6

Matrix: Aqueous Sample ID: VLBLK Batch: L990612104642

Reported on: 06/21/99 17:29 Analyzed on: 06/12/99 10:29 Analyst: LT

METHOD 8260 L163B01

Surrogate	Result	QC Criteria	Units
.,2-Dichloroethane-d4	98	88-110	% Recovery
Toluene-d8	98		% Recovery
Bromofluorobenzene	104		% Recovery

Samples in Batch 9906478-11 9906478-15 9906478-16



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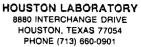
page

Reported on: 06/21/99 17:29 Analyzed on: 06/14/99 15:56 Analyst: LT Matrix: Aqueous Sumple ID: VLBLK Butch: L990614104642

METHOD 8260 L165B01

Compound	Result	Detection Limit	Units
Dichlorodifluoromethane	ND	10	ug/L
Chloromethane	ND	10	ug/L
Vinyl Chloride	ND	10	ug/L
Bromomethane	ND	10	ug/L
Chloroethane	ND	10	ug/L
richlorofluoromethane	ND	5	ug/L
Scetone	ND	100	ug/L
-,1-Dichloroethene	ND	5	ug/L
Methylene Chloride	ND	5	ug/L
Carbon Disulfide	ND	5	ug/L
trans-1,2-Dichloroethene	ND	5	ug/L
1,1-Dichloroethane	ND	5	ug/L
Vinyl Acetate	ND	10	ug/L
2-Butanone	ND	20	ug/L
cis-1,2-Dichloroethene	ND	5	ug/L
1,2-Dichloroethene (total)	ND	5	ug/L
:,2-Dichloropropane	ND	5	ug/L
romochloromethane	ND	5	ug/L
Chloroform	ND	5	ug/L
.,1,1-Trichloroethane	ND	5 5 5	ug/L
1,2-Dichloroethane	ND ND	5	ug/L
1,1-Dichloropropene	ND		ug/L
Benzene	ND	5	ug/L
Carbon Tetrachloride	ND	5	ug/L
1,2-Dichloropropane	ND	5	ug/L
Trichloroethene	ND	5	ug/L
Dibromomethane	ND	5	ug/L
Bromodichloromethane	ND	5	ug/L
-Chloroethylvinylether	ND	10	ug/L
-Methyl-2-Pentanone	ND	10	ug/L
is-1,3-Dichloropropene	ND	5	ug/L
rans-1,3-Dichloropropene	ND	5	ug/L
Toluene	ND	5	ug/L
1,1,2-Trichloroethane	ND	5	ug/L

Notes



page

SPL Blank QC Report

Matrix: Aqueous Sample ID: VLBLK Batch: L990614104642

Reported on: 06/21/99 17:29 Analyzed on: 06/14/99 15:56 Analyst: LT

METHOD 8260 L165B01

Compound	Result	Detection Limit	Units
1,3-Dichloropropane	ND	5	ug/L
1-Hexanone	ND	10	ug/L
Dibromochloromethane	ND	5	ug/L
.,2-Dibromoethane	ND	5	ug/L
"etrachloroethene	ND	5	ug/L
!hlorobenzene	ND	5	ug/L
1,1,1,2-Tetrachloroethane	ND	5 5 5 5 5	ug/L
Ethylbenzene	ND	5	ug/L
Bromoform	ND	5	ug/L
Styrene	ND	5	ug/L
Xylene (Total)	ND	5	ug/L
1,1,2,2-Tetrachloroethane	ND	5	ug/L
1,2,3-Trichloropropane	ND	5	ug/L
Isopropylbenzene	ND	5	ug/L
Bromobenzene	ND	5	ug/L
II-Propylbenzene	ND	5	ug/L
Chlorotoluene	ND	5	ug/L
-Chlorotoluene	ND	5	ug/L
1,3,5-Trimethylbenzene	ND	5	ug/L
mert-Butylbenzene	ND	5	ug/L
1,2,4-Trimethylbenzene	ND	5 5 5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
sec-Butylbenzene	ND	5!	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
p-Isopropyltoluene	ND	5 5	ug/L
1,2-Dichlorobenzene	ND		ug/L
n-Butylbenzene	ND	5	ug/L
.,2-Dibromo-3-Chloropropan	ND	5	ug/L
_,2,4-Trichlorobenzene	ND	5 5 5	ug/L
Waphthalene	ND] 5	ug/L
Hexachlorobutadiene	ND	5	ug/L
1,2,3-Trichlorobenzene	ND	10	ug/L
Methyl t-Butyl Ether	ND	10	ug/L

<u>Notes</u>



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page

Matrix: Aqueous Sample ID: VLBLK Batch: L990614104642

Reported on: 06/21/99 17:29 Analyzed on: 06/14/99 15:56 Analyst: LT

METHOD 8260 L165B01

urrogate	Result	QC Criteria	Units
.,2-Dichloroethane-d4	96	88-110	% Recovery
.oluene-d8	98		% Recovery
Eromofluorobenzene	106		% Recovery

Samples in Batch 9906478-15

Notes

3C WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name:

SPL

Contract:

Lab Code:

Case No:

990613

SAS No:

SDG No:

Matrix Spike - EPA

Sample No:

SBLK

Level (low/med):

	SPIKE	SAMPLE	MS	MS	QC
	ADDED	CONCENTRATION	CONCENTRATION	%	LIMITS
COMPOUND	(ug/L)	(ug/L)	(ug/L)	REC #	REC
Phenol	75	0	23	31	12-110
2-Chlorophenol	75	0	48	64	27-123
1,4-Dichlorobenzene	50	0	28	56	36- 97
N-Nitroso-di-n-propylamine	50	0	33	66	41-116
1,2,4-Trichlorobenzene	50	0	30	60	39- 110
4-Chloro-3-methylphenol	75	0	52	69	23-110
Acenaphthene	50	0	36	72	46-125
4-Nitrophenol	75	0	25	33	25-150
2,4-Dinitrotoluene	50	0	34	68	50-150
Pentachlorophenol	75	0	53	71	9-125
Pyrene	50	0	38 ,	76	26-127

	SPIKE	MSD	MSD			
	ADDED	CONCENTRATION	%	%	QC	LIMITS
COMPOUND	(ug/L)	(ug/L)	REC #	RPD #	RPD	REC
Phenol	75	27	36	15	42	12-110
2-Chlorophenol	75	48	64	0	40	27-123
1,4-Dichlorobenzene	50	33	66	16	28	36- 97
N-Nitroso-di-n-propylamine	50	33	66	0	38	41-116
1,2,4-Trichlorobenzene	50	35	70	15	28	39- 110
4-Chloro-3-methylphenol	75	55	73	6	42	23- 110
Acenaphthene	50	39	78	8	31	46-118
4-Nitrophenol	75	27	36	9	50	25-150
2,4-Dinitrotoluene	50	31	62	9	50	50-150
Pentachlorophenol	75	56	75	5	50	9-125
Pyrene	50	38	76	0	31	26-127

Column to be used to flag recovery and RPD values with an asterisk

RPD:

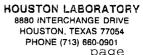
0

out of 11 outside limits

Spike Recovery:

0

out of 22 outside limits



page

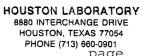
SPL Blank QC Report

Matrix: Aqueous Sample ID: BLANK Batch: E990613042258 Reported on: 06/17/99 12:45 Analyzed on: 06/14/99 18:24 Analyst: YL

METHOD 8270 P164B03

Compound	Result	Detection Limit	Units
Pyridine	ND	5	ug/L
Phenol	ND	5	ug/L
niline	ND		ug/L
Dis(2-Chloroethyl)ether	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
1,3-Dichlorobenzene	ND	5 5 5 5 5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
Benzyl alcohol	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
bis(2-chloroisopropyl)ethe	ND	5 5 5 5 5	ug/L
4-Methylphenol	ND	5	ug/L
N-Nitroso-di-n-propylamine	ND	5	ug/L
Mexachloroethane	ND	5	ug/L
Hitrobenzene	ND	5	ug/L
Isophorone	ND	5	ug/L
3-Nitrophenol	ND	5	ug/L
3,4-Dimethylphenol	ND	5	ug/L
Benzoic acid	ND	25	ug/L
bis(2-Chloroethoxy)methane	ND	5	ug/L
2,4-Dichlorophenol	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
Naphthalene	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
-Chloro-3-methylphenol	ND	5	ug/L
Methylnaphthalene	ND	5	ug/L
Mexachlorocyclopentadiene	ND	5	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
Dimethylphthalate	ND	5	ug/L
2,6-Dinitrotoluene	ND	5	ug/L

<u>Notes</u>



3

SPL Blank QC Report

Matrix: Aqueous Sample ID: BLANK Batch: E990613042258 Reported on: 06/17/99 12:45 Analyzed on: 06/14/99 18:24

Analyst: YL

METHOD 8270 P164B03

ompound:	Result	Detection Limit	Units
Acenaphthylene	ND	5	ug/L
-Nitroaniline	ND	25	ug/L
Acenaphthene	ND	5	ug/L
2,4-Dinitrophenol	ND	25	ug/L
4-Nitrophenol	ND	25	ug/L
Dibenzofuran	ND	5	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
4-Chlorophenyl-phenylether	ND	5	ug/L
7luorene	ND	5	ug/L
Nitroaniline	ND	25	ug/L
4,6-Dinitro-2-methylphenol	ND	25	ug/L
n-Nitrosodiphenylamine	ND	5	ug/L
1,2-Diphenylhydrazine	ND	5	ug/L
4-Bromophenyl-phenylether	ND	5 5 5	ug/L
Hexachlorobenzene	ND		ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Anthracene	ND	5 5 5 5 5	ug/L
Carbazole	ND	5	ug/L
Di-n-butylphthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Pyrene	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10:	ug/L
Benzo[a] anthracene	ND	5	ug/L
Chrysene	ND		ug/L
bis(2-Ethylhexyl)phthalate	ND	5	ug/L
Di-n-octylphthalate	ND	5	ug/L
Benzo[b] fluoranthene	ND	5	ug/L
Benzo[k] fluoranthene	ND ND	5	ug/L
Benzo[a]pyrene	ND		ug/L
Indeno[1,2,3-cd]pyrene	ND	5	ug/L
Dibenz[a,h]anthracene	ND	5	ug/L



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page

Matrix: Aqueous Sample ID: BLANK

Batch: E990613042258

Reported on: 06/17/99 12:45 Analyzed on: 06/14/99 18:24

Analyst: YL

METHOD 8270 P164B03

ompound	Result	Detection Limit	1
Eenzo[g,h,i]perylene	ND	5	ug/L

Surrogate	Result	QC Criteria	Units
∏itrobenzene-d5 ∴-Fluorobiphenyl Terphenyl-d14 ⊉henol-d5 2-Fluorophenol 2,4,6-Třibromophenol	72 64 76 28 47 76	43-116 33-141 10-110 21-110	% Recovery % Recovery % Recovery % Recovery % Recovery % Recovery

Samples in Batch 9906478-11 Notes



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

** SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Gasoline

Matrix: Units:

Aqueous mg/L

Batch Id: VARE990615032000

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Result <1>	Spike Recovery	QC Limits(**) (Mandatory) % Recovery Range
Gasoline Range Organics	ND	1.0	0.68	68.0	64 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Duplio	Spike cate	MS/MSD Relative %		.imits(***) (Advisory)
	<2>	<3>	Result <1>	Recovery <4>	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	ND	0.9	0.37	41.1	0.54	60.0	37.4 *	36	36 - 160

Analyst: DR

Sequence Date: 06/15/99

SPL ID of sample spiked: 9906481-03A

Sample File ID: EEF2050.TX0

Method Blank File ID:

Blank Spike File ID: EEF2040.TX0 Matrix Spike File ID: EEF2045.TX0

Matrix Spike Duplicate File ID: EEF2046.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH(SPL ID):

9906481-06A 9906478-01A 9906478-03A 9906478-04A

9906478-05A 9906478-06A 9906478-07A 9906478-08A

9906478-09A 9906478-10A 9906481-01A 9906478-02A

9906481-02A 9906481-03A



mg/L

Matrix:

Units:

HOUSTON LABORATORY

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

** SPL BATCH QUALITY CONTROL REPORT ** Method Modified 80158*** for Gasoline

Aqueous

Batch Id: VARE990617144800

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike Result Recovery <1> %		QC Limits(**) (Mandatory) % Recovery Range
Gasoline Range Organics	ND	1.0	0.99	99.0	64 - 131

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results	Spike Added	Matrix	Spike	Matrix Dupli	Spike cate	MS/MSD Relative %		imits(***) (Advisory)
	<2>	<3>	Result <1>	Recovery <4>	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	ND	0.9	1.0	111	1.0	111	0	36	36 - 160

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit
% Recovery = [(<1> - <2>) / <3>] x 100

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

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

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

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

SAMPLES IN BATCH(SPL ID):

Sequence Date: 06/17/99

Method Blank File ID:

Sample File ID: EEF2116.TXO

SPL ID of sample spiked: 9906478-11A

Blank Spike File ID: EEF2106.TX0

Matrix Spike File ID: EEF2109.TX0

Matrix Spike Duplicate File ID: EEF2110.TX0

Analyst: YN

9906478-13A 9906478-14A 9906478-12A 9906478-11A



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

** SPL BATCH QUALITY CONTROL REPORT ** Method 8021B ***

Matrix: Units:

Aqueous

ug/L

Batch Id: VARE990615142300

LABORATORY CONTROL SAMPLE

SPIKE	Method	Spike	Blank	Spike	QC Limits(**)
COMPOUNDS	Blank Result <2>	Added <3>	Result <1>	Recovery %	(Mandatory) % Recovery Range
Benzene	ND	50	53	106	61 - 119
Toluene	ND	50	54	108	65 - 125
EthylBenzene	ND ND	50	52	104	70 - 118
O Xylene	ND	50	52	104	72 - 117
M & P Xylene	ND	100	110	110	72 - 116

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results			Matrix Spike		Matrix SpikeDuplicate		QC Limits(***)(Advisory)		
	<2>	<3>	Result	Recovery <4>	Result <1>	Recovery <5>	Recovery Difference <5>		Recovery Range	
BENZENE	ND	20	13	65.0	23	115	55.6 *	21	32 - 164	
TOLUENE	ND	20	13	65.0	22	110	51.4 *	20	38 - 159	
ETHYLBENZENE	ND	20	12	60.0	22	110	58.8 *	19	52 - 142	
O XYLENE	ND	20	13	65.0	24	120	59.5 *	18	53 - 143	
M & P XYLENE	ND	40	25	62.5	48	120	63.0 *	17	53 - 144	

Analyst: DR

Sequence Date: 06/16/99

SPL ID of sample spiked: 9906478-01A

Sample File ID: E_F2065.TX0

Method Blank File ID:

Blank Spike File ID: E_F2082.TX0

Matrix Spike File ID: E_F2062.TX0

Matrix Spike Duplicate File ID: E_F2063.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

(**) = Source: SPL Historical LImits-1st Qtr. '97

(***) = Source: SPL Historical LImits-1st Qtr.'97

SAMPLES IN BATCH(SPL ID):

9906478-07A 9906478-02A 9906478-04A 9906478-08A 9906478-09A 9906478-10A 9906478-01A 9906478-03A

9906478-05A 9906478-06A



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

** SPL BATCH QUALITY CONTROL REPORT ** Method 8021B ***

Matrix: Units:

Aqueous ug/L

Batch Id: VARE990617151501

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Blank Result Added Result		Spike Recovery %	QC Limits(**) (Mandatory) % Recovery Range		
Benzene	ND	50	47	94.0	61 - 119		
Toluene	ND	50	49	98.0	65 - 125		
EthylBenzene	ND	50	46	92.0	70 - 118		
0 Xylene	DN	50	47	94.0	72 - 117		
M & P Xylene	ND	100	95	95.0	72 - 116		

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix Spike		Matrix Spike		l ' i		MS/MSD Relative %		.imits(***) (Advisory)
	Ì		Result	Recovery	Result	Recovery	Difference	RPD			
	<2>	<3>	<1>	<4>	<1>	<5>		Max.	Recovery Range		
BENZENE	ND	20	21	105	21	105	0	21	32 - 164		
TOLUENE	1.8	20	23	106	22	101	4.83	20	38 - 159		
ETHYLBENZENE	ND.	20	20	100	20	100	0	19	52 - 142		
O XYLENE	14	20	35	105	35	105	0	18	53 - 143		
M & P XYLENE	27	40	69	105	69	105	0	17	53 - 144		

Analyst: YN

Sequence Date: 06/17/99

SPL ID of sample spiked: 9906478-12A

Sample File ID: E_F2115.TX0

Method Blank File ID:

Blank Spike File ID: E F2105.TX0

Matrix Spike File ID: E_F2107.TX0

Matrix Spike Duplicate File ID: E F2108.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

(**) = Source: SPL Historical LImits-1st Qtr. 197

(***) = Source: SPL Historical LImits-1st Qtr.'97

SAMPLES IN BATCH(SPL ID):

9906478-13A 9906478-14A 9906478-12A 9906478-11A



SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Diesel

HOUSTON LABORATORY

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

Batch Id: HP_V990617072100

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Result <1>	Spike Recovery	QC Limits(**) (Mandatory) % Recovery Range
Diesel	ND	2.5	2.88	115	53 - 148

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results	Spike Added	Matrix	Spike	MatrixDuplic	Spike	MS/MSD Relative %	QC Limits(***)(Advisory)	
	<2>	<3>	Result	Recovery	Result	Recovery	Difference	RPD Max.	Recovery Range
DIESEL	ND	1.25	1.23	98.4	1.09	87.2	12.1	39	21 - 175

Analyst: APR

Sequence Date: 06/17/99

SPL ID of sample spiked: 9906532-02C

Sample File ID: VVF3079.TX0

Method Blank File ID:

Blank Spike File ID: V_F3075.TX0

Matrix Spike File ID: VVF3082.TX0

Matrix Spike Duplicate File ID: VVF3083.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9906478-05B 9906478-06B 9906478-07B 9906478-08B 9906478-09B 9906478-10B 9906478-11B 9906478-12B 9906478-01B 9906478-02B 9906478-03B 9906478-04B



SPL BATCH QUALITY CONTROL REPORT **

Method 8310 ***

Batch Id: 2990616193911

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

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Result <1>	Spike Recovery	QC Limits(**) (Mandatory) % Recovery Range
Naphthalene	ND	0.50	0.34	68.0	32 - 148
Acenaphthylene	ND	0.50	0.35	70.0	42 - 138
Acenaphthene	ND	0.50	0.35	70.0	22 - 133
Fluorene	ND	0.50	0.35	70.0	11 - 148
Phenanthrene	ND	0.50	0.36	72.0	40 - 121
Anthracene	ND	0.50	0.35	70.0	32 - 121
Fluoranthene	ND	0.50	0.36	72.0	45 - 133
Pyrene	ND	0.50	0.39	78.0	39 - 136
Chrysene	ND	0.50	0.38	76.0	44 - 122
Benzo (a) anthracene	ND	0.50	0.39	78.0	53 - 137
Benzo (b) fluoranthene	ND	0.50	0.39	78.0	62 - 121
Benzo (k) fluoranthene	ND	0.50	0.38	76.0	66 - 128
Benzo (a) pyrene	ND	0.50	0.39	78.0	42 - 120
Dibenzo (a,h) anthracene	ND	0.50	0.39	78.0	59 - 129
Benzo (g,h,i) perylene	ND	0.50	0.42	84.0	67 - 124
Indeno (1,2,3-cd) pyrene	ND	0.50	0.37	74.0	65 - 125

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix Spike		Matrix Duplio	Spike	MS/MSD Relative %	_	Limits(***) (Advisory)	
			Result	Recovery	Result	Recovery	Difference	RPD		
	<2>	<3>	<1>	<4>	<1>	<5>		Max.	Recovery R	ange
NAPHTHALENE	N D	0.50	0.32	64.0	0.34	68.0	6.06	30	1 -	122
ACENAPHTHYLENE	ND	0.50	0.34	68.0	0.34	68.0	0	30	1 -	124
ACENAPHTHENE	ND	0.50	0.34	68.0	0.36	72.0	5.71	30	1 -	124
FLUORENE	ND	0.50	0.38	76.0	0.38	76.0	0	30	1 -	142
PHENANTHRENE	ND	0.50	0.36	72.0	0.38	76.0	5.41	30	1 -	155
ANTHRACENE	ND	0.50	0.34	68.0	0.36	72.0	5.71	30	1 -	126
FLUORANTHENE	ND	0.50	0.38	76.0	0.36	72.0	5.41	30	14 -	123
PYRENE	ND	0.50	0.40	80.0	0.42	84.0	4.88	30	1 -	140
CHRYSENE	ND	0.50	0.38	76.0	0.40	80.0	5.13	30	1 -	199
BENZO (A) ANTHRACENE	ND.	0.50	0.40	80.0	0.42	84.0	4.88	30	12 -	135
BENZO (B) FLUÓRANTHENE	ND	0.50	0.38	76.0	0.36	72.0	5.41	30	6 -	150
BENZO (K) FLUORANTHENE	ND	0.50	0.36	72.0	0.36	72.0	0	30	1 -	159
BENZO (A) PYRENE	ND	0.50	0.36	72.0	0.36	72.0	0	30	1 -	128
DIBENZO (A, H) ANTHRACENE	ND	0.50	0.38	76.0	0.34	68.0	11.1	30	1 -	110
BENZO (G,H,I) PERYLENE	ND	0.50	0.38	76.0	0.32	64.0	17.1	30	1 -	116
INDENO (1,2,3-CD) PYRENE	ND	0.50	0.32	64.0	0.28	56.0	13.3	30	1 -	116



SPL BATCH QUALITY CONTROL REPORT **

Method 8310 ***

HOUSTON LABORATORY

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

Batch Id: 2990616193911

Analyst: KA

Sequence Date: 06/16/99

SPL ID of sample spiked: 9906478-11E

Sample File ID: 990616A\013-1201

Method Blank File ID:

Blank Spike File ID: 990616A\012-1101

Matrix Spike File ID: 990616A\014-1501

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

Matrix Spike Duplicate File ID: 990616A\015-1601 (***) = Source: Temporary Limits

SAMPLES IN BATCH (SPL ID):

9906478-11E 9906555-01A

Analyst: PB

Matrix: Water

Units: mg/L

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

Date:061599 Time:0818 File Name: 0615JM1

Laboratory Control Sample

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit	Work Orde	ers in Batch
Silver	ND	2.00	1.72	86	1.60	2.40	Work Order	Fractions
Aluminum	ND	2.00	1.74	87	1.60	2.40		
Arsenic	ND	4.00	3.50	87	3.20	4.80	99-06-354	06C
Barium	ND	2.00	1.72	86	1.60	2.40		
Beryllium	ND	2.00	1.75	88	1.60	2.40	99-06-455	01D,02D
Calcium	ND	20.00	17.42	87	16.00	24.00		04D
Cadmium	ND	2.00	1.75	87	1.60	2.40		
Cobalt	ND	2.00	1.74	87	1.60	2.40	99-06-411	01B-08B
Chromium	ND	2.00	1.73	87	1.60	2.40		
Copper	ND	2.00	1.76	88	1.60	2.40	99-06-412	02E
Iron	ND	2.00	1.74	87	1.60	2.40		
Potassium	ND	20.00	17.57	88	16.00	24.00	99-06-415	04D
Magnesium	ND	20.00	17.34	87	16.00	24.00		
Manganese	ND	2.00	1.74	87	1.60	2.40	99-06-416	01D
Sodium	ND	20.00	17.59	88	16.00	24.00		
Nickel	ND	2.00	1.75	88	1.60	2.40	99-06-478	11F
Lead	ND	2.00	1.74	87	1.60	2.40		
Antimony	ND	4.00	3.52	88	3.20	4.80	99-06-534	01A
Selenium	ND	4.00	3.54	89	3.20	4.80		
Tin	ND	4.00	3.46	86	3.20	4.80	99-06-012	03C
Vanadium	ND	2.00	1.77	88	1.60	2.40		
Zinc	ND	2.00	1.75	87	1.60	2.40		

Work Order Spiked: 9906241-06C Matrix Spike - Spike Duplicate Results

	Sample	Spike	Matr	ix Spike	Matrix Spi	ke Duplicate	QCL	imits	Spike	QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Red	overy	RPD %	Limits %
Silver	ND	1.0	0.8801	88.0	0.9496	95.0	80	120	7.6	20.0
Aluminum	ND	1.0	0.9164	91.6	0.9892	98.9	80	120	7.6	20.0
Arsenic	ND	2.0	1.779	89.0	1.946	97.3	80	120	9.0	20.0
Barium	ND	1.0	0.8907	89.1	0.9603	96.0	80	120	7.5	20.0
Beryllium	ND	1.0	0.8983	89.8	0.9766	97.7	80	120	8.4	20.0
Calcium	0.195	10.0	9.146	89.5	9.952	97.6	80	120	8.6	20.0
Cadmium	ND	1.0	0.8903	89.0	0.9707	97.1	80	120	8.6	20.0
Cobalt	ND	1.0	0.8908	89.1	0.9731	97.3	80	120	8.8	20.0
Chromium	ND	1.0	0.8934	89.3	0.9729	97.3	80	120	8.5	20.0
Copper	ND	1.0	0.9153	91.5	0.9874	98.7	80	120	7.6	20.0
Iron	0.026	1.0	0.9207	89.5	0.9989	97.3	80	120	8.4	20.0
Potassium	ND	10.0	8.962	89.6	9.687	96.9	80	120	7.8	20.0
Magnesium	ND .	10.0	8.963	89.6	9.69	96.9	80	120	7.8	20.0
Manganese	ND	1.0	0.8958	89.6	0.9754	97.5	80	120	8.5	20.0
Sodium	ND	10.0	9.24	92.4	9.91	99.1	80	120	7.0	20.0
Nickel	ND	1.0	0.9085	90.9	0.9833	98.3	80	120	7.9	20.0
Lead	ND	1.0	0.8952	89.5	0.9741	97.4	80	120	8.4	20.0
Antimony	ND	2.0	1.793	89.7	1.927	96.4	80	120	7.2	20.0
Selenium	ND	2.0	1.818	90.9	1.983	99.2	80	120	8.7	20.0
Tin	ND	2.0	1.792	89.6	1.952	97.6	80	120	8.5	20.0
Vanadium	ND	1.0	0.9104	91.0	0.9873	98.7	80	120	8.1	20.0
Zinc	ND	1.0	0.8984	89.8	0.98	98.0	80	120	8.7	20.0

Checked: PB WILLIGA

ICP Spectroscopy Method 6010 Quality Control Report

Matrix: Water

Units: mg/L

Analyst: EG

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

Date:061599 Time:1116 File Name: 0615JM3

Laboratory Control Sample

		Doracory Cor						
Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit		rs in Batch
Silver							Work Order	Fractions
Aluminum								
Arsenic	ND	4.00	4.06	101	3.20	4.80	99-06-241	06C
Barium								
Beryllium							99-06-354	06C
Calcium								
Cadmium							99-06-425	01C
Cobalt								
Chromium							99-06-411	01B-08B
Copper								
Iron							99-06-412	02E
Magnesium								
Manganese							99-06-415	04B
Nickel	T							
Lead	ND	2.00	1.89	95	1.60	2.40	99-06-416	01D
Antimony								
Selenium	ND	4.00	4.14	103	3.20	4.80	99-06-478 >	11F
Thallium	ND	4.00	3.79	95	3.20	4.80		
Vanadium							99-06-529	01D
Zinc								

Matrix Spike - Spike Duplicate Results Work Order Spiked: 9906241-06C

- Opine De				Work Order Spiked, 3300241-000							
Sample	Spike	Matr	ix Spike	Matrix Spi	ke Duplicate	QCL	imits	Spike	QC		
Result	Added	Result	Recovery	Result	Recovery	% Red	covery	RPD %	Limits %		
•											
ND	2.0	1.925	96.3	2.035	101.8	80	120	5.6	20.0		
								Ī			
-											
						1					
ND .	1.0	0.9107	91.1	0.9616	96.2	80	120	5.4	20.0		
							1 1				
ND	2.0	1.962	98.1	2.06	103.0	80	120	4.9	20.0		
ND	2.0	1.829	91.5	1.918	95.9	80	120	4.8	20.0		
						1			1		
	i			<u> </u>					1		
	Sample Result ND	Sample Result Added ND 2.0 ND 1.0 ND 2.0	Result Added Result ND 2.0 1.925 ND 1.0 0.9107 ND 2.0 1.962	Sample Result Spike Added Matrix Spike Result Recovery ND 2.0 1.925 96.3 ND 1.0 0.9107 91.1 ND 2.0 1.962 98.1	Sample Spike Matrix Spike Result Recovery Result	Sample Result Spike Added Matrix Spike Result Matrix Spike Result Matrix Spike Recovery ND 2.0 1.925 96.3 2.035 101.8 ND 1.0 0.9107 91.1 0.9616 96.2 ND 2.0 1.962 98.1 2.06 103.0	Sample Result Spike Added Matrix Spike Result Matrix Spike Result Matrix Spike Result QC L Result	Sample Result Spike Added Matrix Spike Result Watrix Spike Result Wa	Sample Result Spike Added Matrix Spike Result Matrix Spike Result Matrix Spike Result QC Limits Recovery Spike RPD % ND 2.0 1.925 96.3 2.035 101.8 80 120 5.6 ND 1.0 0.9107 91.1 0.9616 96.2 80 120 5.4 ND 2.0 1.962 98.1 2.06 103.0 80 120 4.9		

Checked: 9m 4/16/99



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

06/24/99

Analyzed on: 06/24/99

Analyst:

AG

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

Mercury, Total Method 7470 A***

SPL Sample ID Number	Blank Value ug/L	Value Concentration Concent		% Recovery	QC Limits Recovery
LCS	ND	2.00	1.96	98.0	80 - 120

-9906585

Samples in batch:

9906478-11F

9906623-01F

COMMENTS:

LCS = SPL ID# 94-452-56-7



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 06/24/99 Analyzed on: 06/24/99

Analyst:

AG

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

Mercury, Total Method 7470 A***

SPL Sample	Method	Sample	Spike	Matr	ix Spike		ix Spike Licate	RPD	QC LIMIT (Advisor)		
ID Number	Blank ug/L	Result ug/L	Added ug/L	Result ug/L	Recovery %	Result ug/L	Recovery %	(%)	RPD Max	%	REC
9906478-11F	ND	ND	2.00	1.90	95.0	1.98	99.0	4.1	20	75	- 125

-9906585

Samples in batch:

9906478-11F 9906623-01F

COMMENTS:

LCS = SPL ID# 94-452-56-7



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

06/15/99

Analyzed on:

06/11/99

Analyst:

ELS

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

Nitrate (as N) Method 300.0 *

SPL Sample ID Number	Blank Value mg/L	_ : :-	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.75	97.5	90 - 110

-9906291

Samples in batch:

9906478-03C

9906478-11C

9906478-05C 9906480-01B 9906478-06C 9906480-02B 9906478-07C

9906480-03B

COMMENTS:

LCS SPL ID# 95535284-5



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

SPL QUALITY CONTROL REPORT **

Matrix: Aqueous Reported on: 06/15/99 Analyzed on: 06/11/99

Analyst:

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

Nitrate (as N) Method 300.0 *

SPL Sample	Method	Sample	Spike	Matr	ix Spike	Matrix Spike Duplicate		RPD		C LIMITS Advisory)
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	% REC
9906480-01B	ND	ND	2.26	2.16	95.6	2.18	96.5	0.9	5	86 -115

-9906291

Samples in batch:

9906478-03C 9906478-05C 9906478-06C

9906478-11C 9906480-01B

9906480-02B

9906478-07C 9906480-03B

COMMENTS: LCS SPL ID# 95535284-5



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

06/17/99

Analyzed on:

06/11/99

Analyst:

ELS

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

> Sulfate Method 300.0 *

SPL Sample ID Number	Blank Value mg/L	lue Concentration Concentration		% Recovery	QC Limits Recovery
LCS	ND	10.0	9.88	98.8	90 - 110

-9906383

Samples in batch:

9906478-03C

9906478-05C

9906478-06C

9906478-07C

9906478-11C

9906480-01B

9906480-02B

9906480-03B

COMMENTS:

LCS SPL ID# 95535284-5



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 06/17/99 Analyzed on: 06/11/99 Analyst: ELS

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

Sulfate Method 300.0 *

SPL Sample	Method	Sample	Spike	Matr	Matrix Spike		Matrix Spike Duplicate		1	QC LIMITS (Advisory)	
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L		Result mg/L	Recovery %	(%)	RPD Max	%	REC
9906480-01B	ND	7.33	10.0	17.2	98.7	17.1	97.7	1.0	7.0	88	-112

-9906383

Samples in batch:

9906478-03C 9906478-05C 9906478-06C 9906478-07C 9906478-11C 9906480-01B 9906480-02B 9906480-03B

COMMENTS: LCS SPL ID# 95535284-5



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

SPL QUALITY CONTROL REPORT **

Aqueous Matrix:

Reported on: 06/22/99 Analyzed on: 06/21/99

CV

Analyst:

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

Chloride Method 325.3 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	162	159.5	98.5	94 - 106

-9906489

Samples in batch:

9906441-01A	9906441-02A	9906441-03A	9906441-04A
9906441-05A	9906441-06A	9906441 - 07A	9906441 - 08A

9906478-11C 9906506-02I

COMMENTS:

LCS-SPL ID#94453228-23



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

SPL QUALITY CONTROL REPORT **

Matrix: Aqueous Reported on: 06/22/99 Analyzed on: 06/21/99 Analyst: CV

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

Chloride Method 325.3 *

SPL Sample	Method	Sample	Spike	Matri			Matrix Spike Duplicate		1	QC LIMITS (Advisory)	
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	%	REC
9906441-06A	ND	28.4	50.0	78.0	99.2	78.0	99.2	0	5	92	-109

-9906489

Samples in batch:

9906441-02A 9906441-06A 9906441-01A 9906441-03A 9906441-04A 9906441-05A 9906441-07A 9906441-08A 9906478-11C 9906506-021

. COMMENTS:

LCS-SPL ID#94453228-23



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 06/17/99

Analyzed on: 06/15/99

Analyst: ELS

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

Fluoride Method 300.0 *

SPL Sample ID Number	Blank Value mg/L	Value Concentration Comg/L mg/L		% Recovery	QC Limits Recovery
LCS	ND	10.0	9.5	95.0	90 - 110

-9906368

Samples in batch:

9906257-02F 9906522-02K 9906416-01C

9906478-11C

9906506-02I

COMMENTS:

LCS SPL ID# 95535280-03



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 06/17/99 Analyzed on: 06/15/99 ELS Analyst:

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

> Fluoride Method 300.0 *

SPL Sample	Method	Sample	Spike	Matr	lx Spike	Matrix Spike Duplicate		I		ac LIMITS Advisory)
ID Number	1	Result mg/L	Added mg/L	Result mg/L	•	Result mg/L	Recovery %	(%)	RPD Max	% REC
9906522-02K	ND	23.8	50.0	73.3	99.0	73.2	98.8	0.2	20	80 -120

-9906368

Samples in batch:

9906257-02F 9906522-02K

9906416-01C 9906478-11C

9906506-021

COMMENTS:

LCS SPL ID# 95535280-03



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 06/25/99

Analyzed on: 06/14/99

Analyst: AB

This sample was randomly selected for use in the \mbox{SPL} quality control program. The results are as follows:

Carbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9906478-11G	ND	ND	0	5

-9906580

Samples in batch:

9906478-11G

COMMENTS:



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

SPL QUALITY CONTROL REPORT **

Matrix: Aqueous Reported on: 06/25/99

Analyzed on: 06/14/99

Analyst:

AB

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

> Bicarbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9906478-11G	316	312	1.3	5

-9906579

Samples in batch:

9906478-11G

COMMENTS:

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

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•	Star	Standard OC I	Level	Level 3 QC		Level 4 QC								6HF
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48hr 🔘 Standard 🔯	3. Relinquished by:	d by:				date		time	*	4. Received by:	1			
Ocher 🗍	5. Relinquished by:	d by:				date	-	Lime	ا و	La Line	6. Received by Laporalory	6/11/3	5	000
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500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775

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

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459-Hughes Drive, Traverse City, MI 49684 (616) 947-5777	rerse City, MI 4968	4 (616) 947	-5777												

SPL Houston Environmental Laboratory Sample Login Checklist

Dat	te: 6/11/99	me: /000		
SPI	L Sample ID:			
	99064	78		
L			Yes	No
1	Chain-of-Custody (COC) form is	present.	/	
2	COC is properly completed.		✓	
3	If no, Non-Conformance Worksh	neet has been completed.		
4	Custody seals are present on the	shipping container.	/	
5	If yes, custody seals are intact.		/	
6	All samples are tagged or labeled.		/	
7	If no, Non-Conformance Worksh	neet has been completed.		
8	Sample containers arrived intact		/	<u></u>
9	Temperature of samples upon arr	rival:	3	° C
10	Method of sample delivery to SP	L: SPL Delivery		
		Client Delivery		
		FedEx Delivery (airbill #)	311305	335029
		Other:		
11	Method of sample disposal:	SPL Disposal		
		HOLD		
		Return to Client		
NI		ln :	······································	
INA	me:	Date:	11/98	



July 22, 1999

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

The following report contains analytical results for the sample(s) received at Southern Petroleum Laboratories (SPL) on July 3, 1999. The sample(s) was assigned to Certificate of Analysis No. (s) 9907124 and analyzed for all parameters as listed on the chain of custody.

Your sample ID: MW13-Soil was written on the chain of custody. However, no sample was received.

Due to our Mercury analyzer being down we had to subcontract your sample(s) to our Lafayette laboratory for completion. It was assigned to their Certificate of Analysis No. 9907787.

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).

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

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

Southern Petroleum Laboratories

Bernadette A. Fini

Senior Project Manager



Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 99-07-124

Approved for Release by:

Bernadette A. Fini, Senior Project Manager

アdダーソフ Date

Joel Grice Laboratory Director

Ted Yen Corporate Quality Assurance Director

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory. The results relate only to the samples tested. Results reported on a Wet Weight Basis unless otherwise noted.



Certificate of Analysis No. H9-9907124-02

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

DATE: 07/21/99

PROJECT: BJ Services

SITE: Hobbs, NM

PROJECT NO: 12832.021
MATRIX: SOIL

SAMPLED BY: Brown and Caldwell SAMPLE ID: MW-12D/13-Soil

DATE SAMPLED: 06/30/99 10:02:00

DATE RECEIVED: 07/03/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B Analyzed by: Date:		08:36:00	ND	1	mg/kg
Arsenic, Total Method 6010B Analyzed by: Date:	***	11:10:00	1.1	0.5	mg/kg
Barium, Total Method 6010B Analyzed by: Date:		08:36:00	67.9	0.5	mg/kg
Cadmium, Total Method 6010B Analyzed by: Date:	***	08:36:00	ND	0.5	mg/kg
Chromium, Tota Method 6010B Analyzed by: Date:	***	08:36:00	17	1	mg/kg
Mercury, Total Method 7471A Analyzed by: Date:	***	15:30:00	ND	0.1	mg/kg

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9907124-02

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

DATE: 07/21/99

PROJECT: BJ Services

PROJECT NO: 12832.021

SITE: Hobbs, NM

MATRIX: SOIL

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 06/30/99 10:02:00

SAMPLE ID: MW-12D/13-Soil

DATE RECEIVED: 07/03/99

ANALYTICAI	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Acid Digestion - Solids, ICP Method 3050B *** Analyzed by: MR Date: 07/07/99 07:30:00	07/07/99	DIMII	
Lead, Total Method 6010B *** Analyzed by: EG Date: 07/13/99 11:10:00	0.9	0.5	mg/kg
Selenium, Total Method 6010B *** Analyzed by: EG Date: 07/13/99 11:10:00	ND	0.5	mg/kg
Solids CLP Inorganics SOW Analyzed by: AB Date: 07/08/99 10:00:00	77	1	%wt

ND - Not detected.

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



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

Certificate of Analysis No. H9-9907124-03

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

DATE: 07/21/99

PROJECT: BJ Services

PROJECT NO: 12832.021

SITE: Hobbs, NM

MATRIX: SOIL

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 06/29/99 10:07:00

SAMPLE ID: MW-12D-Soil

DATE RECEIVED: 07/03/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND		mg/kg
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: FAB Date: 07/11/99	% Recovery 90 90		
Total Petroleum Hydrocarbons-Diesel	ND	10 P	mg/kg
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: RR Date: 07/15/99 02:31:00	% Recovery 114		
Sonication Extraction of DRO by 8015A Method 3550B *** Analyzed by: GT Date: 07/06/99 12:00:00	07/06/99		
Solids CLP Inorganics SOW Analyzed by: AB Date: 07/08/99 10:00:00	90	1	%wt

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9907124-04

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

DATE: 07/21/99

PROJECT: BJ Services PROJECT NO: 12832.021

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 07/02/99 10:50:00

SAMPLE ID: MW-12D DATE RECEIVED: 07/03/99

RESULTS	DETECTION	IDITEC
	LIMIT	UNITS
ND	0.10 P	mg/L
% Recovery 80 73		
ND	0.20 P	mg/L
% Recovery 30		
0.0015	0.0012 P	mg/L
ND	0.01	mg/L
0.022	0.005	mg/L
•	80 73 ND % Recovery 30 0.0015	80 73 ND 0.20 P % Recovery 30 0.0015 0.0012 P ND 0.01 0.022 0.005

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

⁽P) - Practical Quantitation Limit



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9907124-04

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

DATE: 07/21/99

PROJECT: BJ Services

SITE: Hobbs, NM

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-12D

PROJECT NO: 12832.021
MATRIX: WATER

DATE SAMPLED: 07/02/99 10:50:00

DATE RECEIVED: 07/03/99

	ANALYTICAL DATA	\		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Barium, Total Method 6010B *** Analyzed by: JM Date: 07/08/99 1	L3:21:00	0.155	0.005	mg/L
Calcium, Total Method 6010B *** Analyzed by: JM Date: 07/08/99 1	13:21:00	113	0.1	mg/L
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 07/08/99 1	13:21:00	ND	0.005	mg/L
Chromium, Total Method 6010B *** Analyzed by: JM Date: 07/08/99 1	13:21:00	0.02	0.01	mg/L
Mercury, Total Method 7470 A*** Analyzed by: RJB Date: 07/20/99 1	LO:20:00	ND	0.0002	mg/L
Potassium, Total Method 6010B *** Analyzed by: JM Date: 07/19/99 1	10:52:00	66	2	mg/L

ND - Not detected.

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



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

Certificate of Analysis No. H9-9907124-04

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

DATE: 07/21/99

PROJECT: BJ Services

SITE: Hobbs, NM

PROJECT NO: 12832.021

SAMPLED BY: Brown and Caldwell

MATRIX: WATER

DATE SAMPLED: 07/02/99 10:50:00 DATE RECEIVED: 07/03/99

SAMPLE ID: MW-12D

ANALYTICAL DATA PARAMETER RESULTS DETECTION UNITS LIMIT Magnesium, Total 16.6 0.1 mg/L Method 6010B *** Analyzed by: JM Date: 07/08/99 13:21:00 Sodium, Total 121 0.5 mg/L Method 6010B *** Analyzed by: JM Date: 07/19/99 10:52:00 Acid Digestion-Aqueous, ICP 07/06/99 Method 3010A *** Analyzed by: EE Date: 07/06/99 13:30:00 Lead, Total ND0.005 mg/L Method 6010B *** Analyzed by: EG Date: 07/07/99 11:07:00 Selenium, Total ND 0.005 mg/L Method 6010B *** Analyzed by: EG Date: 07/07/99 11:07:00 Liquid-liquid extraction SEMIVOLATILES 07/04/99 Method 3520C *** Analyzed by: KL Date: 07/04/99 16:00:00

ND - Not detected.

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



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

Certificate of Analysis No. H9-9907124-04

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

DATE: 07/21/99

PROJECT: BJ Services PROJECT NO: 12832.021

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 07/02/99 10:50:00

SAMPLE ID: MW-12D DATE RECEIVED: 07/03/99

	ANALYTICAL	DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Chloride Method 325.3 Analyzed by: Date:		195	5	mg/L
Carbonate, as Method SM 45 Analyzed by: Date:	00-CO2D **	ND	1.0	mg/L
Bicarbonate, Method SM 45 Analyzed by: Date:	00-CO2D **	200	1.0	mg/L
Fluoride Method 300.0 Analyzed by: Date:		1.83	0.1	mg/L
Nitrate nitro Method 353.3 Analyzed by: Date:	*	2.1	0.1	mg/L
Sulfate Method 375.4 Analyzed by: Date:		249	25	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



Certificate of Analysis No. H9-9907124-04

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

07/21/99

PROJECT: BJ Services

SITE: Hobbs, NM

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-12D

PROJECT NO: 12832.021

MATRIX: WATER

DATE SAMPLED: 07/02/99 10:50:00

DATE RECEIVED: 07/03/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	ug/L
Bromobenzene	ND	5	ug/L
Bromochloromethane	ND	5	ug/L
Bromodichloromethane	ND	5	ug/L
Bromoform	ND	5	ug/L
Bromomethane	ND	10	ug/L
n-Butylbenzene	ND	5	uq/L
sec-Butylbenzene	ND	5	ug/L
tert-Butylbenzene	ND	5	ug/L
Carbon tetrachloride	ND	5	ug/L
Chlorobenzene	ND	5	ug/L
Chlorodibromomethane	ND	5	ug/L
Chloroethane	ND	10	ug/L
Chloroform	ND	5	ug/L
Chloromethane	ND	10	ug/L
2-Chlorotoluene	ND	5	ug/L
4-Chlorotoluene	ND	5	ug/L
1,2-Dibromo-3-chloropropane	ND	5	ug/L
1,2-Dibromoethane	ND	5	ug/L
Dibromomethane	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
Dichlorodifluoromethane	ND	10	ug/L
1,1-Dichloroethane	ND	5	ug/L
1,2-Dichloroethane	ND	5	ug/L
1,1-Dichloroethene	ND	5	ug/L
cis-1,2-Dichloroethene	ND	5	ug/L
trans-1,2-Dichloroethene	ND	5	ug/L
1,2-Dichloropropane	ND	5	ug/L
1,3-Dichloropropane	ND	5	ug/L
2,2-Dichloropropane	ND	5	ug/L
1,1-Dichloropropene	ND	5	ug/L
Ethylbenzene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
Isopropylbenzene	ND	5	ug/L
p-Isopropyltoluene	ND	5	ug/L
Methylene chloride	ND	5	ug/L

METHOD: 8260 Water, Volatile Organics (continued on next page)



Certificate of Analysis No. H9-9907124-04

Brown and Caldwell

SAMPLE ID: MW-12D

115

ANALY	TICAL DATA	(cont	inued)		
PARAMETER	RESULT		PQL*		UNITS
Naphthalene		ND	5		ug/L
n-Propylbenzene		ND	5		ug/L
Styrene		ND	5		ug/L
1,1,1,2-Tetrachloroethane		ND	5		ug/L
1,1,2,2-Tetrachloroethane		ND	5		ug/L
Tetrachloroethene		ND	5		ug/L
Toluene		ND	5		ug/L
1,2,3-Trichlorobenzene		ND	5		ug/L
1,2,4-Trichlorobenzene		ND	5		ug/L
1,1,1-Trichloroethane		ND	5		ug/L
1,1,2-Trichloroethane		ND	5		ug/L
Trichloroethene		ND			ug/L
Trichlorofluoromethane		ND	5 5 5		ug/L
1,2,3-Trichloropropane		ND	5		ug/L
1,2,4-Trimethylbenzene		ND	5		ug/L
1,3,5-Trimethylbenzene		ND	5		ug/L
Vinyl chloride		ND	10		ug/L
Xylenes (total)		ND	5		ug/L
1,2-Dichloroethene (total)		ND	5		ug/L
cis-1,3-Dichloropropene		ND	5		ug/L
trans-1,3-Dichloropropene		ND	5		ug/L
Acetone		130	100		ug/L
2-Butanone		ND	20		ug/L
4-Methyl-2-Pentanone		ND	10		ug/L
2-Hexanone		ND	10		ug/L
Carbon Disulfide		ND	5		ug/L
Vinyl Acetate		ND	10		ug/L
2-Chloroethylvinylether		ND	10		ug/L
Methyl t-Butyl Ether		ND	10		ug/L
SURROGATES	AMOUNT	%		LOWER	UPPER
	SPIKED	REC	OVERY	LIMIT	LIMIT
1,2-Dichloroethane-d4	50 ug/L		90	80	120
Toluene-d8	50 ug/L		92	88	110
4 B	50 J.		~ ~		

4-Bromofluorobenzene 50 ug/L 96 86 ANALYZED BY: JC

DATE/TIME: 07/06/99 21:35:00 METHOD: 8260 Water, Volatile Organics

* - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



Certificate of Analysis No. H9-9907124-04

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

07/21/99

PROJECT: BJ Services PROJECT NO: 12832.021

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown and Caldwell DATE SAMPLED: 07/02/99 10:50:00

SAMPLE ID: MW-12D DATE RECEIVED: 07/03/99

ANALYTICA	г. пата		
PARAMETER	RESULTS	PQL*	UNITS
Acenaphthene	ND	5	ug/L
Acenaphthylene	ND	5	ug/L
Aniline	ND	5	ug/L
Anthracene	ND	5	ug/L
Benzo(a)Anthracene	ND	5	ug/L
Benzo(b)Fluoranthene	ND	5	ug/L
Benzo(k) Fluoranthene	ND	5	ug/L
Benzo(a)Pyrene	ND	5	ug/L
Benzoic Acid	ND	25	ug/L
Benzo(g,h,i)Perylene	ND	5	ug/L
Benzyl alcohol	ND	5	ug/L
4-Bromophenylphenyl ether	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
di-n-Butyl phthalate	ND	5	ug/L
Carbazole	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
bis(2-Chloroethoxy)Methane	ND	5	ug/L
bis(2-Chloroethyl)Ether	ND	5	ug/L
bis(2-Chloroisopropyl)Ether	ND	5	ug/L
4-Chloro-3-Methylphenol	ND	5	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
4-Chlorophenylphenyl ether	ND	5	ug/L
Chrysene	ND	5	ug/L
Dibenz(a,h)Anthracene	ND	5	ug/L
Dibenzofuran	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
2,4-Dichlorophenol	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Dimethyl Phthalate	ND	5	ug/L
4,6-Dinitro-2-Methylphenol	ND	25	ug/L
2,4-Dinitrophenol	ND	25	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
2,6-Dinitrotoluene	ND	5	ug/L
		-	-3/-

METHOD: 8270C, Semivolatile Organics - Water (continued on next page)



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9907124-04

Brown and Caldwell

SAMPLE ID: MW-12D

ANALYTICAL DATA (continued)					
PARAMETER	RESULTS	PQL*	UNITS		
1,2-Diphenylhydrazine	ND	5	ug/L		
bis(2-Ethylhexyl)Phthalate	ND	5	ug/L		
Fluoranthene	ND	5	ug/L		
Fluorene	ND	5	ug/L		
Hexachlorobenzene	ND	5	ug/L		
Hexachlorobutadiene	ND	5	ug/L		
Hexachloroethane	ND	5	ug/L		
Hexachlorocyclopentadiene	ND	5	ug/L		
Indeno(1,2,3-cd)Pyrene	ND	5	ug/L		
Isophorone	ND	5 5	ug/L		
2-Methylnaphthalene	ND	5	ug/L		
2-Methylphenol	ND	5	ug/L		
4-Methylphenol	ND	5	ug/L		
Naphthalene	ND	5	ug/L		
2-Nitroaniline	ND	25	ug/L		
3-Nitroaniline	ND	25	ug/L		
4-Nitroaniline	ND	25	ug/L		
Nitrobenzene	ND	5	ug/L		
2-Nitrophenol	ND	5	ug/L		
4-Nitrophenol	ND	25	ug/L		
N-Nitrosodiphenylamine	ND	5	ug/L		
N-Nitroso-Di-n-Propylamine	ND	5	ug/L		
Di-n-Octyl Phthalate	ND	5	ug/L		
Pentachlorophenol	ND	25	ug/L		
Phenanthrene	ND	5	ug/L		
Phenol	ND	5	ug/L		
Pyrene	ND	5	ug/L		
Pyridine	ND	5 5 5	ug/L		
1,2,4-Trichlorobenzene	ND	5	ug/L		
2,4,5-Trichlorophenol	ND	10	ug/L		
2,4,6-Trichlorophenol	ND	5	ug/L		

METHOD: 8270C, Semivolatile Organics - Water (continued on next page)



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

Certificate of Analysis No. H9-9907124-04

Brown and Caldwell

SAMPLE ID: MW-12D

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	76	35	114
2-Fluorobiphenyl	50 ug/L	80	43	116
Terphenyl-d14	50 ug/L	78	. 33	141
Phenol-d5	75 ug/L	20	10	110
2-Fluorophenol	75 ug/L	35	21	110
2,4,6-Tribromophenol	75 ug/L	111	10	123

ANALYZED BY: SC DATE/TIME: 07/06/99 17:11:00 EXTRACTED BY: KL DATE/TIME: METHOD: 8270C, Semivolatile Organics - Water DATE/TIME: 07/04/99 16:00:00

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



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

Certificate of Analysis No. H9-9907124-04

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

07/21/99

PROJECT: BJ Services

SITE: Hobbs, NM

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-12D

PROJECT NO: 12832.021

MATRIX: WATER

DATE SAMPLED: 07/02/99 10:50:00

DATE RECEIVED: 07/03/99

AN	ALYTICAL DATA				
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		0.6	0.1		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT	8		LOWER	UPPER
1-Fluoronaphthalene	SPIKED 0.50 uq/L	RECO	OVERY 61	LIMIT 50	LIMIT 150
Phenanthrene d-10	0.50 ug/L		76	50	150

ANALYZED BY: LJ DATE/TIME: 07/14/99 00:51:38 EXTRACTED BY: KL DATE/TIME: 07/04/99 13:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

PHONE (713) 660-0901

Certificate of Analysis No. H9-9907124-05

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

07/21/99

PROJECT: BJ Services
SITE: Hobbs, NM

SAMPLE D: Provided by SPL SAMPLE ID: Trip Blank 6/9/99

PROJECT NO: 12832.021

MATRIX: WATER
DATE SAMPLED: 07/02/99

DATE RECEIVED: 07/03/99

ANALYTICAL DATA				
PARAMETER RESULTS	PQL*	UNITS		
Benzene ND	5	ug/L		
Bromobenzene ND	5	ug/L		
Bromochloromethane ND	5	ug/L		
Bromodichloromethane ND	5	ug/L		
Bromoform ND	5	ug/L		
Bromomethane ND	10	ug/L		
n-Butylbenzene ND	5	ug/L		
sec-Butylbenzene ND	5	ug/L		
tert-Butylbenzene ND	5	ug/L		
Carbon tetrachloride ND	5	ug/L		
Chlorobenzene ND	5	ug/L		
Chlorodibromomethane ND	5	ug/L		
Chloroethane ND	10	ug/L		
Chloroform ND	5	ug/L		
Chloromethane ND	10	ug/L		
2-Chlorotoluene ND	5	ug/L		
4-Chlorotoluene ND	5	ug/L		
1,2-Dibromo-3-chloropropane ND	5	ug/L		
1,2-Dibromoethane ND	5	ug/L		
Dibromomethane ND	5	ug/L		
1,2-Dichlorobenzene ND	5	ug/L		
1,3-Dichlorobenzene ND	5	ug/L		
1,4-Dichlorobenzene ND	5	ug/L		
Dichlorodifluoromethane ND	10	ug/L		
1,1-Dichloroethane ND	5	ug/L		
1,2-Dichloroethane ND	5	ug/L		
1,1-Dichloroethene ND	5	ug/L		
cis-1,2-Dichloroethene ND	5	ug/L		
trans-1,2-Dichloroethene ND	5	ug/L		
1,2-Dichloropropane ND	5	ug/L		
1,3-Dichloropropane ND	5	ug/L		
2,2-Dichloropropane ND	5	ug/L		
1,1-Dichloropropene ND	5	ug/L		
Ethylbenzene ND	5	ug/L		
Hexachlorobutadiene ND	5	ug/L		
Isopropylbenzene ND	5	ug/L		
p-Isopropyltoluene ND	5	ug/L		
Methylene chloride ND	5	ug/L		

METHOD: 8260 Water, Volatile Organics (continued on next page)



HOUSTON LABORATORY
8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9907124-05

Brown and Caldwell

SAMPLE ID: Trip Blank 6/9/99

ANALYTICAL DATA (continued)				
PARAMETER	RESULTS	PQL ¹	k	UNITS
Naphthalene	1	ND	5	${\tt ug/L}$
n-Propylbenzene	1	ND	5	ug/L
Styrene		ND	5	ug/L
1,1,1,2-Tetrachloroethane		ND	5	ug/L
1,1,2,2-Tetrachloroethane	_	ND	5	ug/L
Tetrachloroethene		ND	5	ug/L
Toluene		ND	5 5	ug/L
1,2,3-Trichlorobenzene	_	ND	5	ug/L
1,2,4-Trichlorobenzene		ND	5	ug/L
1,1,1-Trichloroethane		ND	5	ug/L
1,1,2-Trichloroethane		MD	5	ug/L
Trichloroethene	_	MD	5 5	ug/L
Trichlorofluoromethane		ND	5	ug/L
1,2,3-Trichloropropane		ND	5 5	ug/L
1,2,4-Trimethylbenzene		ND	5	ug/L
1,3,5-Trimethylbenzene		ND.	5	ug/L
Vinyl chloride		ND	10	ug/L
Xylenes (total)		ND	5	ug/L
1,2-Dichloroethene (total)		ND	5	ug/L
cis-1,3-Dichloropropene		ND	5	ug/L
trans-1,3-Dichloropropene		ND	5	ug/L
Acetone			100	ug/L
2-Butanone		ND	20	ug/L
4-Methyl-2-Pentanone		ND	10	ug/L
2-Hexanone		ND	10	ug/L
Carbon Disulfide		ND	5	ug/L
Vinyl Acetate		ND	10	ug/L
2-Chloroethylvinylether		ND	10	ug/L
Methyl t-Butyl Ether	1	ND	10	ug/L
SURROGATES A	MOUNT	8	LOW	ER UPPER
_	PIKED	RECOVER		
	0 ug/L	88		80 120
	0 ug/L	92	;	88 110
4-Bromofluorobenzene 5	0 ug/L	98	;	86 115

ANALYZED BY: JC DATE/TIME: 07/07/99 20:44:00

METHOD: 8260 Water, Volatile Organics

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:

QUALITY CONTROL

DOCUMENTATION

3A WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: SPL

Contract:

Lab Code:

Case No.: 9907122

SAS No.: SDG No.:

Matrix Spike - EPA Sample No.: MW-13

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC. LIMITS REC.
	=======	=======================================	===========	=====	=====
1,1-Dichloroethene	50	0	57	114	61-145
Trichloroethene	50	0	58	116	71-120
Benzene	50	1500	1500	0*	76-127
Toluene	50	23	73	100	76-125
Chlorobenzene	50	0	52	104	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LI RPD	IMITS REC.
1,1-Dichloroethene Trichloroethene Benzene Toluene Chlorobenzene	50 - 50 50 50 50	54 56 1500 72 52	108 112 0* 98 104	6 2 0 2	14 14 11 13 13	===== 61-145 71-120 76-127 76-125 75-130

- # Column to be used to flag recovery and RPD values with an asterisk
- * Values outside of QC limits due to matrix interference

RPD: 0 out of 5 outside limits Spike Recovery: 2 out of 10 outside limits

Data File: /var/chem/l.i/1990706.b/l187tl1.d

Report Date: 06-Jul-1999 14:59

SPL Houston Labs

RECOVERY REPORT

Client Name:

Client SDG: 1990706

Sample Matrix: LIQUID Lab Smp Id: LCS-8260W Level: LOW

Fraction: VOA

Operator: LT

SampleType: LCS

Quant Type: ISTD

Data Type: MS DATA Sample SpikeList File: 8260_water.spk Quant Sublist File: 8260_lcs.sub
Method File: /var/chem/l.i/1990706.b/18260aw.m
Misc Info: L187W1//L187CW1

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
8 1,1-Dichloroethene	50	55	110.00	61-145
29 Trichloroethene	50	55	110.00	71-120
25 Benzene	50	55	110.00	76-127
37 Toluene	50	49	98.00	76-125
45 Chlorobenzene	50	52	104.00	75-130

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
\$ 21 1,2-Dichloroethane	50	45	90.00	80-120
\$ 36 Toluene-d8	50	46	92.00	88-110
\$ 56 Bromofluorobenzene	50	49	98.00	86-115

Page 3



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

page

Matrix: Aqueous Sample ID: VLBLK Batch: L990706104642 Reported on: 07/15/99 12:34 Analyzed on: 07/06/99 13:05 Analyst: LT

METHOD 8260/8240 L187B01

Compound	Result	Detection Limit	Units
Dichlorodifluoromethane	ND	10	ug/L
Chloromethane	ND	10	ug/L
Vinyl Chloride	ND	10	ug/L
Bromomethane	ND	10	ug/L
Chloroethane	ND	10	ug/L
Trichlorofluoromethane	ND	5	ug/L
Acetone	ND	100	ug/L
1,1-Dichloroethene	ND	5	ug/L
Methylene Chloride	ND	5	ug/L
Carbon Disulfide	ND	5	ug/L
trans-1,2-Dichloroethene	ND	5	ug/L
1,1-Dichloroethane	ND	5	ug/L
Vinyl Acetate	ND	10	ug/L
2-Butanone	ND	20	ug/L
cis-1,2-Dichloroethene	ND	5	ug/L
1,2-Dichloroethene (total)	ND ND	5 5 5	ug/L
2,2-Dichloropropane Bromochloromethane	ND	כו	ug/L
Chloroform	ND	5	ug/L ug/L
1,1,1-Trichloroethane	ND	5	ug/L
1,2-Dichloroethane	ND ND	5	ug/L
1,1-Dichloropropene	ND	5	ug/L
Benzene	ND	5	ug/L
Carbon Tetrachloride	ND	5	ug/L
1,2-Dichloropropane	ND	5	ug/L
Trichloroethene	ND	5	ug/L
Dibromomethane	ND	5	ug/L
Bromodichloromethane	ND	5	ug/L
2-Chloroethylvinylether	ND	10	ug/L
4-Methyl-2-Pentanone	ND	10	ug/L
cis-1,3-Dichloropropene	ND	5	ug/L
trans-1,3-Dichloropropene	ND	5	ug/L
Toluene	ND	5	ug/L
1,1,2-Trichloroethane	∥ ND	5	ug/L



HOUSTON LABORATORY

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

page

Matrix: Aqueous Sample ID: VLBLK
Batch: L990706104642 Reported on: 07/15/99 12:34 Analyzed on: 07/06/99 13:05 Analyst: LT

METHOD 8260/8240 L187B01

C o m p o u n d	Result	Detection Limit	Units
1,3-Dichloropropane	ND	5	ug/L
2-Hexanone	ND	10	ug/L
Dibromochloromethane	ND	5	ug/L
1,2-Dibromoethane	ND	5	ug/L
Tetrachloroethene	ND	5	ug/L
Chlorobenzene	ND	5	ug/L
1,1,1,2-Tetrachloroethane	ND	5	ug/L
Ethylbenzene	ND	5	ug/L
Bromoform	ND	5	ug/L
Styrene	ND	5	ug/L
Xylene (Total)	ND	5	ug/L
1,1,2,2-Tetrachloroethane	ND	5	ug/L
1,2,3-Trichloropropane	ND	5	ug/L
Isopropylbenzene	ND	5	ug/L
Bromobenzene	ND	5	ug/L
N-Propylbenzene	ND	5	ug/L
2-Chlorotoluene	ND	5	ug/L
4-Chlorotoluene	ND	5	ug/L
1,3,5-Trimethylbenzene	ND	5	ug/L
tert-Butylbenzene	ND	5	ug/L
1,2,4-Trimethylbenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
sec-Butylbenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
p-Isopropyltoluene	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
n-Butylbenzene	ND	5	ug/L
1,2-Dibromo-3-Chloropropan	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
Naphthalene	ND	5	ug/L
Hexachlorobutadiene	ND	5	ug/L
1,2,3-Trichlorobenzene	ND	5	ug/L
Methyl t-Butyl Ether	ND	10	ug/L

Notes



HOUSTON LABORATORY

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

page

Matrix: Aqueous Sample ID: VLBLK

Batch: L990706104642

Reported on: 07/15/99 12:34 Analyzed on: 07/06/99 13:05 Analyst: LT

METHOD 8260/8240 L187B01

Surrogate	Result	QC Criteria	Units
1,2-Dichloroethane-d4	88	88-110	% Recovery
Toluene-d8	94		% Recovery
Bromofluorobenzene	98		% Recovery

Samples in Batch 9907124-04 9907124-05 Notes

3C WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name:

SPL

Contract:

Lab Code:

Case No:

E990704

SAS No:

SDG No:

Matrix Spike - EPA

Sample No:

BLANK

Level (low/med):

	SPIKE	SAMPLE	MS	MS	QC
	ADDED	CONCENTRATION	CONCENTRATION	%	LIMITS
COMPOUND	(ug/L)	(ug/L) ,	(ug/L)	REC #	REC
Phenol	75	0	27	36	12-110
2-Chlorophenol	75	0	59	79	27-123
1,4-Dichlorobenzene	50	0	34	68	36-110
N-Nitroso-di-n-propylamine	50	0	37	74	41-116
1,2,4-Trichlorobenzene	50	0	39	78	39- 110
4-Chloro-3-methylphenol	75	0.	48	64	23-110
Acenaphthene	50	0	42	84	46-125
4-Nitrophenol	75	0	29	39	25-150
2,4-Dinitrotoluene	50	0	33	66	50-150
Pentachlorophenol	75	0	67	89	9-125
Pyrene	50	0	47	94	26-127

	SPIKE	MSD	MSD			
1	ADDED	CONCENTRATION	%	%	QC	LIMITS
COMPOUND	(ug/L)	(ug/L)	REC #	RPD #	RPD	REC
Phenol	75	24	32	12	42	12-110
2-Chlorophenol	75	52	69	14	40	27-123
1,4-Dichlorobenzene	50	33	66	3	28	36- 110
N-Nitroso-di-n-propylamine	50	32	64	14	38	41-116
1,2,4-Trichlorobenzene	50	38	76	3	28	39- 110
4-Chloro-3-methylphenol	75	44	59	8	42	23- 110
Acenaphthene	50	42	84	0	31	46-125
4-Nitrophenol	75	27	36	8	50	25-150
2,4-Dinitrotoluene	50	32	64	3	50	50-150
Pentachlorophenol	75	62	83	7	50	9-125
Pyrene	50	45	90	4	31	26-127

Column to be used to flag recovery and RPD values with an asterisk

RPD:

0

out of 11 outside limits

Spike Recovery:

۰

out of 22 outside limits

FORM III SV-1

3/90



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 27954 PHONE (713) 650-0901

Matrix: Aqueous Sample ID: BLANK Batch: E990704042258 Reported on: 07/12/99 16:32 Analyzed on: 07/06/99 16:02 Analyst: SC

METHOD 8270 J185B03

		Detection	
Compound	Result	Limit	Units
Pyridine	ND	5	ug/L
Phenol	ND	5	ug/L
Aniline	ND	5	ug/L
bis(2-Chloroethyl)ether	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
1,3-Dichlorobenzene	ND	5 5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
Benzyl alcohol	ND	555555	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
bis (2-chloroisopropyl) ethe	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
N-Nitroso-di-n-propylamine	ND	5 5	ug/L
Hexachloroethane	ND	5	ug/L
Nitrobenzene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Benzoic acid	ND	25	ug/L
bis(2-Chloroethoxy)methane	ND	5	ug/L
2,4-Dichlorophenol	ND	5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
Naphthalene	ND	5	ug/L
4-Chloroaniline	ND	5	ug/L
Hexachlorobutadiene	ND	5 5 5 5 5 5 5 5	ug/L
4-Chloro-3-methylphenol	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
Dimethylphthalate	ND ND	5 5	ug/L
2,6-Dinitrotoluene	ND	∥ 5	ug/L

Notes



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

page

2

Reported on: 07/12/99 16:32 Matrix: Aqueous Sample ID: BLANK **Analyzed on:** 07/06/99 16:02 Batch: E990704042258

Analyst: SC

METHOD 8270 J185B03

Compound	Result	Detection Limit	Units
Acenaphthylene	ND	5	ug/L
3-Nitroaniline	ND	25	ug/L
Acenaphthene	ND	5	ug/L
2,4-Dinitrophenol	ND	25	ug/L
4-Nitrophenol	ND	25	ug/L
Dibenzofuran	ND	5	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
4-Chlorophenyl-phenylether	ND	5	ug/L
Fluorene	ND	5	ug/L
4-Nitroaniline	ND	25	ug/L
4,6-Dinitro-2-methylphenol	ND	25	ug/L
n-Nitrosodiphenylamine	ND	5	ug/L
1,2-Diphenylhydrazine	ND	5	ug/L
4-Bromophenyl-phenylether	ND	5	ug/L
Hexachlorobenzene	ND	5	ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Anthracene	ND	5	ug/L
Carbazole	ND	5 5	ug/L
Di-n-butylphthalate	ND	5	ug/L
Fluoranthene	ND	5	ug/L
Pyrene	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
Benzo[a]anthracene	ND	5	ug/L
Chrysene	ND	5	ug/L
bis (2-Ethylhexyl) phthalate	ND	5	ug/L
Di-n-octylphthalate	ND	5	ug/L
Benzo[b] fluoranthene	ND	5	ug/L
Benzo[k] fluoranthene	ND	5 5	ug/L
Benzo[a]pyrene	ND	5	ug/L
Indeno[1,2,3-cd]pyrene	ND	5 5	ug/L
Dibenz[a,h]anthracene	ND	5	ug/L



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

PHONE (713) 660-0901 page

3

Matrix: Aqueous Sample ID: BLANK Batch: E990704042258

Reported on: 07/12/99 16:32 Analyzed on: 07/06/99 16:02

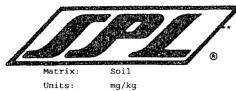
Analyst: SC

METHOD 8270 J185B03

Compound	Result	Detection Limit	Units
Benzo[g,h,i]perylene	ND	5	ug/L

Surrogate	Result	QC Criteria	Units
Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol	62 72 70 28 49 89	43-116 33-141 10-110 21-110	% Recovery % Recovery % Recovery % Recovery % Recovery % Recovery

Samples in Batch 9907124-04 Notes



SPL BATCH QUALITY CONTROL REPORT **
Modified 8015B***

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

Batch Id: HP_0990710173200

LABORATORY CONTROL SAMPLE

SPIKE	Method	QC Limits(**)				
COMPOUNDS	Blank Result	Added <3>	Result <1>	Recovery %	(Mandatory) % Recovery Range	
Gasoline Range Organics	ND	1.0	0.92	92.0	53 - 137	

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Dupli	Spike	MS/MSD Relative %	~	Limits(***) (Advisory)
•	<2>	<3>	Result	Recovery	Result	Recovery	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	0.47	0.9	0.99	57.8	1.3	92.2	45.9	50	36 - 163

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

Sequence Date: 07/10/99

Sample File ID: OOG1184.TX0 Method Blank File ID:

SPL ID of sample spiked: 9907279-04A

Matrix Spike Duplicate File ID: OOG1182.TX0

Blank Spike File ID: OOG1178.TX0 Matrix Spike File ID: OOG1181.TX0

Analyst: fab

9907124-03A



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

** SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Gasoline

Matrix: Units:

Aqueous mg/L

Batch Id: VARE990709134001

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Result <1>	Spike Recovery	QC Limits(**) (Mandatory) % Recovery Range
Gasoline Range Organics	ND	1.0	0.83	83.0	64 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Dupli	Spike cate	MS/MSD Relative %		.imits(***) (Advisory)
	<2>	<3>	Result <1>	Recovery <4>	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	5.1	4	6.2	27.5 *	6.0	22.5 *	20.0	36	36 - 160

Analyst: DR

Sequence Date: 07/09/99

SPL ID of sample spiked: 9907122-01B

Sample File ID: EEG1152.TX0

Method Blank File ID:

Blank Spike File ID: EEG1143.TXO

Matrix Spike File ID: EEG1147.TX0

Matrix Spike Duplicate File ID: EEG1148.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH(SPL ID):

9907156-01A 9907122-01B 9907124-04B



SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B***

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

Units: mg/kg Batch Id: HPVV990719124100

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Result <1>	Spike Recovery	QC Limits(**) (Mandatory) % Recovery Range
Diesel	ND	166	180	108	77 - 145

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Duplic	Spike	MS/MSD Relative %	_	Limits(***) (Advisory)
	<2>	<3>	Result	Recovery	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery Range
DIESEL	6525	166	5401	NC	7764	ИC	NC	50	21 - 175

Analyst: RR

Sequence Date: 07/19/99

SPL ID of sample spiked: 9906C41-10A

Sample File ID: VVF5172.TX0

Method Blank File ID:

Blank Spike File ID: VVG1097.TX0 Matrix Spike File ID: VVF5173.TX0

Matrix Spike Duplicate File ID: VVF5174.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

 κ = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9906C41-10A 9907124-03B



SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Diesel

HOUSTON LABORATORY

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

Matrix: Units: Aqueous mg/L Batch Id: HPVV990707011300

LABORATORY CONTROL SAMPLE

SPIKE	Method	Spike	Blank	Spike	QC Limits(**)			
COMPOUNDS	Blank Result	Added <3>	Result <1>	Recovery	(Mandatory) % Recovery Range			
Diesel	ND	5.0	6.7	134	53 - 148			

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results	Spike Added	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative %	QC Limits(***) (Advisory)	
	<2>	<3>	Result	Recovery	Result	Recovery	Difference	RPD Max.	Recovery Range
DIESEL	2.212	5.00	6.91	94.0	7.44	105	11.1	39	21 - 175

Analyst: RR

Sequence Date: 07/08/99

SPL ID of sample spiked: 9907122-01C

Sample File ID: VVF5074.TX0

Method Blank File ID:

Blank Spike File ID: VVF5072.TX0

Matrix Spike File ID: VVF5075.TX0

Matrix Spike Duplicate File ID: VVF5076.TX0.

 \star = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

 $Recovery = {(<1> - <2>) / <3> } x 100$

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9907125-02A 9907124-04C 9907125-03A 9907125-01A

9907122-01C



SPL BATCH QUALITY CONTROL REPORT **

Method 8310 ***

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

Matrix: Units: Aqueous ug/L Batch Id: 2990704124500

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Result <1>	Spike Recovery	QC Limits(**) (Mandatory) % Recovery Range			
Naphthalene	ND	0.5	0.33	66.0	32 - 148			
Acenaphthylene	ND	0.5	0.35	70.0	42 - 138			
Acenaphthene	ND	0.5	0.34	68.0	22 - 133			
Fluorene	ND	0.5	0.32	64.0	11 - 148			
Phenanthrene	ND	0.5	0.37	74.0	40 - 121			
Anthracene	ND	0.5	0.36	72.0	32 - 121			
Fluoranthene	ND	0.5	0,37	74.0	45 - 133			
Pyrene	ND	0.5	0.37	74.0	39 - 136			
Chrysene	ND	0.5	0.39	78.0	44 ~ 122			
Benzo (a) anthracene	ND	0.5	0.39	78.0	53 - 137			
Benzo (b) fluoranthene	ND	0.5	0.39	78.0	62 - 121			
Benzo (k) fluoranthene	ND	0.5	0.39	78.0	66 - 128			
Benzo (a) pyrene	ND	0.5	0.37	74.0	42 - 120			
Dibenzo (a,h) anthracene	ND	0.5	0.36	72.0	59 - 129			
Benzo (g,h,i) perylene	ND	0.5	0.37	74.0	67 - 124			
Indeno (1,2,3-cd) pyrene	ND	0.5	0.39	78.0	65 - 125			

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Spike Results Added		Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative %	QC Limits(***) (Advisory)		
			Result	Recovery	Result	Recovery	Difference	RPD		
	<2>	<3>	<1>	<4>	<1>	<5>		Max.	Recovery	Range
NAPHTHALENE	34	0.50	39	NC	28	NC	NC	30	1 -	122
ACENAPHTHYLENE	ND	0.50	0.42	84.0	0.34	68.0	21.1	30	1 -	124
ACENAPHTHENE	ND	0.50	0.49	98.0	0.46	92.0	6.32	30	1	124
FLUORENE	2.5	0.50	2.6	NC	2.1	NC	NC	30	1 -	142
PHENANTHRENE	ND	0.50	0.50	100	0.46	92.0	8.33	30	1 -	155
ANTHRACENE	ND	0.50	0.37	74.0	0.37	74.0	0	30	1 -	126
FLUORANTHENE	DM	0.50	0.38	76.0	0.37	74.0	2.67	30	14 -	123
PYRENE	מא	0.50	0.53	106	0.50	100	5.83	30	1 -	140
CHRYSENE	ND	0.50	0.44	88.0	0.43	86.0	2.30	30	1 -	199
BENZO (A) ANTHRACENE	ND	0.50	0.49	98.0	0.46	92.0	6.32	30	12 -	135
BENZO (B) FLUORANTHENE	ND	0.50	0.45	90.0	0.42	84.0	6.90	30	6 -	150
BENZO (K) FLUORANTHENE	ND	0.50	0.42	84.0	0.40	80.0	4.88	30	1 -	159
BENZO (A) PYRENE	ND	0.50	0.44	88.0	0.42	84.0	4.65	30	1 -	128
DIBENZO (A,H) ANTHRACENE	ND	0.50	0.37	74.0	0.37	74.0	0	30	1 -	110
BENZO (G,H,I) PERYLENE	ND	0.50	0.42	84.0	0.42	84.0	0	30	1 -	116
INDENO (1,2,3-CD) PYRENE	ND	0.50	0.36	72.0	0.21	42.0	52.6 +	30	1 -	116



SPL BATCH QUALITY CONTROL REPORT ** Method 8310 ***

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

Matrix: Units:

Aqueous ug/L

Batch Id: 2990704124500

* = Values outside QC Range due to Matrix Interference (except RPD)

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

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

Analyst: LJ

Sequence Date: 07/08/99

SPL ID of sample spiked: 9907122-01F

Sample File ID: 990713A\009-0901

Method Blank File ID:

Blank Spike File ID: 990708A\022-1101

Matrix Spike File ID: 990713A\011-1101

Matrix Spike Duplicate File ID: 990713A\012-1201 (***) = Source: Temporary Limits

LCS % Recovery = (<1> / <3>) x 100Relative Percent Difference = |(<4> - <5>)| / [(<4> + <5>) x 0.5] x 100

ND = Not Detected/Below Detection Limit

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

« = Data outside Method Specification limits.

SAMPLES IN BATCH (SPL ID):

9907128-05C 9907128-06C 9907122-01F 9907124-04F

9907128-02C 9907128-03C 9907128-04C

ICP

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: PB



Matrix: Soil

Units: mg/Kg

HOUSTON LABORATORY

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

Time:0836

File Name: 0712PB3

Date: 071299

Labo	ratory	Control	Samp	le L	.ot#240

Element	Mth. Blank		Result	% Recovery	Lower Limit	Upper Limit
Silver	ND	34.1	32	95	25.4	42.9
Aluminum						
Arsenic		·				
Barium	ND	112	110	98	86.3	138
Beryllium	ND	77	73	95	60.4	93.7
Calcium			·			
Cadmium	ND	34.6	31	90	26.6	42.6
Cobalt	ND	59.8	57	96	47.5	72
Chromium	ND	108	104	96	79	136
Copper	ND	61.7	56	91	50.5	72.9
lron						
Potassium						
Molybdenum	ND	65.8	63	96	50.3	81.2
Manganese						
Sodium						
Nickel	ND	48.4	47	97	37.9	58.9
Lead						
Antimony	ND	26.2	31	118	10	53.1
Selenium						
Tin	ND	82.7	80	96	61.5	104
Vanadium	ND	81.9	79	96	55.9	108
Zinc	ND	137	129	_ 94	106	168

Work Orders in Batch Work Order Fractions

99-07-118 01B,02B

99-07-109 01A

99-07-124 _ 02A

Matrix Spike - Spike Duplicate Results Work Order Spiked: 9907118-01B

	Sample	Spike	Mati	rix Spike	Matrix Spi	ke Duplicate	Q.C. I	Spike	QC	
Element	Result	Added	Result	Recovery	Result	Recovery	% Red	overy	RPD %	Limits %
Silver	ND	100	87.54	88	87.22	87	80	120	0.4	20.0
Aluminum										
Arsenic	-						T			
Barium	95.65	100	186.4	91	186.2	91	80	120	0.2	20.0
Beryllium	0.5451	100	88.75	88	89.11	89	80	120	0.4	20.0
Calcium										
Cadmium	ND	100	88.2	88	89.17	89	80	120	1.1	20.0
Cobalt	3.674	100	92.96	89	93.82	90	80	120	1.0	20.0
Chromium	7.191	100	103.9	97	104	97	80	120	0.1	20.0
Copper	5.142	100	93.18	88	92.97	88	80	120	0.2	20.0
Iron										
Potassium										
Molybdenum	ND	100	88.55	89	89.39	89	80	120	0.9	20.0
Manganese									ĺ	
Sodium										
Nickel	6.172	100	97.49	91	98.67	92	80	120	1.3	20.0
Lead										
Antimony	ND	200	176.3	88	185.3	93	80	120	5.0	20.0
Selenium										
Tin	ND	200	176.3	88	176.3	88	80	120	0.0	20.0
Vanadium	14.52	100	114.3	100	114	99	80	120	0.3	20.0
Zinc	16.22	100	112.8	97	112.9	97	80	120	0.1	20.0

Elements Post Spiked: Sb

Checked <u>PF 71449</u>

TRACE ICP

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: EG



Matrix: Soil

Units: mg/Kg

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON TEXAS 77054

PHONE (713) 660-0901

Date: 071399

Time:1110

File Name: 0713PB2

Laboratory Control Sample Lot#240

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum						
Arsenic	ND	36.5	36	99	27.2	45.9
Barium						
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Molybdenum						
Manganese						
Nickel						
Lead	ND	50.2	49	97	35.7	64.7
Antimony	ND	26.2	32	121	0.5	53.1
Selenium	ND	45.7	41	90	33	58.4
Thallium						
Vanadium						
Zinc						

Work Orders in Batch Work Order Fractions 01B,02B 99-07-118

99-07-124 . 02A

Work Order Spiked: 9907118-01B

Matrix Spike	- Spike Di	ipiicate Re	sults		Work Order Spiked: 9907118-01B							
	Sample	Spike	Mat	rix Spike	Matrix Sp	ike Duplicate	Q.C.	Limits	Spike	QC		
Element	Result	Added	Result	Recovery	Result	Recovery	% Red	covery	RPD %	Limits %		
Silver												
Aluminum												
Arsenic	2.416	200	174.7	86	176.3	87	80	120	0.9	20.0		
Barium		<u> </u>										
Beryllium						1						
Calcium												
Cadmium												
Cobalt												
Chromium						1						
Copper												
iron												
Molybdenum												
Manganese							1					
Nickel						1						
Lead	4.407	100	92.02	88	92.47	88	80	120	0.5	20.0		
Antimony	ND	200	190.1	95	191.2	96	80	120	0.6	20.0		
Selenium	ND	200	163.7	82	164.4	82	80	120	0.4	20.0		
Thallium						†				1		
Vanadium					1			1		 		
Zinc			 		1			 				

Elements Post Spiked: Sb

Checked 89,7/14/99

Analyst: JM

Matrix: Water

Units: mg/L

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

Date:070899 Time:1321 File Name: 0708MR3

Laboratory Control Sample

Element	Mth. Blank	True Value		% Recovery	Lower Limit	Upper Limit
Silver	ND	2.00	2.03	101	1.60	2.40
Aluminum				·		
Arsenic	ND	4.00	4.02	101	3.20	4.80
Barium	ND	2.00	2.09	104	1.60	2.40
Boron	ND	4.00	4.21	105	3.20	4.80
Calcium						
Cadmium	ND	2.00	1.94	97	1.60	2.40
Cobalt						
Chromium	ND	2.00	1.95	97	1.60	2.40
Copper	ND	2.00	2.12	106	1.60	2.40
Iron	ND	2.00	1.97	98	1.60	2.40
Potassium						
Magnesium	ND	20.00	20.43	102	16.00	24.00
Manganese	ND	2.00	1.96	98	1.60	2.40
Sodium						
Nickel	ND	2.00	1.95	98	1.60	2.40
Lead	ND	2.00	1.96	98	1.60	2.40
Antimony						
Selenium	ND	4.00	4.07	102	3.20	4.80
Tin						
Vanadium						
Zinc	ND	2.00	1.97	98	1.60	2.40

	ers in Batch
Work Order	Fractions
99-07-108	01C-11C
99-07-148	01A
99-07-090	05A
99-07-078	01F
99-07-122	01D
99-07-124	04D
99-07-048	03C

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9907108-01C

	Sample	Spike	Mati	ix Spike	Matrix Spi	ke Duplicate	QCL	imits	Spike		QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Re	covery	RPD %		Limits %
Silver	ND	1.0	0.9797	98.0	0.9754	97.5	80	120	0.4	П	20.0
Aluminum										П	
Arsenic	ND	2.0	2.097	104.9	2.078	103.9	80	120	0.9	П	20.0
Barium	0.6092	1.0	1.657	104.8	1.587	97.8	80	120	6.9		20.0
Boron	1.083	2.0	3.227	107.2	3.162	104.0	80	120	3.1		20.0
Calcium										П	
Cadmium	ND	1.0	0.9494	94.9	0.961	96.1	80	120	1.2	П	20.0
Cobalt	-									П	
Chromium	ND	1.0	0.9152	91.5	0.9281	92.8	80	120	1.4		20.0
Copper	ND	1.0	1.086	108.6	1.034	103.4	80	120	4.9	П	20.0
Iron	6.336	1.0	7.325	98.9	7.184	84.8	80	120	15.4	П	20.0
Potassium					•					П	
Magnesium	55.23	10.0	67.02	117.9	64.48	92.5	80	120	24.1	**	20.0
Manganese	0.3088	1.0	1.243	93.4	1.245	93.6	80	120	0.2	П	20.0
Sodium											
Nickel	ND	1.0	0.9183	91.8	0.9322	93.2	80	120	1.5	П	20.0
Lead	ND	1.0	0.9129	91.3	0.9304	93.0	80	120	1.9	П	20.0
Antimony					T						
Selenium	ND	2.0	2.026	101.3	2.009	100.5	80	120	0.8	П	20.0
Tin										\sqcap	
Vanadium										П	
Zinc	0.0211	1.0	0.9813	96.0	0.9812	96.0	80	120	0.0	\top	20.0

^{**} Spike RPD Outside Method Limits

Checked: Sm 7/9/79

Trace-icp

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: EG



Matrix: Water

Units: mg/L

HOUSTON LABORATORY

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

Date:070799 Time:1107 File Name: 0707MR1

Laboratory Control Sample

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum						
Arsenic	ND	4.00	3.91	98	3.20	4.80
Barium						
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Magnesium						
Manganese						
Nickel						
Lead	NĎ	2.00	2.01	100	1.60	2.40
Antimony						
Selenium	ND	4.00	3.83	96	3.20	4.80
Thallium						
Vanadium						
Zinc						

Work Orde	ers in Batch
Work Order	Fractions
99-07-082	01D
99-07-091	01C
99-07-148	01A
99-07-078	01F
99-07-122	01D
99-07-124 ,	04D
99-07-150	01C

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9907108-01C

Matrix Shike	. Shive Dr	aplicate Re				opiked: 330				
	Sample	Spike	Matr	ix Spike	Matrix Spi	ke Duplicate	QCL	mits	Spike	QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Rec	overy	RPD %	Limits %
Silver								<u> </u>		
Aluminum										
Arsenic	0.0686	2.0	1.969	95.0	1.966	94.9	80	120	0.2	20.0
Barium										
Beryllium										
Calcium										
Cadmium										
Cobalt								Î		
Chromium										
Copper	-									
Iron										
Magnesium										
Manganese		T								
Nickel										
Lead	ND	1.0	0.9434	94.3	0.9429	94.3	80	120	0.1	20.0
Antimony										
Selenium	ND	2.0	1.898	94.9	1.894	94.7	80	120	0.2	20.0
Thallium										
Vanadium										
Zinc		<u> </u>		i						
						 				

Checked: EG . 7/8/99

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: JM



Matrix: Water

Units: mg/L

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE

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

Date:071999 Time:1052 File Name: 0719JM1

Laboratory Control Sample

Element		True Value		% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum				-		
Arsenic						
Barium						
Beryllium						
Calcium			-			
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Potassium	ND	20.00	20.50	103	16.00	24.00
Magnesium						
Manganese						
Sodium	ND	20.00	20.66	103	16.00	24.00
Nickel						
Lead						
Antimony						
Selenium						!
Tin	ļ					
Vanadium						
Zinc					<u> </u>	

Work Orders in Batch
Work Order Fractions

99-07-122 01D

99-07-124 / 04D

Matrix Spike - Spike Duplicate Results Work Order Spiked: 9907122-01D

Matrix Spike	atrix Spike - Spike Duplicate Results						Work Order Spiked: 9907122-01D						
	Sample	Spike	Matr	ix Spike	k Spike Ma		Matrix Spike Duplicate		QC Limits		Spike		QC
Element	Result	Added	Result	Recovery	· 1	Result	Recovery		% Rec	overy	RPD %		Limits %
Silver					П								
Aluminum													
Arsenic					П								
Barium]			П								
Beryllium]				П			П				T	
Calcium					П							T	
Cadmium	-				П							\top	
Cobalt					П			Г					
Chromium					П			1				\top	
Copper]		1		П]	T				T	
Iron					П			Т					
Potassium	5.817	10.0	15.74	99.2	П	15.5	96.8		80	120	2.4	T	20.0
Magnesium					П			Τ					
Manganese	1				П								
Sodium	165.1	10.0	168.2	31.0	*	169	39.0	*	80	120	22.9	**	20.0
Nickel					П							\top	
Lead					П			Τ				Т	
Antimony					П								
Selenium					П			Τ				Τ	
Tin					П			Т					
Vanadium					П			Т				丅	
Zinc					П			T	1	1			

^{*} Spike Results Outside Method Limits Elements Post Spiked: ALL

Checked m 7/249

Analyst: JM



Matrix: Water

Units: mg/L

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Laboratory Control Sample

Date:070899 Time:1321 File Name: 0708JM10

Work Orders in Batch

Work Order Fractions

99-07-122 01D

99-07-124 / 04D

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver	I					
Aluminum				-		-
Arsenic						
Barium						
Beryllium						
Calcium	ND	20.00	18.93	95	16.00	24.00
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Potassium						
Magnesium				l		
Manganese						
Sodium						
Nickel						
Lead						
Antimony						
Selenium						
Tin						
Vanadium						
Zinc						l

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9907108-01C

Watrix Spike	rix Spike - Spike Duplicate Results						Work Order Spiked: 9907108-01C Matrix Spike Duplicate QC Limits						
	Sample	Spike		ix Spike	- 1	_				imits	Spike	- 1	QC
Element	Result	Added	Result	Recover	<u> </u>	Result	Recovery		% Rec	overy	RPD %		Limits %
Silver					\prod								
Aluminum								Ĺ				П	
Arsenic													
Barium					П								
Beryllium					\prod							П	
Calcium	141.3	10.0	149.1	78.0	*	144.4	31.0	*	80	120	86.2	**	20.0
Cadmium													
Cobalt					\prod								
Chromium					П								
Copper					П								
Iron					П			Π					
Potassium					П			Γ					
Magnesium													
Manganese					П		}	Π					
Sodium								Γ					
Nickel					П								
Lead		T			П			Τ					
Antimony					\top								
Selenium								Т				Т	
Tin					П			Γ				T	
Vanadium					П							T	
Zinc					\top			T					

^{*} Spike Results Outside Method Limits

Checked: 9717/2399

^{**} Spike RPD Outside Method Limits Elements Post Spiked: ALL





SPL QUALITY CONTROL REPORT **

Matrix:

Liquid

Reported on:

07/20/99

Analyzed on: 07/20/99

Analyst:

RJB

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

Mercury, Total Method 7470 A***

SPL Sample ID Number			Measured Concentration mg/L	% Recovery	QC Limits Recovery	
LCS	ND	0.0100	0.0103	103	80 - 120	

FIAS990720102000-9907A61

Samples in batch:

9907735-01A	9907789-02A	9907790-01A	9907793-01A
9907793-02A	9907793-03A	9907793-04A	9907793-05A
9907793-06A	9907793-07A	9907 7 93-08A	9907793-09A
9907793-10A	9907793-11 A	9907 7 94-01A	9907795-01A
9907797-02A	9907801-01A		

COMMENTS:



LAFAYETTE AREA LAB 500 AMBASSADOR CAFFERY PKWY. SCOTT, LOUISIANA ZIP 70583-8544 PHONE: (316) 237-4775

** SPL QUALITY CONTROL REPORT **

Matrix: Liquid

Reported on: 07/20/99 Analyzed on: 07/20/99

Analyst:

RJB

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

Mercury, Total Method 7470 A***

 SPL Sample	 Method	Sample	Spike	Matri	ix Spike		ix Spike licate	RPD		QC LI Advis	
 ID Number 	!			Result mg/L		Result	Recovery	(%)	RPD Max	 %	REC
990 7735-01A	ND	ND	0.010	0.0103	103	0.0102	102	1.0	20	80	-120

FIAS990720102000-9907A60

Samples in batch:

9907735-01A	9907789-02A	9907790-01A	9907793-01A
9907793-02A	9907793-03A	9907793-04A	9907793-0 5 A
9907793-06A	9907793-07A	9907793-08A	9907793-09A
9907793-10A	9907793-11A	9907794-01A	9907795-01A
99 07797-02A	9907801-01A		

COMMENTS:





SPL QUALITY CONTROL REPORT **

Matrix: Solid Reported on: 07/21/99 Analyzed on: 07/20/99

Analyst:

RJB

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

Mercury, Total Method 7471A ***

SPL Sample ID Number	Blank Value mg/Kg	Certified Value mg/Kg	Measured Concentration mg/Kg	Mandatory Range of Measured Concentration
LCS	ND	1.00	1.12	0.61 - 1.39

FIAS990720153000-9907B30

Samples in batch:

9907499-01A	9907501-01A	9907503-01A	9907504-01A
9907505-01A	9907589-01G	9907653-01C	9907695-01A
9907695-03A	9907695-05A	9907789-01A	9907797-04A
9907799-01A	9907799-02A	9907799-03A	9907799-04A
99 077 99-05 A	9907799-06 A		

COMMENTS:

Sample chosen for spiking exhibited an abosrptive effect on the spikes added. Control limits do not apply.

NC = Not calculated



LAFAYETTE AREA LAB 500 AMBASSADOR CAFFERY PKWY. SCOTT, LOUISIANA ZIP 70583-8544 PHONE: (318) 237-4775

** SPL QUALITY CONTROL REPORT **

Matrix: Solid

Reported on: 07/21/99 Analyzed on: 07/20/99

Analyst:

RJB

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

Mercury, Total Method 7471A ***

SPL Sample	 Method	 Sample	 Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)	
 ID Number 	,	 Result mg/Kg	•		: -	Result mg/Kg	Recovery	(%)	RPD Max	% REC
9907789-01A	ND	ND	1.25	NC	0	NC	0	0	20	80 -120

FIAS990720153000-9907B29

Samples in batch:

9907499-01A	9907501-01A	9907503-01A	9907504-01A
9907505-01A	9907589-01G	9907653-01C	9907695-01A
9907695-03A	9907695-05A	9907789-01A	9907797-04A
9907799-01A	9907799-02A	9907799-03A	9907799-04A
9907799~05A	9907799-06A		

COMMENTS:

Sample chosen for spiking exhibited an abosrptive effect on the spikes added. Control limits do not apply.

NC = Not calculated



** SPL QUALITY CONTROL REPORT **

Soil Matrix:

Reported on: 07/09/99

Analyzed on: 07/08/99

Analyst:

AΒ

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Solids

CLP Inorganics SOW

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration %wt	Duplicate Sample %wt	RPD	RPD Max.
9907109-01A	100	100	.0	20

-9907114

Samples in batch:

9907109-01A 9907112-02B 9907118-01B 9907118-02B 9907124-02A 9907124-03B 9907149-01A 9907179-01B

COMMENTS:



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

07/15/99

Analyzed on:

07/13/99

Analyst:

CV

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

Chloride Method 325.3 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	162	163.1	101	94 - 106

-9907220

Samples in batch:

9907124-04H 9907268-02G 9907215-04G 9907268-04G 9907218-08G

9907268-01G

COMMENTS:

LCS-SPL ID#94453228-23



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/15/99 Analyzed on: 07/13/99

Analyst:

cv

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

Chloride Method 325.3 *

SPL Sample	Method	Sample	Spike	Matr	ix Spike		ix Spike licate	RPD	QC LIMITS (Advisory)		
ID Number	1	Result mg/L	Added mg/L	Result mg/L		Result mg/L	Recovery %	(%)	RPD Max	% REC	
9907215-04G	ND	26.6	50.0	76.2	99.2	78.0	103	3.8	5	92 -109	

-9907220

Samples in batch:

9907124-04H 9907268-02G

9907268-04G

9907215-04G 9907218-08G 9907268-01G

COMMENTS:

LCS-SPL ID#94453228-23



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

SPL QUALITY CONTROL REPORT **

Matrix: Aqueous Reported on: 07/14/99

Analyzed on: 07/03/99

Analyst: ELS

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

> Carbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9907124-04H	ND	ND	0	5

-9907208

Samples in batch:

9907122-01H 9907124-04H

COMMENTS:



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

SPL QUALITY CONTROL REPORT **

Matrix: Aqueous Reported on: 07/14/99

Analyzed on: 07/03/99

Analyst: ELS

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Bicarbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9907124-04H	200	204	2.0	5

-9907207

Samples in batch:

9907122-01H 9907124-04H

COMMENTS:



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

07/06/99

Analyzed on: 07/06/99

Analyst:

ELS

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

> Fluoride Method 300.0 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.46	94.6	90 - 110

-9907073

Samples in batch:

9906552-03A

9907024-02J

9907122-03I

9907124-04I

COMMENTS:

LCS SPL ID# 95535278-12



** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/06/99 Analyzed on: 07/06/99 Analyst: ELS

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

> Fluoride Method 300.0 *

SPL Sample	Method	Sample	Spike	Matri	ix Spike		ix Spike Licate	RPD	QC LIMITS (Advisory)		
ID Number	1	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	% REC	
9907024-02J	ND	1.83	10.0	10.9	90.7	11.0	91.7	1.1	20	80 -120	

-9907073

Samples in batch:

9906552-03A

9907024-02J

9907122-031

9907124-041

COMMENTS: LCS SPL ID# 95535278-12



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

07/09/99

Analyzed on:

07/08/99

Analyst:

CV

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

Nitrate nitrogen(as N)
Method 353.3 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	5.0	4.88	97.6	92 - 113

-9907135

Samples in batch:

9907122-03I

9907124-04I

9907215-04G

9907218-08G

COMMENTS:

NO2 ON 9907122 & 9907124 WERE RUN ON 07/03/99 NO3 WERE ANALYZED ON PRESERVED SAMPLES LCS- SPL ID#94453220-10



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/09/99 Analyzed on: 07/08/99

Analyst:

CV

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

Nitrate nitrogen(as N) Method 353.3 *

SPL Sample	Method	Sample	Spike	Matr	ix Spike		ix Spike licate	RPD	QC LIMITS (Advisory)			
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	,	Result mg/L	Recovery %	(%)	RPD Max	% REC		
9907124-041	ND	2.09	5.0	7.37	106	7.25	103	2.9	12	84 -125		

-9907135

Samples in batch:

9907122-031

9907124-041

9907215-04G

9907218-08G

COMMENTS:

NO2 ON 9907122 & 9907124 WERE RUN ON 07/03/99 NO3 WERE ANALYZED ON PRESERVED SAMPLES LCS- SPL ID#94453220-10



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

07/06/99

Analyzed on:

07/06/99

Analyst:

ELS

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

> Sulfate Method 375.4 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery		Limits covery
LCS	ND	26.8	28.0	104	82	- 111

-9907072

Samples in batch:

9906552-03A

9907024-02J

9907122-03I

9907124-04I

COMMENTS:

LCS SPL ID# 95535274-12



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/06/99 Analyzed on: 07/06/99 Analyst: ELS

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

Sulfate Method 375.4 *

 SPL Sample	Method	Sample	Spike	Matrix Spike		•	ix Spike licate	RPD	QC LIMITS (Advisory)			
ID Number	•	Result mg/L	Added mg/L	Result	Recovery	Result	Recovery	(%)	RPD Max	% F	EC	
9907024-02J	ND	247	250	514	107	512	106	0.9	9.5	84 -	120	

-9907072

Samples in batch:

9906552-03A 9907024-02J 9907122-03I 9907124-04I

COMMENTS:

LCS SPL ID# 95535274-12

CHAIN OF CUSTODY

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SAMPLE RECEIPT CHECKLIST

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SPL Houston Environmental Laboratory Sample Login Checklist

	Ω Ω Ω Γ Γ Γ	1		
	9907124			
			Yes	No
1 C	Chain-of-Custody (COC) form is pres	sent.		
2 C	COC is properly completed.			
3 If	f no, Non-Conformance Worksheet	has been completed.		
4 C	Custody seals are present on the ship	ping container.		
5 If	f yes, custody seals are intact.			
6 A	ll samples are tagged or labeled.			
7 If	f no, Non-Conformance Worksheet	has been completed.		
	ample containers arrived intact			
9 T	emperature of samples upon arrival:	:		4c
10 M	Method of sample delivery to SPL:	SPL Delivery		
		Client Delivery		
		FedEx Delivery (airbill #)	81132	7533
		Other:		
I l M	Method of sample disposal:	SPL Disposal	V	
		HOLD		
		Return to Client		



July 22, 1999

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

The following report contains analytical results for the sample(s) received at Southern Petroleum Laboratories (SPL) on July 3, 1999. The sample(s) was assigned to Certificate of Analysis No. (s) 9907122 and analyzed for all parameters as listed on the chain of custody.

Due to our Mercury analyzer being down we had to subcontract your sample(s) to our Lafayette laboratory for completion. It was assigned to their Certificate of Analysis No. 9907790.

Your sample ID: MW-13 (SPL ID: H9-9907122-01) was randomly selected for the use in SPL's Quality Control program for the Volatile Organic analysis by SW846 method 8260B. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) were outside of the advisable quality control limits for Benzene, 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.

Your sample ID: MW-13 (SPL ID: H9-9907122-01) was randomly selected for the use in SPL's Quality Control program for the Gasoline Range Organics analysis by SW846 method 8260B. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) were outside of the advisable quality control limits (Batch ID: VARE990709134001), 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.

Your sample ID: MW-13 (SPL ID: H9-9907122-01) was randomly selected for the use in SPL's Quality Control program for the Total Metals analysis by SW846 method 6010B. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) were outside of the advisable quality control limits for Sodium (File Name: 0719JM1), 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.



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).

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

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

Southern Petroleum Laboratories

Bernadette A. Fini

Senior Project Manager



Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 99-07-122

Approved for Release by:

Bernadette A. Fini, Senior Project Manager

Date

Joel Grice Laboratory Director

Ted Yen Corporate Quality Assurance Director

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory. The results relate only to the samples tested. Results reported on a Wet Weight Basis unless otherwise noted.



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

DATE: 07/22/99

Certificate of Analysis No. H9-9907122-01

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

PROJECT: BJ Services

PROJECT NO: 12832.021

MATRIX: WATER

SITE: Hobbs, NM SAMPLED BY: Brown and Caldwell DATE SAMPLED: 07/02/99 12:20:00

SAMPLE ID: MW-13 DATE RECEIVED: 07/03/99

ANALYTICAL DATA PARAMETER RESULTS DETECTION UNITS LIMIT Gasoline Range Organics 5.1 0.50 P mg/L Surrogate % Recovery 4-Bromofluorobenzene 93 1,4-Difluorobenzene 107 Method 8015B *** for Gasoline Analyzed by: DR Date: 07/09/99 Total Petroleum Hydrocarbons-Diesel 2.2 1.00 P mg/L Surrogate % Recovery n-Pentacosane 60 Method 8015B *** for Diesel Analyzed by: RR Date: 07/08/99 03:06:00 Methane 0.0017 0.0012 P mg/L

RSKSOP-147

Analyzed by: JDR

Date: 07/14/99 03:03:00

(P) - Practical Quantitation Limit

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



Certificate of Analysis No. H9-9907122-01

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

DATE: 07/22/99

PROJECT: BJ Services

PROJECT NO: 12832.021

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 07/02/99 12:20:00

SAMPLE ID: MW-13

DATE RECEIVED: 07/03/99

		ANALYTICAL	DATA		_
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B Analyzed by: Date:		13:21:00	ND	0.01	mg/L
Arsenic, Tota Method 6010B Analyzed by: Date:	***	11:07:00	0.008	0.005	mg/L
Barium, Total Method 6010B Analyzed by: Date:		13:21:00	0.333	0.005	mg/L
Calcium, Tota Method 6010B Analyzed by: Date:	***	13:21:00	389	0.1	mg/L

ND - Not detected.

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



Certificate of Analysis No. H9-9907122-01

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

DATE: 07/22/99

PROJECT: BJ Services

PROJECT NO: 12832.021

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 07/02/99 12:20:00

SAMPLE ID: MW-13

DATE RECEIVED: 07/03/99

	ANALYI	CICAL DATA		-
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total Method 6010B ** Analyzed by: JM Date: 07		ND	0.005	mg/L
Chromium, Total Method 6010B ** Analyzed by: JM Date: 07		0.02	0.01	mg/L
Mercury, Total Method 7470 A** Analyzed by: RJ Date: 07		ND	0.0002	mg/L
Potassium, Total Method 6010B ** Analyzed by: JM Date: 07	**	6	2	mg/L
Magnesium, Total Method 6010B ** Analyzed by: JM Date: 07	**	83.9	0.1	mg/L

ND - Not detected.

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



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

Certificate of Analysis No. H9-9907122-01

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

DATE: 07/22/99

PROJECT: BJ Services

PROJECT NO: 12832.021

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 07/02/99 12:20:00

SAMPLE ID: MW-13

DATE RECEIVED: 07/03/99

ANALYTICAL DATA					
PARAMETER		RESULTS	DETECTION LIMIT	UNITS	
Sodium, Total Method 6010B Analyzed by: Date:		165	0.5	mg/L	
Method 3010A Analyzed by:		07/06/99			
Lead, Total Method 6010B Analyzed by: Date:		ND	0.005	mg/L	
Selenium, Tota Method 6010B Analyzed by: Date:	***	ND	0.005	mg/L	

ND - Not detected.

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



Certificate of Analysis No. H9-9907122-01

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

DATE: 07/22/99

PROJECT: BJ Services

PROJECT NO: 12832.021

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 07/02/99 12:20:00

SAMPLE ID: MW-13

DATE RECEIVED: 07/03/99

ANALYTICAL DATA					
PARAMETER		RESULTS	DETECTION LIMIT	UNITS	
Method 3520C Analyzed by:		07/04/99	HIMIT		
Chloride Method 325.3 Analyzed by: Date:		496	10	mg/L	
Carbonate, as Method SM 450 Analyzed by: Date:	00-CO2D **	ND	1.0	mg/L	
Bicarbonate, a Method SM 450 Analyzed by: Date:	00-CO2D **	520	2.0	mg/L	

ND - Not detected.

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



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

PHONE (713) 660-0901

Certificate of Analysis No. H9-9907122-01

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

07/22/99

PROJECT: BJ Services

SITE: Hobbs, NM

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-13

PROJECT NO: 12832.021 MATRIX: WATER

DATE SAMPLED: 07/02/99 12:20:00

DATE RECEIVED: 07/03/99

ANALYTICAL DATA						
PARAMETER	RESULTS	PQL*	UNITS			
Benzene	1500	50	ug/L			
Bromobenzene	ND	5	ug/L			
Bromochloromethane	ND	5	ug/L			
Bromodichloromethane	ND	5	ug/L			
Bromoform	ND	5	ug/L			
Bromomethane	ND	10	ug/L			
n-Butylbenzene	ND	5	${\tt ug/L}$			
sec-Butylbenzene	5	5	ug/L			
tert-Butylbenzene	ND	5	ug/L			
Carbon tetrachloride	ND	5	\mathtt{ug}/\mathtt{L}			
Chlorobenzene	ND	5	ug/L			
Chlorodibromomethane	ND	5	ug/L			
Chloroethane	ND	10	\mathtt{ug}/\mathtt{L}			
Chloroform	ND	5	ug/L			
Chloromethane	ND	10	ug/L			
2-Chlorotoluene	ND	5	ug/L			
4-Chlorotoluene	ND	5	ug/L			
1,2-Dibromo-3-chloropropane	ИD	5	ug/L			
1,2-Dibromoethane	ND	5	ug/L			
Dibromomethane	ND	5	ug/L			
1,2-Dichlorobenzene	ND	5	ug/L			
1,3-Dichlorobenzene	ND	5	ug/L			
1,4-Dichlorobenzene	ND	5	${ t ug/L}$			
Dichlorodifluoromethane	ND	10	ug/L			
1,1-Dichloroethane	ND	5	ug/L			
1,2-Dichloroethane	ND	5	ug/L			
1,1-Dichloroethene	ND	5	ug/L			
cis-1,2-Dichloroethene	ND	5	ug/L			
trans-1,2-Dichloroethene	ND	5	ug/L			
1,2-Dichloropropane	ND	5	ug/L			
1,3-Dichloropropane	ND	5	ug/L			
2,2-Dichloropropane	ND	5	ug/L			

METHOD: 8260 Water, Volatile Organics (continued on next page)





Certificate of Analysis No. H9-9907122-01

Brown and Caldwell

SAMPLE ID: MW-13

ANALYTICAL DATA (continued)				
PARAMETER	RESULTS	PQL*	UNITS	
1,1-Dichloropropene	ND	5	ug/L	
Ethylbenzene	750	50	ug/L	
Hexachlorobutadiene	ND	5	ug/L	
Isopropylbenzene	31	5	ug/L	
p-Isopropyltoluene	ND	5	ug/L	
Methylene chloride	ND	5	ug/L	
Naphthalene	190	5	ug/L	
n-Propylbenzene	68	5	ug/L	
Styrene	ND	5	ug/L	
1,1,1,2-Tetrachloroethane	ND	5	ug/L	
1,1,2,2-Tetrachloroethane	ND	5	ug/L	
Tetrachloroethene	ND	5	ug/L	
Toluene	23	5	ug/L	
1,2,3-Trichlorobenzene	ND	5	ug/L	
1,2,4-Trichlorobenzene	ND	5	ug/L	
1,1,1-Trichloroethane	ND	5	ug/L	
1,1,2-Trichloroethane	ND	5	ug/L	
Trichloroethene	ND	5	ug/L	
Trichlorofluoromethane	ND	5	ug/L	
1,2,3-Trichloropropane	ND	5	ug/L	
1,2,4-Trimethylbenzene	93	5	ug/L	
1,3,5-Trimethylbenzene	93	5	ug/L	
Vinyl chloride	ND	10	ug/L	
Xylenes (total)	58	5	ug/L	
1,2-Dichloroethene (total)	ND	5	ug/L	
cis-1,3-Dichloropropene	ND	5	ug/L	
trans-1,3-Dichloropropene	ND	5	ug/L	
Acetone	ND	100	ug/L	
2-Butanone	ND	20	ug/L	
4-Methyl-2-Pentanone	ND	10	ug/L	
2-Hexanone	ND	10	ug/L	
Carbon Disulfide	ND	5	ug/L	
Vinyl Acetate	ND	10	ug/L	
2-Chloroethylvinylether	ND	10	ug/L	
Methyl t-Butyl Ether	25	10	ug/L	

METHOD: 8260 Water, Volatile Organics (continued on next page)



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

Certificate of Analysis No. H9-9907122-01

Brown and Caldwell

SAMPLE ID: MW-13

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	50 ug/L	90	80	120
Toluene-d8	50 ug/L	92	88	110
4-Bromofluorobenzene	50 ug/L	96	86	115

ANALYZED BY: JC

DATE/TIME: 07/06/99 13:56:00

METHOD: 8260 Water, Volatile Organics

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

PHONE (713) 660-0901

Certificate of Analysis No. H9-9907122-01

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

07/22/99

PROJECT: BJ Services

SITE: Hobbs, NM

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-13

PROJECT NO: 12832.021

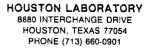
MATRIX: WATER

DATE SAMPLED: 07/02/99 12:20:00

DATE RECEIVED: 07/03/99

ANALYTICAL DATA					
PARAMETER	RESULTS	PQL*	UNITS		
Acenaphthene	ND	5	ug/L		
Acenaphthylene	ND	5	ug/L		
Aniline	ND	5	ug/L		
Anthracene	ND	5	ug/L		
Benzo(a)Anthracene	ND	5	ug/L		
Benzo(b)Fluoranthene	ND	5	ug/L		
Benzo(k)Fluoranthene	ND	5	ug/L		
Benzo(a)Pyrene	ND	5	ug/L		
Benzoic Acid	ND	25	ug/L		
Benzo(g,h,i)Perylene	ND	5	ug/L		
Benzyl alcohol	ND	5	ug/L		
4-Bromophenylphenyl ether	ND	5	ug/L		
Butylbenzylphthalate	ND	5	ug/L		
di-n-Butyl phthalate	ND	5	ug/L		
Carbazole	ND	5	ug/L		
4-Chloroaniline	ND	5	ug/L		
bis(2-Chloroethoxy)Methane	ND	- 5	ug/L		
bis(2-Chloroethyl)Ether	ND	5	ug/L		
bis(2-Chloroisopropyl)Ether	ND	5	ug/L		
4-Chloro-3-Methylphenol	ND	5	ug/L		
2-Chloronaphthalene	ND-	5	ug/L		
2-Chlorophenol	ND	5	ug/L		
4-Chlorophenylphenyl ether	ND	5	ug/L		
Chrysene	ND	5	ug/L		
Dibenz(a,h)Anthracene	ND	5	ug/L		
Dibenzofuran	ND	5	ug/L		
1,2-Dichlorobenzene	ND	5	ug/L		
1,3-Dichlorobenzene	ND	5	ug/L		
1,4-Dichlorobenzene	ND	5	ug/L		
3,3'-Dichlorobenzidine	ND	10	ug/L		
2,4-Dichlorophenol	ND	5	ug/L		
Diethylphthalate	ND	5	ug/L		
4 • · · · · · · · · · · · · · · · · · ·	2	J	~9/ D		

METHOD: 8270C, Semivolatile Organics - Water (continued on next page)





Certificate of Analysis No. H9-9907122-01

Brown and Caldwell

SAMPLE ID: MW-13

ANALYTICAL DATA (continued)				
PARAMETER	RESULTS	PQL*	UNITS	
2,4-Dimethylphenol	56	5	ug/L	
Dimethyl Phthalate	ND	5	ug/L	
4,6-Dinitro-2-Methylphenol	ND	25	ug/L	
2,4-Dinitrophenol	ND	25	ug/L	
2,4-Dinitrotoluene	ND	5	ug/L	
2,6-Dinitrotoluene	ND	5	ug/L	
1,2-Diphenylhydrazine	ND	5	ug/L	
bis(2-Ethylhexyl)Phthalate	ND	5	ug/L	
Fluoranthene	ND	5	ug/L	
Fluorene	ND	5	ug/L	
Hexachlorobenzene	ND	5	ug/L	
Hexachlorobutadiene	ND	5	ug/L	
Hexachloroethane	ND	5	ug/L	
Hexachlorocyclopentadiene	ND	5	ug/L	
Indeno(1,2,3-cd)Pyrene	ND	5	ug/L	
Isophorone	ND	5	ug/L	
2-Methylnaphthalene	29	5	ug/L	
2-Methylphenol	ND	5	ug/L	
4-Methylphenol	ND	5	ug/L	
Naphthalene	88	10	ug/L	
2-Nitroaniline	ND	25	ug/L	
3-Nitroaniline	ND	25	ug/L	
4-Nitroaniline	ND	25	ug/L	
Nitrobenzene	ND	5	ug/L	
2-Nitrophenol	ND	5	ug/L	
4-Nitrophenol	ND	25	ug/L	
N-Nitrosodiphenylamine	ND	5	ug/L	
N-Nitroso-Di-n-Propylamine	ND	5	ug/L	
Di-n-Octyl Phthalate	ND	5	ug/L	
Pentachlorophenol	ND	25	ug/L	
Phenanthrene	ND	5	ug/L	
Phenol	6	5	ug/L	
Pyrene	ND	5	ug/L	
Pyridine	ND	5	ug/L	
1,2,4-Trichlorobenzene	ND	5	ug/L	
2,4,5-Trichlorophenol	ND	10	ug/L	
2,4,6-Trichlorophenol	ND	5	ug/L	
_), —	

METHOD: 8270C, Semivolatile Organics - Water (continued on next page)



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

Certificate of Analysis No. H9-9907122-01

Brown and Caldwell

SAMPLE ID: MW-13

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
Nitrobenzene-d5	50 ug/L	76	35	114
2-Fluorobiphenyl	50 ug/L	76	43	116
Terphenyl-d14	50 ug/L	58	. 33	141
Phenol-d5	75 ug/L	24	10	110
2-Fluorophenol	75 ug/L	37	21	110
2,4,6-Tribromophenol	75 ug/L	92	10	123

ANALYZED BY: SC DATE/TIME: 07/06/99 20:35:00 EXTRACTED BY: KL DATE/TIME: METHOD: 8270C, Semivolatile Organics - Water DATE/TIME: 07/04/99 16:00:00

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:

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



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

Certificate of Analysis No. H9-9907122-01

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

07/22/99

PROJECT: BJ Services

SITE: Hobbs, NM

SAMPLED BY: Brown and Caldwell

SAMPLE ID: MW-13

PROJECT NO: 12832.021

MATRIX: WATER

DATE SAMPLED: 07/02/99 12:20:00

DATE RECEIVED: 07/03/99

ANALYTICAL DATA					
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		34	5.0		ug/L
Acenaphthylene		ND	1.0		ug/L
Acenaphthene		ND	1.0		ug/L
Fluorene		ND	1.0		ug/L
Phenanthrene		ND	1.0		ug/L
Anthracene		ND	1.0		ug/L
Fluoranthene		ND	1.0		ug/L
Pyrene		ND	1.0		ug/L
Chrysene		ND	1.0		ug/L
Benzo (a) anthracene		ИD	1.0		ug/L
Benzo (b) fluoranthene		ND	1.0		ug/L
Benzo (k) fluoranthene		ND	1.0		ug/L
Benzo (a) pyrene		ND	1.0		ug/L
Dibenzo (a,h) anthracene		ND	1.0		${ t ug/L}$
Benzo (g,h,i) perylene		ND	1.0		ug/L
Indeno (1,2,3-cd) pyrene		ND	1.0		ug/L
SURROGATES	AMOUNT SPIKED	% PFC0	VERY	LOWER LIMIT	UPPER LIMIT
1-Fluoronaphthalene	0.50 ug/L	206		50	150
Phenanthrene d-10	0.50 ug/L	200	98	50	150

ANALYZED BY: LJ DATE/TIME: 07/13/99 22:19:13 EXTRACTED BY: KL DATE/TIME: 07/04/99 13:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

MI - Matrix Interference.

COMMENTS:

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



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9907122-02

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

07/22/99

PROJECT: BJ Services

SITE: Hobbs, NM

SAMPLED BY: Provided by SPL

SAMPLE ID: Trip Blank

6/9/99

PROJECT NO: 12832.021

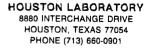
MATRIX: WATER

DATE SAMPLED: 07/02/99

DATE RECEIVED: 07/03/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	5	ug/L
Bromobenzene	ND	5	ug/L
Bromochloromethane	ND	5	ug/L
Bromodichloromethane	ND	5	ug/L
Bromoform	ND	5	${ t ug/L}$
Bromomethane	ND	10	${ m ug/L}$
n-Butylbenzene	ND	5	ug/L
sec-Butylbenzene	ND	5	\mathtt{ug}/\mathtt{L}
tert-Butylbenzene	ND	5	ug/L
Carbon tetrachloride	ND	5	ug/L
Chlorobenzene	ND	5	${ t ug/L}$
Chlorodibromomethane	ND	5	ug/L
Chloroethane	ND	10	${ t ug/L}$
Chloroform	ND	5	ug/L
Chloromethane	ND	10	\mathtt{ug}/\mathtt{L}
2-Chlorotoluene	ND	5	\mathtt{ug}/\mathtt{L}
4-Chlorotoluene	ND	5	ug/L
1,2-Dibromo-3-chloropropane	ND	5	ug/L
1,2-Dibromoethane	ND	5	\mathtt{ug}/\mathtt{L}
Dibromomethane	ND	5	$\mathtt{ug/L}$
1,2-Dichlorobenzene	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
Dichlorodifluoromethane	ND	10	\mathtt{ug}/\mathtt{L}
1,1-Dichloroethane	ND	5	ug/L
1,2-Dichloroethane	ND	5	ug/L
1,1-Dichloroethene	ND	5	\mathtt{ug}/\mathtt{L}
cis-1,2-Dichloroethene	ND	5	${ t ug/L}$
trans-1,2-Dichloroethene	ND	5	ug/L
1,2-Dichloropropane	ND	5	ug/L
1,3-Dichloropropane	ND	5	${ t ug/L}$
2,2-Dichloropropane	ND	5	${ t ug/L}$

METHOD: 8260 Water, Volatile Organics (continued on next page)





Certificate of Analysis No. H9-9907122-02

Brown and Caldwell

SAMPLE ID: Trip Blank 6/9/99

ANALYTICAL DATA (continued)				
PARAMETER	RESULTS	PQL*	UNITS	
1,1-Dichloropropene	ND	5	ug/L	
Ethylbenzene	ND	5	ug/L	
Hexachlorobutadiene	ND	5	ug/L	
Isopropylbenzene	ND	5	ug/L	
p-Isopropyltoluene	ND	5	ug/L	
Methylene chloride	ND	5	ug/L	
Naphthalene	ND	5	ug/L	
n-Propylbenzene	ND	5	ug/L	
Styrene	ND	5	ug/L	
1,1,1,2-Tetrachloroethane	ND	5	ug/L	
1,1,2,2-Tetrachloroethane	ND	5	ug/L	
Tetrachloroethene	ND	5	ug/L	
Toluene	ND	5	ug/L	
1,2,3-Trichlorobenzene	ND	5	ug/L	
1,2,4-Trichlorobenzene	ND	5	ug/L	
1,1,1-Trichloroethane	ND	5	ug/L	
1,1,2-Trichloroethane	ND	5	ug/L	
Trichloroethene	ND	5	ug/L	
Trichlorofluoromethane	ND	5	ug/L	
1,2,3-Trichloropropane	ND	5	ug/L	
1,2,4-Trimethylbenzene	ND	5	ug/L	
1,3,5-Trimethylbenzene	ND	5	ug/L	
Vinyl chloride	ND	10	ug/L	
Xylenes (total)	ND	5	ug/L	
1,2-Dichloroethene (total)	ND	5	ug/L	
cis-1,3-Dichloropropene	ND	5	ug/L	
trans-1,3-Dichloropropene	ND	5	ug/L	
Acetone	ND	100	ug/L	
2-Butanone	ND	20	ug/L	
4-Methyl-2-Pentanone	ND	10	ug/L	
2-Hexanone	ND	10	ug/L	
Carbon Disulfide	ND	5	ug/L	
Vinyl Acetate	ND	10	ug/L	
2-Chloroethylvinylether	ND	10	ug/L	
Methyl t-Butyl Ether	ND	10	ug/L	

METHOD: 8260 Water, Volatile Organics (continued on next page)



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

Certificate of Analysis No. H9-9907122-02

Brown and Caldwell

SAMPLE ID: Trip Blank

6/9/99

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,2-Dichloroethane-d4	50 ug/L	92	80	120
Toluene-d8	50 ug/L	92	88	110
4-Bromofluorobenzene	50 ug/L	96	86	115

ANALYZED BY: JC

DATE/TIME: 07/06/99 13:31:00

METHOD: 8260 Water, Volatile Organics

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:

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



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

Certificate of Analysis No. H9-9907122-03

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

DATE: 07/22/99

PROJECT: BJ Services

PROJECT NO: 12832.021

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown and Caldwell

DATE SAMPLED: 07/02/99 13:33:00

SAMPLE ID: MW-13

DATE RECEIVED: 07/03/99

		ANALYTICA	L DATA	-		
PARAMETER				RESULTS	DETECTION LIMIT	UNITS
Fluoride Method 300.0	*			2.22	0.1	mg/L
Analyzed by:	ELS					
Date:	07/06/99	11:57:16				
Nitrate nitro	gen(as N)			2.4	0.1	mg/L
Method 353.3	*					
Analyzed by:	CV					
Date:	07/08/99	13:30:00				
Sulfate				334	25	mg/L
Method 375.4	*					
Analyzed by:	ELS					
Date:	07/06/99	16:00:00				

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

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

QUALITY CONTROL

DOCUMENTATION

3A WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: SPL

Contract:

Lab Code:

Case No.: 9907122

SAS No.: SDG No.:

Matrix Spike - EPA Sample No.: MW-13

COMPOUND	SPIKE	SAMPLE	MS	MS	QC.
	ADDED	CONCENTRATION	CONCENTRATION	%	LIMITS
	(ug/L)	(ug/L)	(ug/L)	REC #	REC.
1,1-Dichloroethene Trichloroethene Benzene Toluene Chlorobenzene	50 50 50 50 50	0 0 0 1500 23 0	57 58 1500 73 52	114 116 0* 100 104	====== 61-145 71-120 76-127 76-125 75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LI RPD	IMITS REC.
=======================================	=======	~========	======	=====	=====	=====
1,1-Dichloroethene	50	54	108	6	14	61-145
Trichloroethene	50	56	112	2	14	71-120
Benzene	50	1500	0*	0	11	76-127
Toluene	50	72	98	2	13	76-125
Chlorobenzene	50	52	104	0	13	75-130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits due to matrix interference

RPD: 0 out of 5 outside limits Spike Recovery: 2 out of 10 outside limits

Data File: /var/chem/1.i/1990706.b/l187tl1.d

Report Date: 06-Jul-1999 14:59

SPL Houston Labs

RECOVERY REPORT

Client SDG: 1990706

Fraction: VOA

Operator: LT

SampleType: LCS Quant Type: ISTD

Client Name:

Sample Matrix: LIQUID Lab Smp Id: LCS-8260W Level: LOW

Data Type: MS DATA Sample: SpikeList File: 8260_water.spk Quant Sublist File: 8260_lcs.sub
Method File: /var/chem/l.i/1990706.b/18260aw.m
Misc Info: L187W1//L187CW1

SPIKE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
8 1,1-Dichloroethene	50	55	110.00	61-145
29 Trichloroethene	50	55	110.00	71-120
25 Benzene	50	55	110.00	76-127
37 Toluene	50	49	98.00	76-125
45 Chlorobenzene	50	52	104.00	75-130

SURROGATE COMPOUND	CONC ADDED ug/L	CONC RECOVERED ug/L	% RECOVERED	LIMITS
\$ 21 1,2-Dichloroethane	50	45	90.00	80-120
\$ 36 Toluene-d8	50	46	92.00	88-110
\$ 56 Bromofluorobenzene	50	49	98.00	86-115

Page 3



SPL Blank QC Report

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

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

page

1

Matrix: Aqueous Sample ID: VLBLK

Batch: L990706104642

Reported on: 07/06/99 16:36 Analyzed on: 07/06/99 13:05

Analyst: LT

METHOD 8260/8240 L187B01

c o m p o u n d	Result	Detection Limit	Units
Dichlorodifluoromethane	ND	10	ug/L
Chloromethane	ND	10	ug/L
Vinyl Chloride	ND	10	ug/L
Bromomethane	ND	10	ug/L
Chloroethane	ND	10	ug/L
Trichlorofluoromethane	ND	5	ug/L
Acetone	ND	100	ug/L
1,1-Dichloroethene	ND	5	ug/L
Methylene Chloride	ND	5	ug/L
Carbon Disulfide	ND	5	ug/L
rans-1,2-Dichloroethene	ND	5	ug/L
1,1-Dichloroethane	ND	5	ug/L
Vinyl Acetate	ND	10	ug/L
2-Butanone	ND	20	ug/L
cis-1,2-Dichloroethene	ND	5	ug/L
1,2-Dichloroethene (total)	ND	5	ug/L
2,2-Dichloropropane	ND	5	ug/L
Bromochloromethane	ND	5 5 5 5 5	ug/L
Chloroform	ND	5	ug/L
,1,1-Trichloroethane	ND	5	ug/L
_,2-Dichloroethane	ND	5	ug/L
1,1-Dichloropropene	ND	5	ug/L
Benzene	ND	5	ug/L
Carbon Tetrachloride	ND	5	ug/L
1,2-Dichloropropane	ND	5 5 5	ug/L
Trichloroethene	ND	5	ug/L
Dibromomethane	ND	5	ug/L
Bromodichloromethane	ND	5	ug/L
2-Chloroethylvinylether	ND	10	ug/L
4-Methyl-2-Pentanone	ND	10	ug/L
cis-1,3-Dichloropropene	ND	5	ug/L
rans-1,3-Dichloropropene	ND	5	ug/L
Toluene	ND	5 5 5	ug/L
.,1,2-Trichloroethane	ND	5	ug/L

Notes



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

page

SPL Blank QC Report

Matrix: Aqueous S:mple ID: VLBLK B:tch: L990706104642 Reported on: 07/06/99 16:36 **Analyzed on:** 07/06/99 13:05

Analyst: LT

M.THOD 8260/8240 L187B01

ompound	Result	Detection Limit	Units
1,3-Dichloropropane	ND	5	ug/L
C-Hexanone	ND	10	ug/L
Dibromochloromethane	ND	5	ug/L
.,2-Dibromoethane	ND		ug/L
etrachloroethene	ND	5 5 5 5 5 5	ug/L
hlorobenzene	ND	5	ug/L
,1,1,2-Tetrachloroethane	ND	5	ug/L
Sthylbenzene	ND	5	ug/L
Bromoform	ND	5	ug/L
Styrene	ND	5	ug/L
Xylene (Total)	ND	5	ug/L
1,1,2,2-Tetrachloroethane	ND	5	ug/L
1,2,3-Trichloropropane	ND	5	ug/L
Isopropylbenzene	ND	5	ug/L
Bromobenzene	ND	5	ug/L
Propylbenzene	ND	5	ug/L
Chlorotoluene	ND	5	ug/L
-Chlorotoluene	ND ND	5	ug/L
.,3,5-Trimethylbenzene	ND		ug/L
ert-Butylbenzene ,2,4-Trimethylbenzene	ND	5	ug/L ug/L
,2,4-111methylbenzene	ND	5	ug/L
sec-Butylbenzene	ND ND	5	ug/L
1,4-Dichlorobenzene	ND	5	ug/L
p-Isopropyltoluene	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
n-Butylbenzene	ND	5	uq/L
, 2-Dibromo-3-Chloropropan	ND	5	ug/L
,2,4-Trichlorobenzene	ND	5	ug/L
aphthalene	ND	5	ug/L
Mexachlorobutadiene	ND	5	ug/L
.,2,3-Trichlorobenzene	ND	5	ug/L
Methyl t-Butyl Ether	ND	10	ug/L

<u>Notes</u>



SPL Blank QC Report

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

page

3

Matrix: Aqueous Sample ID: VLBLK

Batch: L990706104642

Reported on: 07/06/99 16:36 Analyzed on: 07/06/99 13:05 Analyst: LT

METHOD 8260/8240 L187B01

urrogate	Result	QC Criteria	Units
,2-Dichloroethane-d4	88	88-110	% Recovery
Foluene-d8	94		% Recovery
Fromofluorobenzene	98		% Recovery

Simples in Batch 9907122-01 9907122-02 Notes

3C WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name:

SPL

Contract:

Lab Code:

Case No:

E990704

SAS No:

SDG No:

Matrix Spike - EPA

Sample No:

BLANK

Level (low/med):

	SPIKE	SAMPLE	MS	MS	QC
	ADDED	CONCENTRATION	CONCENTRATION	%	LIMITS
COMPOUND	(ug/L)	(ug/L) ,	(ug/L)	REC #	REC
Phenol	75	0	27	36	12-110
2-Chlorophenol	75	0	59	79	27-123
1,4-Dichlorobenzene	50	0	34	68	36-110
N-Nitroso-di-n-propylamine	50	0	37	74	41-116
1,2,4-Trichlorobenzene	50	0	39	78	39- 110
4-Chloro-3-methylphenol	75	0	48	64	23-110
Acenaphthene	50	0	42	84	46-125
4-Nitrophenol	75	0	29	39	25-150
2,4-Dinitrotoluene	50	0	33	66	50-150
Pentachlorophenol	75	0	67	89	9-125
Pyrene	50	0	47	94	26-127

	SPIKE	MSD	MSD			
	ADDED	CONCENTRATION	%	%	QC	LIMITS
COMPOUND	(ug/L)	(ug/L)	REC #	RPD #	RPD	REC
Phenol	75	24	32	12	42	12-110
2-Chlorophenol	75	52	69	14	40	27-123
1,4-Dichlorobenzene	50	33	66	3	28	36- 110
N-Nitroso-di-n-propylamine	50	32	64	14	38	41-116
1,2,4-Trichlorobenzene	50	38	76	3	28	39- 110
4-Chloro-3-methylphenol	75	44	59	8	42	23- 110
Acenaphthene	50	42	84	0	31	46-125
4-Nitrophenol	75	27	36	8	50	25-150
2,4-Dinitrotoluene	50	32	64	3	50	50-150
Pentachlorophenol	75	62	83	7	50	9-125
Pyrene	50	45	90	4	31	26-127

Column to be used to flag recovery and RPD values with an asterisk

RPD:

0

out of 11 outside limits

Spike Recovery:

0

out of 22 outside limits

FORM III SV-1

3/90



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

1

page

SPL Blank QC Report

Matrix: Aqueous Sample ID: BLANK Batch: E990704042258 Reported on: 07/12/99 15:33 Analyzed on: 07/06/99 16:02

Analyst: SC

METHOD 8270 J185B03

Compound	Result	Detection Limit	Units
Pyridine	ND	5	ug/L
Phenol	ND	5	ug/L
Aniline	ND	5	ug/L
bis(2-Chloroethyl)ether	ND	5	ug/L
2-Chlorophenol	ND	5	ug/L
1,3-Dichlorobenzene	ND	5	ug/L
1,4-Dichlorobenzene	ND	5 5	ug/L
Benzyl alcohol	ND	5	ug/L
1,2-Dichlorobenzene	ND	5	ug/L
2-Methylphenol	ND	5	ug/L
bis(2-chloroisopropyl)ethe	ND	5	ug/L
4-Methylphenol	ND	5	ug/L
N-Nitroso-di-n-propylamine	ND	ច ច ច ច ច ច	ug/L
Hexachloroethane	ND	5	ug/L
Nitrobenzene	ND	5	ug/L
Isophorone	ND	5	ug/L
2-Nitrophenol	ND	5	ug/L
2,4-Dimethylphenol	ND	5	ug/L
Benzoic acid	ND	25	ug/L
bis(2-Chloroethoxy)methane	ND	5	ug/L
2,4-Dichlorophenol	ND	5 5 5 5	ug/L
1,2,4-Trichlorobenzene	ND	5	ug/L
Naphthalene	ND	5	ug/L
4-Chloroaniline	ND		ug/L
Hexachlorobutadiene	ND	5 5 5 5	ug/L
4-Chloro-3-methylphenol	ND	5	ug/L
2-Methylnaphthalene	ND	5	ug/L
Hexachlorocyclopentadiene	ND	5	ug/L
2,4,6-Trichlorophenol	ND	5	ug/L
2,4,5-Trichlorophenol	ND	10	ug/L
2-Chloronaphthalene	ND	5	ug/L
2-Nitroaniline	ND	25	ug/L
Dimethylphthalate	ND	5	ug/L
2,6-Dinitrotoluene	∥ ND	∬ 5	∥ ug/L∥

Notes



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

page

2

SPL Blank QC Report

Matrix: Aqueous
Sample ID: BLANK
Batch: E990704042258

Reported on: 07/12/99 15:33 Analyzed on: 07/06/99 16:02

Analyst: SC

METHOD 8270 J185B03

Compound	Result	Detection Limit	Units
Acenaphthylene	ND	5	ug/L
3-Nitroaniline	ND	25	ug/L
Acenaphthene	ND	5	ug/L
2,4-Dinitrophenol	ND	25	ug/L
4-Nitrophenol	ND	25	ug/L
Dibenzofuran	ND	5	ug/L
2,4-Dinitrotoluene	ND	5	ug/L
Diethylphthalate	ND	5	ug/L
4-Chlorophenyl-phenylether	ND	5	ug/L
Fluorene	ND	5	ug/L
4-Nitroaniline	ND	25	ug/L
4,6-Dinitro-2-methylphenol	ND	25	ug/L
n-Nitrosodiphenylamine	ND	5	ug/L
1,2-Diphenylhydrazine	ND	5 5 5	ug/L
4-Bromophenyl-phenylether	ND	5	ug/L
Hexachlorobenzene	ND		ug/L
Pentachlorophenol	ND	25	ug/L
Phenanthrene	ND	5	ug/L
Anthracene	ND	5	ug/L
Carbazole	ND	5	ug/L
Di-n-butylphthalate	ND	5 5 5 5	ug/L
Fluoranthene	ND	5	ug/L
Pyrene	ND	5	ug/L
Butylbenzylphthalate	ND	5	ug/L
3,3'-Dichlorobenzidine	ND	10	ug/L
Benzo[a] anthracene	ND	5	∥ ug/L∥
Chrysene	ND	5	ug/L
bis(2-Ethylhexyl)phthalate	ND	5	ug/L
Di-n-octylphthalate	ND	5	ug/L
Benzo[b]fluoranthene	ND	5 5 5 5 5 5 5 5	ug/L
Benzo[k]fluoranthene	ND	∥ 5	ug/L
Benzo[a]pyrene	ND		ug/L
Indeno[1,2,3-cd]pyrene	ND	11	ug/L
Dibenz[a,h]anthracene	ND	∥ 5	ug/L

Notes



SPL Blank QC Report

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

page

3

Matrix: Aqueous
Sample ID: BLANK
Batch: E990704042258

Reported on: 07/12/99 15:33 Analyzed on: 07/06/99 16:02

Analyst: SC

METHOD 8270 J185B03

Compound	Result Detection Limit		
Benzo[g,h,i]perylene	ND	5	ug/L

Surrogate	Result	QC Criteria	Units
Nitrobenzene-d5 2-Fluorobiphenyl Terphenyl-d14 Phenol-d5 2-Fluorophenol 2,4,6-Tribromophenol	62 72 70 28 49 89	43-116 33-141 10-110 21-110	% Recovery % Recovery % Recovery % Recovery % Recovery % Recovery

Samples in Batch 9907122-01 Notes



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

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

Matrix: Units:

Aqueous mg/L

Batch Id: VARE990709134001

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Result Recovery		QC Limits(**) (Mandatory) % Recovery Range
Gasoline Range Organics	ND	1.0	0.83	83.0	64 - 131

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results	Spike Added	Matrix	Spike	Matrix Dupli	Spike	MS/MSD Relative %		_imits(***) (Advisory)
	<2>	<3>	Result <1>	Recovery <4>	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	5.1	4	6.2	27.5 *	6.0	22.5 *	20.0	36	36 - 160

Analyst: DR

Sequence Date: 07/09/99

SPL ID of sample spiked: 9907122-01B

Sample File ID: EEG1152.TXO

Method Blank File ID:

Blank Spike File ID: EEG1143.TX0

Matrix Spike File ID: EEG1147.TX0

Matrix Spike Duplicate File ID: EEG1148.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH(SPL ID):

9907156-01A 9907122-01B 9907124-04B



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

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

Matrix:

Aqueous

Units: mg/L

Batch Id: HPVV990707011300

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike Result Recovery <1> %		QC Limits(**) (Mandatory) % Recovery Range
Diesel	ND	5.0	6.7	134	53 - 148

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Dupli	Spike	MS/MSD Relative %		.imits(***) (Advisory)
	<2>	<3>	Result <1>	Recovery <4>	Result	Recovery <5>	Difference	RPD Max.	Recovery Range
DIESEL	2.212	5.00	6.91	94.0	7.44	105	11.1	39	21 - 175

Analyst: RR

Sequence Date: 07/08/99

SPL ID of sample spiked: 9907122-010

Sample File ID: VVF5074.TX0

Method Blank File ID:

Blank Spike File ID: VVF5072.TX0 Matrix Spike File ID: VVF5075.TX0

Matrix Spike Duplicate File ID: VVF5076.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH(SPL ID):

9907125-02A 9907124-04C 9907125-03A 9907125-01A

9907122-01C



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

** SPL BATCH QUALITY CONTROL REPORT ** Method 8310 ***

Matrix: Units:

ug/L

Aqueous

Batch Id: 2990704124500

LABORATORY CONTROL SAMPLE

SPIKE	Method	Spike	Blank	Spike	QC Limits(**)
COMPOUNDS	Blank Result	Added	Result	Recovery	(Mandatory)
	<2>	<3>	<1>	*	% Recovery Range
Naphthalene	ND	0.5	0.33	66.0	32 - 148
Acenaphthylene	ND	0.5	0.35	70.0	42 - 138
Acenaphthene	ND	0.5	0.34	68.0	22 - 133
Fluorene	ND	0.5	0.32	64.0	11 - 148
Phenanthrene	ND	0.5	0.37	74.0	40 - 121
Anthracene	ND	0.5	0.36	72.0	32 - 121
Fluoranthene	ND	0.5	0.37	74.0	45 - 133
Pyrene	ND	0.5	0.37	74.0	39 - 136
Chrysene	ND	0.5	0.39	78.0	44 - 122
Benzo (a) anthracene	ND	0.5	0.39	78.0	53 - 137
Benzo (b) fluoranthene	ND	0.5	0.39	78.0	62 - 121
Benzo (k) fluoranthene	ND .	0.5	0.39	78.0	66 - 128
Benzo (a) pyrene	ND	0.5	0.37	74.0	42 - 120
Dibenzo (a,h) anthracene	ND	0.5	0.36	72.0	59 - 129
Benzo (g,h,i) perylene	ND	0.5	0.37	74.0	67 - 124
Indeno (1,2,3-cd) pyrene	ND	0.5	0.39	78.0	65 - 125

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results	Spike Matrix Added		Spike	Matrix Dupli	Spike cate	MS/MSD Relative %		imits(***) Advisory)	
	<2>	<3>	Result <1>	Recovery <4>	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery	/ Range
NAPHTHALENE	34	0.50	39	NC	28	NC	NC	30	1 -	122
ACENAPHTHYLENE	ND	0.50	0.42	84.0	0.34	68.0	21.1	30	1 -	124
ACENAPHTHENE	ND	0.50	0.49	98.0	0.46	92.0	6.32	30	1 -	124
FLUORENE	2.5	0.50	2.6	NE	2.1	NC	NC	30	1 -	142
PHENANTHRENE	ND	0.50	0.50	100	0.46	92.0	8.33	30	1 -	155
ANTHRACENE	ND	0.50	0.37	74.0	0.37	74.0	0	30	1 -	126
FLUORANTHENE	ND	0.50	0.38	76.0	0.37	74.0	2.67	30	14 -	123
PYRENE	ND	0.50	0.53	106	0.50	100	5.83	30	1 -	140
CHRYSENE	ON	0.50	0.44	88.0	0.43	86.0	2.30	30	1 -	199
BENZO (A) ANTHRACENE	ND	0.50	0.49	98.0	0.46	92.0	6.32	30	12 -	135
BENZO (B) FLUORANTHENE	ND.	0.50	0.45	90.0	0.42	84.0	6.90	30	6 -	150
BENZO (K) FLUORANTHENE	ND	0.50	0.42	84.0	0.40	80.0	4.88	30	1 -	159



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

** SPL BATCH QUALITY CONTROL REPORT ** Method 8310 ***

Matrix: Units:

Aqueous

ug/L

Batch Id: 2990704124500

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Dupli	Spike cate	MS/MSD Relative %		imits(***) (Advisory)
	<2>	<3>	Result <1>	Recovery <4>	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery Range
BENZO (A) PYRENE	ND	0.50	0.44	88.0	0.42	84.0	4.65	30	1 - 128
DIBENZO (A,H) ANTHRACENE	ND	0.50	0.37	74.0	0.37	74.0	0	30	1 - 110
BENZO (G,H,I) PERYLENE	ND ND	0.50	0.42	84.0	0.42	84.0	0	30	1 - 116
INDENO (1,2,3-CD) PYRENE	ND	0.50	0.36	72.0	0.21	42.0	52.6 *	30	1 - 116

Analyst: LJ

Sequence Date: 07/08/99

SPL ID of sample spiked: 9907122-01F

Sample File ID: 990713A\009-0901

Method Blank File ID:

Blank Spike File ID: 990708A\022-1101

Matrix Spike File ID: 990713A\011-1101

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

Matrix Spike Duplicate File ID: 990713A\012-1201 (***) = Source: Temporary Limits

SAMPLES IN BATCH(SPL ID):

9907128-05c 9907128-06c 9907122-01F 9907124-04F

9907128-020 9907128-030 9907128-040

ICP

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: JM

Matrix: Water

Units: mg/L

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

Date:070899 Time:1321 File Name: 0708MR3

PHONE (713) 660-0901

Laboratory Control Sample

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit	Work Orde	rs in Batch
Silver	ND	2.00	2.03	101	1.60	2.40	Work Order	Fractions
Aluminum								
Arsenic	ND	4.00	4.02	101	3.20	4.80	99-07-108	01C-11C
Barium	ND	2.00	2.09	104	1.60	2.40		
Boron	ND	4.00	4.21	105	3.20	4.80	99-07-148	01A
Calcium								
Cadmium	ND	2.00	1.94	97	1.60	2.40	99-07-090	05A
Cobalt								
Chromium	ND	2.00	1.95	97	1.60	2.40	99-07-078	01F
Copper	ND	2.00	2.12	106	1.60	2.40	1	
Iron	ND	2.00	1.97	98	1.60	2.40	99-07-122	01D
Potassium								
Magnesium	ND	20.00	20.43	102	16.00	24.00	99-07-124	04D
Manganese	ND	2.00	1.96	98	1.60	2.40		
Sodium							99-07-048	03C
Nickel	ND	2.00	1.95	98	1.60	2.40		
Lead	ND	2.00	1.96	98	1.60	2.40		
Antimony								
Selenium	ND	4.00	4.07	102	3.20	4.80		
Tin								
Vanadium								
Zinc	ND	2.00	1.97	98	1.60	2.40		

Work Order Spiked: 9907108-01C Matrix Spike - Spike Duplicate Results

Matrix Spik	e - Shive Di	upilicate Ne	อนหอ			i opikeu. 330					
	Sample	Spike	Mati	rix Spike	Matrix Sp	ike Duplicate	QCI	imits	Spike		QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Re	covery	RPD %		Limits %
Silver	ND	1.0	0.9797	98.0	0.9754	97.5	80	120	0.4	П	20.0
Aluminum										П	
Arsenic	ND	2.0	2.097	104.9	2.078	103.9	80	120	0.9	П	20.0
Barium	0.6092	1.0	1.657	104.8	1.587	97.8	80	120	6.9		20.0
Boron	1.083	2.0	3.227	107.2	3.162	104.0	80	120	3.1	П	20.0
Calcium										\Box	
Cadmium	ND	1.0	0.9494	94.9	0.961	96.1	80	120	1.2	T	20.0
Cobalt										\top	
Chromium	ND	1.0	0.9152	91.5	0.9281	92.8	80	120	1.4		20.0
Copper	ND	1.0	1.086	108.6	1.034	103.4	80	120	4.9	\sqcap	20.0
Iron	6.336	1.0	7.325	98.9	7.184	84.8	80	120	15.4	\sqcap	20.0
Potassium					1					П	
Magnesium	55.23	10.0	67.02	117.9	64.48	92.5	80	120	24.1	**	20.0
Manganese	0.3088	1.0	1.243	93.4	1.245	93.6	80	120	0.2	П	20.0
Sodium									,	\Box	
Nickel	ND	1.0	0.9183	91.8	0.9322	93.2	80	120	1.5	П	20.0
Lead	ND	1.0	0.9129	91.3	0.9304	93.0	80	120	1.9	\sqcap	20.0
Antimony										\sqcap	
Selenium	ND	2.0	2.026	101.3	2.009	100.5	80	120	0.8	\top	20.0
Tin					1					\sqcap	
Vanadium										\top	
Zinc	0.0211	1.0	0.9813	96.0	0.9812	96.0	80	120	0.0	П	20.0
				1							

^{**} Spike RPD Outside Method Limits

Checked: 9117/9/79

Trace-icp

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: EG



Matrix: Water

Units: mg/L

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

Date:070799 Time:1107 File Name: 0707MR1

Laboratory Control Sample

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit	
Silver							Work Orde
Aluminum							
Arsenic	ND	4.00	3.91	98	3.20	4.80	99-07-082
Barium							
Beryllium							99-07-091
Calcium							
Cadmium							99-07-148
Cobalt							1
Chromium							99-07-078
Copper							
Iron							99-07-122
Magnesium							
Manganese]		99-07-124
Nickel							
Lead	ND	2.00	2.01	100	1.60	2.40	99-07-150
Antimony							
Selenium	ND	4.00	3.83	96	3.20	4.80	
Thallium							
Vanadium							{
Zinc					<u> </u>	<u></u>]

Work Order	Fractions
99-07-082	01D
99-07-091	01C
99-07-148	01A
99-07-078	01F
99-07-122	01D
99-07-124	04D
99-07-150	01C

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9907108-01C

Matrix Spike	- Spike Di					r Spikea: 990				
	Sample	Spike	Matr	ix Spike	Matrix Spi	ke Duplicate	QCL	imits	Spike	QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Red	overy	RPD %	Limits %
Silver										
Aluminum										
Arsenic	0.0686	2.0	1.969	95.0	1.966	94.9	80	120	0.2	20.0
Barium										
Beryllium										
Calcium										
Cadmium										
Cobalt										
Chromium										
Соррег										
Iron										
Magnesium										
Manganese	_									
Nickel										
Lead	ND	1.0	0.9434	94.3	0.9429	94.3	80	120	0.1	20.0
Antimony										
Selenium	ND	2.0	1.898	94.9	1.894	94.7	80	120	0.2	20.0
Thallium										
Vanadium			1				7			
Zinc			T							

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: JM



Matrix: Water

Units: mg/L

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

Date:071999 Time:1052 File Name: 0719JM1

Laboratory Control Sample

		DUIALUTY COL				
Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum				-		
Arsenic						
Barium						
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Potassium	ND	20.00	20.50	103	16.00	24.00
Magnesium				_		
Manganese						
Sodium	ND	20.00	20.66	103	16.00	24.00
Nickel						
Lead						
Antimony						
Selenium						
Tin						
Vanadium						
Zinc						
11.4.1.0.11	0 1 D		14		181 - 1 - 0 - 1	

Work Orders in Batch Work Order Fractions 99-07-122 / 01D

04D

99-07-124

Matrix Spike - Spike Duplicate Results Work Order Spiked: 9907122-01D

Sample	Spike	Matr	ix Spike		Matrix Spi	ke Duplicate		QC L	imits	Spike	\neg	QC
Result	Added	Result	Recovery		Result	Recovery		% Rec	overy	RPD %	_[1	Limits %
							Ι					
							Τ					
							Ι				П	
· ·							Т					
	1	T .					Т				П	
		Ī					Т				П	
				П			Т				П	
							Т				П	
				П			T				П	
5.817	10.0	15.74	99.2	П	15.5	96.8	Т	80	120	2.4	П	20.0
				П							П	
			1	П			T				П	
165.1	10.0	168.2	31.0	7	169	39.0	*	80	120	22.9	**	20.0
				П			Τ				П	
				П			Τ				П	
				П			T				П	
							T				П	
				П							П	
				П			T				\sqcap	
				П							77	
	5.817	Result Added	Result Added Result 5.817 10.0 15.74	Result Added Result Recovery	Result Added Result Recovery	Result Added Result Recovery Result 5.817 10.0 15.74 99.2 15.5	Result Added Result Recovery Result Recovery 5.817 10.0 15.74 99.2 15.5 96.8	Result Added Result Recovery Result Recovery 5.817 10.0 15.74 99.2 15.5 96.8	Result Added Result Recovery Result Recovery % Recovery 5.817 10.0 15.74 99.2 15.5 96.8 80	Result Added Result Recovery Result Recovery % Recovery	Result Added Result Recovery Recovery Recovery RPD %	Result Added Result Recovery Recovery RPD % I

^{*} Spike Results Outside Method Limits Elements Post Spiked: ALL

ICP

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: JM

Matrix: Water

Units: mg/L

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

PHONE (713) 660-0901

Date:070899 Time:1321 File Name: 0708JM10

	A	O
Laboratory	Control	Samble

Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum				-		
Arsenic						
Barium						
Beryllium						
Calcium	ND	20.00	18.93	95	16.00	24.00
Cadmium						
Cobalt						
Chromium				r.		
Copper						
Iron						
Potassium						
Magnesium						
Manganese						
Sodium						
Nickel						
Lead	Ī					
Antimony						
Selenium	<u> </u>					
Tin						
Vanadium						
Zinc						

Work Orders in Batch Work Order Fractions 99-07-122 01D

04D

99-07-124

Matrix Spike - Spike Duplicate Results Work Order Spiked: 9907108-01C

IVIATIIX SPIKE	Sample	Spike		ix Spike	_		ike Duplicate		QC L		Spike	┱	QC
Element	Result	Added	Result	Recover	у	Result	Recovery			overy	RPD %		Limits %
Silver					П								
Aluminum													
Arsenic												П	
Barium					TT								
Beryllium													
Calcium	141.3	10.0	149.1	78.0	*	144.4	31.0	*	80	120	86.2	**	20.0
Cadmium					\prod								
Cobalt					Ш								
Chromium					\prod							Ш	
Copper													
Iron												Ш	
Potassium												Ш	
Magnesium								L				Ш	
Manganese								L	<u> </u>			Ш	
Sodium								L				Ш	
Nickel												Ш	
Lead													
Antimony					П								
Selenium		1			\prod			L				П	
Tin													
Vanadium					П								
Zinc					\top								

^{*} Spike Results Outside Method Limits

Checked: 991 7/22/99

^{**} Spike RPD Outside Method Limits Elements Post Spiked: ALL





SPL QUALITY CONTROL REPORT **

Matrix:

Liquid

Reported on: 07/20/99

Analyzed on: 07/20/99

Analyst:

RJB

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

Mercury, Total Method 7470 A***

SPL Sample ID Number	- I		Measured Concentration mg/L	% Recovery	QC Limits Recovery		
LCS ND		0.0100	0.0103	103	80 - 120		

FIAS990720102000-9907A61

Samples in batch:

9907735-01A	9907789-02A	9907790-01 A	9907793-01A
9907793-02A	9907793-03A	9907793-04A	9907793-05A
9907793-06A	9907793-07A	9907793-08A	9907793-09A
9907793-10A	9907793-11A	9907794-01A	9907795-01A
9907797-02A	9907801-01A		

COMMENTS:



LAFAYETTE AREA LAB 500 AMBASSADOR CAFFERY PKWY. SCOTT. LOUISINNA ZIP 70583-8544 PHONE: (318) 237-4775

** SPL QUALITY CONTROL REPORT **

Matrix: Liquid

Reported on: 07/20/99 Analyzed on: 07/20/99 Analyst: RJB

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

Mercury, Total Method 7470 A***

 SPL Sample	 Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD		QC LIMITS (Advisory)	
1			 Added mg/L	Result		Result mg/L	Recovery	(왕)	RPD Max	% REC	
9907735-01A	ND	ND	0.010	0.0103	103	0.0102	102	1.0	20	80 -120	

FIAS990720102000-9907A60

Samples in batch:

9907735-01A	9907789-02A	9907790-01A	9907793-01A
9907793-02A	9907793-03A	9907793-04A	9907793-05A
9907793-06A	9907793-07A	9907793-08A	9907793-09A
99077 93-10A	9907793-11A	9907794-01A	9907795-01A
9907797-02A	9907801-01A		
COMMENTS:			



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/15/99

Analyzed on: 07/13/99

Analyst: CV

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

Chloride Method 325.3 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	162	163.1	101	94 ~ 106

-9907219

Samples in batch:

9907080-01C 9907080-02C 9907080-03C 9907080-04C 9907080-05C 9907080-06C 9907080-07C 9907080-08C 9907080-09C

COMMENTS:

LCS-SPL ID#94453228-23



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/15/99 Analyzed on: 07/13/99

Analyst:

CV

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

Chloride Method 325.3 *

SPL Sample	Method	Sample	Spike			Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)		
ID Number		Result mg/L	Added mg/L			Recovery %	(%)	RPD Max	%	REC	
9907080-01c	ND	5.32	50.0	56.7	103	56.7	103	0	5	92	-109

-9907219

Samples in batch:

9907080-01C 9907080-05C 9907080-09C 9907080-02C 9907080-06C 9907122-01H 9907080-03C 9907080-04C 9907080-07C 9907080-08C

COMMENTS:

LCS-SPL ID#94453228-23



B880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054 PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/14/99

Analyzed on: 07/03/99

Analyst: ELS

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Carbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9907124-04H	ND	ND	0	5

-9907208

Samples in batch:

9907122-01H

9907124-04H

COMMENTS:



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/14/99

Analyzed on: 07/03/99

Analyst: ELS

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Bicarbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9907124-04H	200	204	2.0	5

-9907207

Samples in batch:

9907122-01H

9907124-04H

COMMENTS:



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

07/06/99

Analyzed on:

07/06/99

Analyst:

ELS

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

> Fluoride Method 300.0 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.46	94.6	90 - 110

-9907073

Samples in batch:

9906552-03A

9907024-02J

9907122-03I

9907124-04I

COMMENTS:

LCS SPL ID# 95535278-12



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/06/99 Analyzed on: 07/06/99 Analyst: ELS

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

Fluoride Method 300.0 *

SPL Sample	Method	Sample	Spike	Matr	Matrix Spike		Matrix Spike Duplicate		QC LIMITS (Advisory)		
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max		% REC
9907024-02J	ND	1.83	10.0	10.9	90.7	11.0	91.7	1.1	20	80	-120

-9907073

Samples in batch:

9906552-03A

9907024-02J

9907122-031

9907124-041

COMMENTS: LCS SPL ID# 95535278-12



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

: 07/09/99

Analyzed on:

07/08/99

Analyst:

CV

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

Nitrate nitrogen(as N)
Method 353.3 *

SPL Sample ID Number	Blank LCS Value Concentration mg/L mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery		
LCS	ND	5.0	4.88	97.6	92 - 113		

-9907135

Samples in batch:

9907122-03I

9907124-04I

9907215-04G

9907218-08G

COMMENTS:

NO2 ON 9907122 & 9907124 WERE RUN ON 07/03/99 NO3 WERE ANALYZED ON PRESERVED SAMPLES LCS- SPL ID#94453220-10



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/09/99 Analyzed on: 07/08/99

Analyst:

C۷

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

Nitrate nitrogen(as N) Method 353.3 *

SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)	
ID Number		Result mg/L	Added mg/L	Result mg/L		Result mg/L	Recovery %	(%)	RPD Max	% REC
9907124-041	ND	2.09	5.0	7.37	106	7.25	103	2.9	12	84 -125

-9907135

Samples in batch:

9907122-031 9907124-041

9907215-04G

9907218-08G

COMMENTS:

NO2 ON 9907122 & 9907124 WERE RUN ON 07/03/99 NO3 WERE ANALYZED ON PRESERVED SAMPLES LCS- SPL ID#94453220-10



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

07/06/99

Analyzed on: 07/06/99

Analyst:

ELS

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

Sulfate Method 375.4 *

SPL Sample Blank ID Number Value mg/L		LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery	
LCS	ND	26.8	28.0	104	82 - 111	

-9907072

Samples in batch:

9906552-03A

9907024-02J

9907122-03I

9907124-04I

COMMENTS:

LCS SPL ID# 95535274-12



HOUSTON LABORATORY

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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 07/06/99 Analyzed on: 07/06/99 Analyst: ELS

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

Sulfate Method 375.4 *

SPL Sample	Method	Sample	Spike	Matrix Spike Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)			
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	% REC
9907024-02J	ND	247	250	514	107	512	106	0.9	9.5	84 -120

-9907072

Samples in batch:

9906552-03A

9907024-02J

9907122-031

9907124-041

COMMENTS: LCS SPL ID# 95535274-12

CHAIN OF CUSTODY

AND

SAMPLE RECEIPT CHECKLIST

	SP	SPL, Inc.		22/40phans		1068	374
Gent Name: Pr. 113 (190) (1914) 173 749 -0999	m 8280-821 (517) 1/4/11	matrix bottle size p	pres.	٦.	ested Ahal	ysis	95
Address Phone: 1415 LOUS and + 2500, Howsen	M	glass	<u> </u>	PS 0	52.		(195) (195)
Circut Contact: KICK ROKFOCK		other: imber vial	other:	, 2002 19	1109 W	(01 E	(8.5
		S=A Y=V S0A= S0A= S1=0	S=O JnoD	1010 1010	19/3 19/3 1-10	20	EZE)
HOGES	M	udge stic sss ter 4	SO4	9/09 W	1000 (60) 540, 25-3	260	3/2
Invoice To: KICK Re	COX OCC TIME COMP grab	slq='	ZH=1	208)	Jach Jach Jach	~	41
Mar 13	X 0221 6	0 146/16	100 () None	X X	<u>`</u>) ×	
MW-13	1		1				×
Tro Blang #1	X 107/	W V W	6 A	×			
		-					
				Promote			
CientConsulant Remarks: 24 hr	Circulconsulant Remarks: 24 hr for naround on Method Blody VOCS ON MW-15; all others at 2-WK formaround	of Method Sted Laboratory remarks: FactEX OK turnaround 811305	、在でもに推	5/105040		ia?	z ()
(per method requi		Base Date	Special Detect	Special Detection Limits (specify):		PM neview (initial):	irútial):
Requested IAI		Ó				一 と 条	77
24hr 🔘 72hr 🔘	1. Residentished by Sporger:	1967/L	1530	2. Received by:			
48hr Standard 🔲	3. Relinquished by:	date	time	4. Received by:			(
other M See Remarks	5. Relinquished by:	date	tine	Sugar Market by Labor	Moone	1/5/1	8
S889 Interchange Drive, Houston, TX 77054 (, Houston, TX 77054 (713) 660-0901	\\ \text{\tin}\text{\tetx{\text{\tetx{\text{\text{\texi}\text{\text{\texi}\text{\text{\text{\text{\tin}\text{\text{\text{\text{\text{\texi}\text{\text{\texit{\text{\texi}\titt{\text{\ti}\tinttit{\text{\texit{\texi}\text{\texi}\t	0 Ambassador	500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775	Scott, LA 70	583 (318) 23	7-4775

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

SPL Houston Environmental Laboratory Sample Login Checklist

Dat	e: 7/3/99 Time:	1000				
SPL	Sample ID:					
	9907122					
			Yes	No		
l	Chain-of-Custody (COC) form is pre	sent.				
2	COC is properly completed.					
3	If no, Non-Conformance Worksheet	has been completed.				
4						
5						
6	6 All samples are tagged or labeled.					
7	If no, Non-Conformance Worksheet	has been completed.				
	Sample containers arrived intact					
9	Temperature of samples upon arrival	:		$\psi_{\mathbf{C}}$		
10	Method of sample delivery to SPL:	SPL Delivery				
		Client Delivery				
		FedEx Delivery (airbill #)	8//30	5335		
		Other:				
Ιl	Method of sample disposal:	SPL Disposal	V			
		HOLD				
		Return to Client				
Nai	me: Auben Sta	Date: 7/2	199			

,			
		•	

BROWN AND CALDWELL

Suite 2500, 1415 L (713) 759-0952 • (7		, TX 77002		TRANS	MITTAL	MEMORANDUM
	yne Price			Date: 5/14/99		Job No: 12832-014
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MARCH 1999 GROUNDWATER SAMPLING REPORT HOBBS, NEW MEXICO FACILITY

BJ SERVICES COMPANY, U.S.A.

MAY 14, 1999

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

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CONTENTS

1.0	INTRODUCTION1					
2.0	GROUNDWATER SAMPLING AND ANALYSES22.1Groundwater Measurements And Sampling22.2Results of Groundwater Analyses32.3Natural Attenuation Evaluation5					
3.0	REMEDIATION SYSTEM8					
4.0	CONCLUSIONS AND RECOMMENDATIONS					
DIST	RIBUTION AND QA/QC REVIEWER'S SIGNATURE					
FIGU	RES					
1 2 3 4 5	Site Map Potentiometric Surface Map for March 9,1999 Benzene Isoconcentration and Total BTEX Distribution Map for March 9-10, 1999 Total Petroleum Hydrocarbons Distribution Map for March 9-10, 1999 Dissolved Benzene Mass versus Time: West Plume					
TABL	LES					
1 2 3 4 5	Site Chronology Cumulative Groundwater Elevation Data Field Screening Results for Groundwater Samples Cumulative Analytical Results for Groundwater Samples Summary of Detected Analytical for PAHs, Metals, SVOCs, and Groundwater Quality Parameters Laboratory Analytical Results for Natural Attenuation Evaluation Parameters Summary of Analytical Results for Air Emissions					
APPE	CNDICES					
A B	Groundwater Sampling Forms Laboratory Analytical Reports for Groundwater Samples					

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1.0 INTRODUCTION

Brown and Caldwell conducted field activities associated with the March 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 March 9 and 10, 1999. The facility layout is shown in Figure 1.

The facility formerly operated an above-grade on-site fueling system. Subsurface impact near a diesel fueling system was first detected by the New Mexico Oil Conservation Division (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 groundwater remediation system, and previous sampling events is presented on Table 1. Expansions of the biosparging system were performed in March/April 1997 and February/March 1998.

During the March 1999 sampling event, groundwater samples collected from all monitor wells were analyzed for gasoline and diesel range total petroleum hydrocarbons (TPH-G and TPH-D), benzene, toluene, ethylbenzene, and total xylenes (BTEX), polynuclear aromatic hydrocarbons (PAHs), carbonate, bicarbonate, major anions, major cations, total hardness, and RCRA metals. Additionally, samples from upgradient well MW-5 and downgradient wells MW-10, MW-11A, and MW-12 were analyzed for dissolved methane/ethylene/ethane, sulfates, and nitrates. This report presents the results of the groundwater sampling event, a description of the field activities, and a summary of the analytical results. A groundwater potentiometric surface map, a benzene concentration map, and a hydrocarbon distribution map are included.

2.0 GROUNDWATER SAMPLING AND ANALYSES

Brown and Caldwell purged and sampled the groundwater monitor wells at the facility on March 9 and 10, 1999 to determine concentrations of dissolved-phase hydrocarbons in groundwater. The following subsections describe the activities conducted during this sampling event and present the results of the groundwater analyses.

2.1 Groundwater Measurements and Sampling

Eleven monitor wells were sampled during the March 1999 sampling event. A site map depicting the locations of the monitor wells is presented as Figure 1. As noted in previous sampling reports, monitor well MW-2 and MW-11 can not be located and are assumed destroyed by facility activities such as grading.

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 on Table 2. The groundwater elevation data indicates that the general groundwater flow direction is to the east with a hydraulic gradient of approximately 0.008 foot/foot (ft/ft). A potentiometric surface map is presented in Figure 2. Approximately 0.04 feet of phase-separated hydrocarbons (PSH) was observed in monitor well MW-4 during this sampling event.

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

The field parameter readings were recorded in the field log book and are listed on the groundwater sampling forms included in Appendix A. The field screening results for groundwater samples are presented on Table 3.

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 (DI) water. Purged water and excess water generated by equipment cleaning operations were 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 TPH-D and TPH-G by EPA Method 8015 Modified, BTEX by EPA Method 8020, PAHs by EPA Method 8310, and the eight RCRA metals by EPA Method 6010/7000 series. All samples were also analyzed for groundwater quality parameters, including major anions (chloride, fluoride, nitrate, and sulfate), major cations (calcium, magnesium, potassium, and sodium), hardness, carbonate, and bicarbonate. Additionally, four monitor wells (MW-5, MW-10, MW-11A and MW-12) were sampled for methane/ethylene/ethane,nitrate, and sulfate to evaluate natural attenuation processes.

Current and cumulative analytical results for BTEX, TPH-D, and TPH-G are presented in Table 4. Current and cumulative analytical results for groundwater quality parameters as well as detected PAHs and RCRA metals are presented in Table 5. The analytical results for nitrate, sulfate, and

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dissolved methane analyses performed on groundwater samples from monitor wells MW-5, MW-10, MW-11A, and MW-12 to evaluate natural attenuation processes are presented in Table 6

BTEX constituent concentrations in excess of applicable laboratory detection limits were reported in seven of the 11 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 monitor wells MW-1, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, and MW-11A. Figure 3 presents a benzene isoconcentration and total BTEX distribution map for the March 1999 sampling event. A total petroleum hydrocarbon distribution map for the March 1999 sampling event is presented in Figure 4. The laboratory analytical report and chain-of-custody record for the groundwater samples are included in Appendix B.

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. The benzene concentrations in monitor well MW-1, MW-3, and MW-4 are less than the New Mexico WQCC standard of 0.01 mg/L. Benzene concentrations in the offsite monitor well, MW-9, have not exceeded 0.01 mg/L since March 1997.

Benzene concentrations in MW-6 decreased substantially following the startup of the biosparging system in March 1995, but have been erratic since March 1997. Monitor well MW-6 is located immediately adjacent to (i.e., within approximately 5 feet of) a biosparging system air injection/extraction well, AV-17. It is believed that the close proximity of monitor well MW-6 to air injection/extraction well AV-17 may bias the results obtained from MW-6, due to the effects of continuous air introduction and extraction from AV-17 up until shortly prior to commencement of quarterly groundwater sampling activities at MW-6.

Table 5 presents a summary of PAHs and metals detected in this and previous groundwater sampling events at the facility. Analytical results for groundwater quality parameters are also presented in Table 5. Naphthalene is the only PAH compound that has been detected in any of the

groundwater sampling events conducted at the facility. During the March 1999 groundwater sampling event, naphthalene concentrations in monitor wells MW-6 at 160 μ g/L and MW-4 at 170 μ g/L were the only exceedances of the New Mexico Water Quality Control Commission (WQCC) groundwater standard of 30 μ g/L for PAHs (i.e., total naphthalene plus monomethylnaphthalenes).

Inorganic constituents detected at concentrations greater than method detection limits during the March 1999 groundwater sampling event include arsenic and barium. Arsenic and barium were detected in groundwater samples from each of the monitor wells, but none of these detections exceeded the New Mexico WQCC Standards of 0.1 mg/L for arsenic or 1.0 mg/L for barium.

The New Mexico WQCC standard of 1.6 mg/L for fluoride was exceeded in monitor wells MW-6, MW-9, MW-10, MW-11A, and MW-12, with concentrations ranging from 1.79 mg/L to 4.93 mg/L.

The New Mexico WQCC standard of 250 mg/L for chloride was exceeded in monitor wells MW-6, MW-8, MW-10, MW-11A, and MW-12. Concentrations in these wells ranged from 274 mg/L to 1160 mg/L.

2.3 Natural Attenuation Evaluation

Natural attenuation is planned to be the primary remediation mechanism for the portion of the plume 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 have stabilized at concentrations less than 100 mg/L subsequent to removal of the field waste tanks in

March 1997. Furthermore, 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, nitrates, ferric iron, sulfates, and carbon dioxide. The following lines of geochemical evidence suggest that intrinsic bioremediation (an important natural attenuation mechanism) is occurring:

- 1. DO concentrations measured in monitor wells MW-10, MW-11A and MW-12 are depressed relative to background. DO concentrations in these wells ranged from 0.3 mg/L to 0.78 mg/L (see Table 3). These concentrations are less than the DO concentrations ranging from 4.08 mg/L to 6.06 mg/L that were measured in monitor wells MW-5, MW-7, and MW-8, which are upgradient or cross-gradient wells believed to exhibit background conditions. DO is utilized during intrinsic bioremediation, and therefore DO concentrations should be depressed in areas where intrinsic bioremediation is occurring.
- 2. The nitrate concentrations as determined by EPA Method 353.3 (as required by NMOCD on an annual basis) were measured at less than 0.1 mg/L in monitor wells MW-11A and MW-12. These concentrations are less than the nitrate concentrations of 3.3 mg/L and 0.7 mg/L measured in background wells MW-7 and MW-8, respectively (see Table 6). The nitrate concentration in background well MW-5 was not measured by EPA Method 353.3. Nitrate is utilized during intrinsic bioremediation. Therefore, nitrate concentrations should be depressed in areas where intrinsic bioremediation is occurring. The nitrate concentrations by EPA Method 353.3 generally indicate this. Nitrate concentrations as determined by EPA Method 300.0 (which has been used in the past by Brown and Caldwell to evaluate natural attenuation on a quarterly basis) were measured at less than 0.1 mg/L in monitor wells MW-10, MW-11A and MW-12. The Method 300.0 concentration in background well MW-5 was measured at less than 0.1 mg/L. Therefore, the Method 300.0 nitrate analysis is inconclusive.
- 3. Ferrous iron was measured at concentrations ranging from 3 mg/L to 6 mg/L in monitor wells MW-10, MW-11A, and MW-12 (see Table 3). Ferrous iron was not detected in any of the other monitor wells at the site except MW-1. 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. The elevated ferrous iron concentration in monitor wells MW-10, MW-11A, and MW-12 provide evidence that natural attenuation of hydrocarbon is occurring at the former field waste tanks area. The detection of ferrous iron in monitor well MW-1 suggests that intrinsic bioremediation may also be occurring in the former fueling system 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 84.5 millivolts (mV) to 188.9 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 -57.1 mV to -111.6 mV. The negative redox values in monitor wells MW-10, MW-11A and MW-12 indicate that electron acceptors other than dissolved oxygen 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 DO, nitrate, and ferric iron has occurred. The concentrations of methane are elevated in former field waste tanks area wells MW-10 and MW-11A relative to the methane concentration in background well MW-5 (see Table 6), suggesting that utilization of carbon dioxide may be occurring locally in the areas of monitor wells MW-10 and MW-11A.

Sulfate concentrations in monitor wells MW-10, MW-11A, and MW-12 are comparable to those observed in monitor wells MW-5, MW-7, and MW-8 (see Table 6). It appears that sulfate in not being utilized during intrinsic bioremediation.

Therefore, DO, ferric iron and possibly nitrate are supplying adequate electron acceptors to facilitate natural attenuation. In addition, carbon dioxide is apparently acting as an electron acceptor in the vicinity of monitor wells MW-10 and MW-11A, as indicated by elevated dissolved methane concentrations.

The alkalinity data generated during the March 1999 groundwater sampling event is inconclusive with regard to the potential for natural attenuation of hydrocarbons at the facility, because the results from monitor wells MW-10, MW-11A, and MW-12 as well as the background area wells are all greater than 400 mg/L (see Table 3). Evaluation of laboratory-derived alkalinity data is recommended for the next groundwater sampling event.

It is recommended that monitoring for natural attenuation evaluation parameters continue in the former field waste tanks area.

3.0 REMEDIATION SYSTEM

Brown and Caldwell submitted a Remedial Action Plan (RAP) to the New Mexico OCD in May 1994. Based on the results of previous investigations conducted by Brown and Caldwell and Roberts/Schornick and Associates, Inc. (RSA), Brown and Caldwell recommended the installation of a biosparging system. The biosparging system simultaneously treats 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.

The New Mexico OCD 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 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 in monitor well MW-1 measured during the March 1999 groundwater sampling event continue to display declines relative to concentrations of these parameters prior to installation of injection wells AI-20 through AI-24 in February 1998. Benzene concentrations dropped from 7,600 μg/L in December 1997 to less than 1.0 μg/L in December 1998 and March 1999. Total BTEX concentrations have dropped from 30,600 μg/L to 117.9 μg/L between December 1997 and March 1999. TPH concentration decreased from 82 mg/L to 1.5 mg/L during this time period.

Benzene concentrations have decreased from 240 μ g/L to 3.2 μ g/L in monitor well MW-3 and from 230 μ g/L to 8 μ g/L in monitor well MW-4 between December 1997 and March 1999. Similarly, total BTEX concentrations have decreased from 1.930 mg/L to 0.0846 mg/L in monitor well MW-3 and from 4.250 mg/L to 1.678 mg/L in monitor well MW-4 between December 1997 and March 1999. TPH concentrations in monitor well MW-3 dropped from 5.89 mg/L to 0.64 mg/L during this time period. These decreases are likely attributable to increased air flow being applied to the aquifer through air injection wells AI-20 through AI-24.

A graph showing the calculated dissolved-phase benzene mass in the western plume versus time is presented in Figure 5 (the western plume is located in the area of monitor wells MW-1, MW-3, MW-4, and MW-6). 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 of groundwater from vadose zone soils. The benzene mass then decreased steadily after installation. 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.

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 rates 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 March 1999 sampling event was 80 parts per million by volume (ppmv).

The TPH concentration of 80 ppmv measured during the March 1999 sampling event shows a substantial drop from the 1500 ppmv TPH discharge rate observed during the March 24, 1998 groundwater sampling event. The March 1999 TPH discharge rate of 80 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 March 1999.

The VOC emissions rate calculated for the March 1999 groundwater sampling event was 0.11 pound per hour (lb/hour). This emission rate is below the regulatory limit of 10 lb/hour for VOCs. The March 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 0.11 lb/hour and 0.33 lb/hour during the time period of June 1998 through March 1999.

This 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 system modification. The subsequent decrease in mass transfer, in concert with plume mass calculations, as shown in Figure 5, indicates that the overall contaminant mass has been reduced by the biosparging system.

A cumulative summary of analytical results for air emissions monitoring is included in Table 7. These results are based on both laboratory and field analyses.

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4.0 CONCLUSIONS AND RECOMMENDATIONS

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

4.1 Conclusions

- Groundwater flow was to the east at an average hydraulic gradient of 0.008 ft/ft.
- Dissolved benzene and total BTEX concentrations in monitor wells MW-1, MW-3 and MW-4, which are located at the former fueling system area, have decreased during the time period between September 1998 and March 1999. Benzene and total BTEX concentrations in these wells have continued to decline since installation of deep injection wells AI-20 through AI-24 in February 1998.
- Dissolved benzene concentrations have decreased in perimeter monitor wells MW-5, MW-7, MW-8 and MW-9 during operation of the biosparging system.
- Benzene concentrations in monitor wells MW-1, MW-3, MW-4, MW-5, MW-7, MW-8, MW-9, and MW-11A are below the New Mexico Water Quality Control Commission standard of 0.01 mg/L.
- Chloride concentrations in monitor wells MW-10, MW-11A and MW-12, which are located in the former field waste tank area, are above the New Mexico Quality Control Commission standard of 250 mg/L.

4.2 Recommendations

- Continue the quarterly groundwater sampling program and the operation and maintenance of the biosparging system.
- Continue monitoring hydrocarbon emissions on a quarterly basis using a calibrated field FID.
- Continue monitoring for natural attenuation parameters in monitor wells MW-5, MW-10, MW-11A, and MW-12.
- Utilize an existing monitor well (OW-4) at a location approximately 200 feet east of
 existing monitor wells MW-11A and MW-12 to define the lateral extent of constituents
 exceeding WQCC standards and to evaluate groundwater conditions in the area northeast of

monitor well MW-6. (The well, OW-4, is on an adjacent property and should be made available by the current landowner).

- Install a monitor well (MW-13) to the northeast of monitor well MW-6, beyond the zone of influence of existing air injection and extraction wells in order to accurately characterize groundwater conditions in this area. Plug and abandon monitor well MW-6 with the installation of its replacement well, MW-13.
- Install a monitor well (MW-12D) adjacent to existing monitor well MW-12 to evaluate the potential for vertical migration of constituents due to possible density gradients. Monitor well MW-12 was selected as the existing monitor well to be twinned because it has the highest concentrations of chloride and benzene in the former underground field waste tank area, based on data from the last four sampling events.

DISTRIBUTION

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

May 14, 1999

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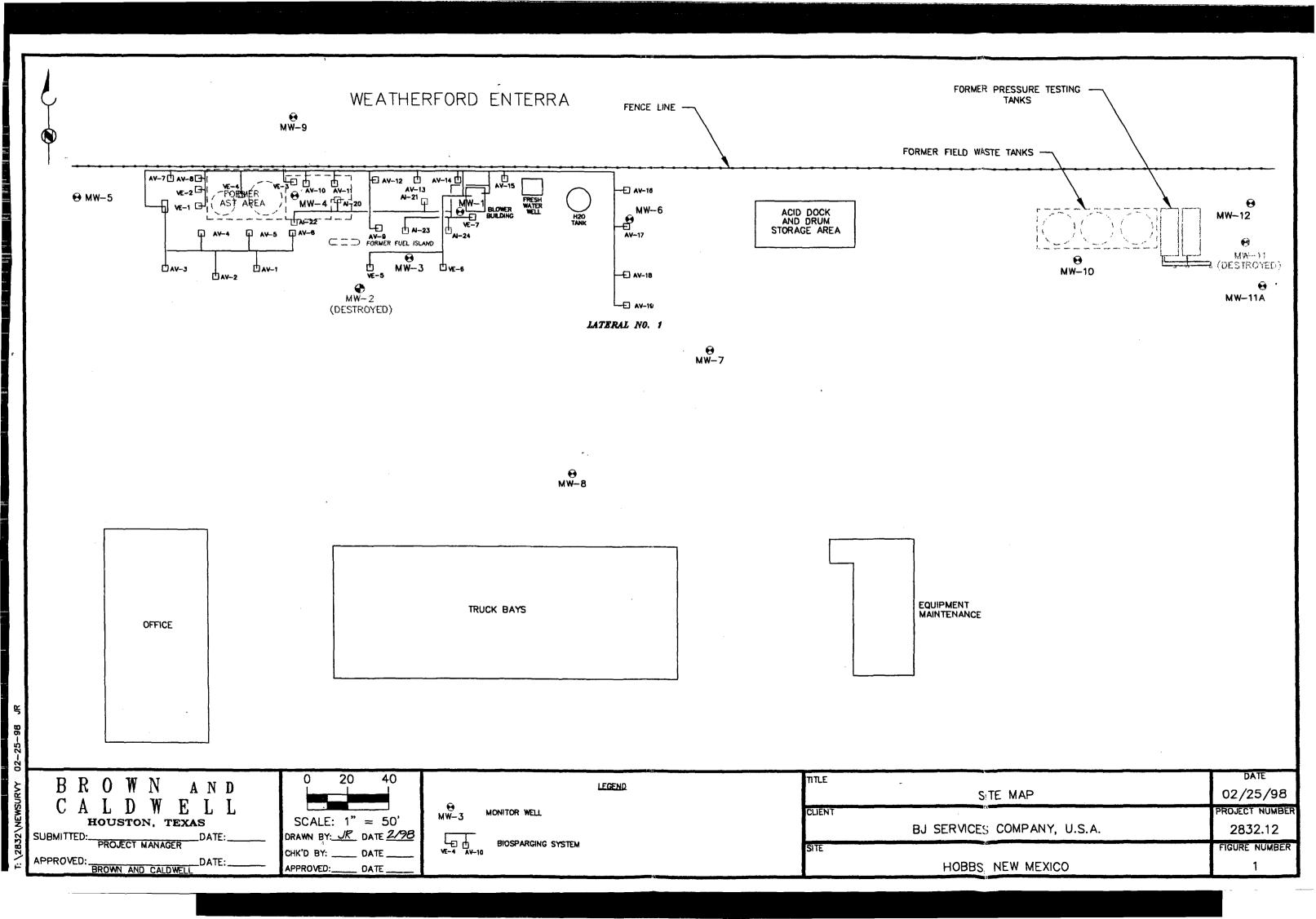
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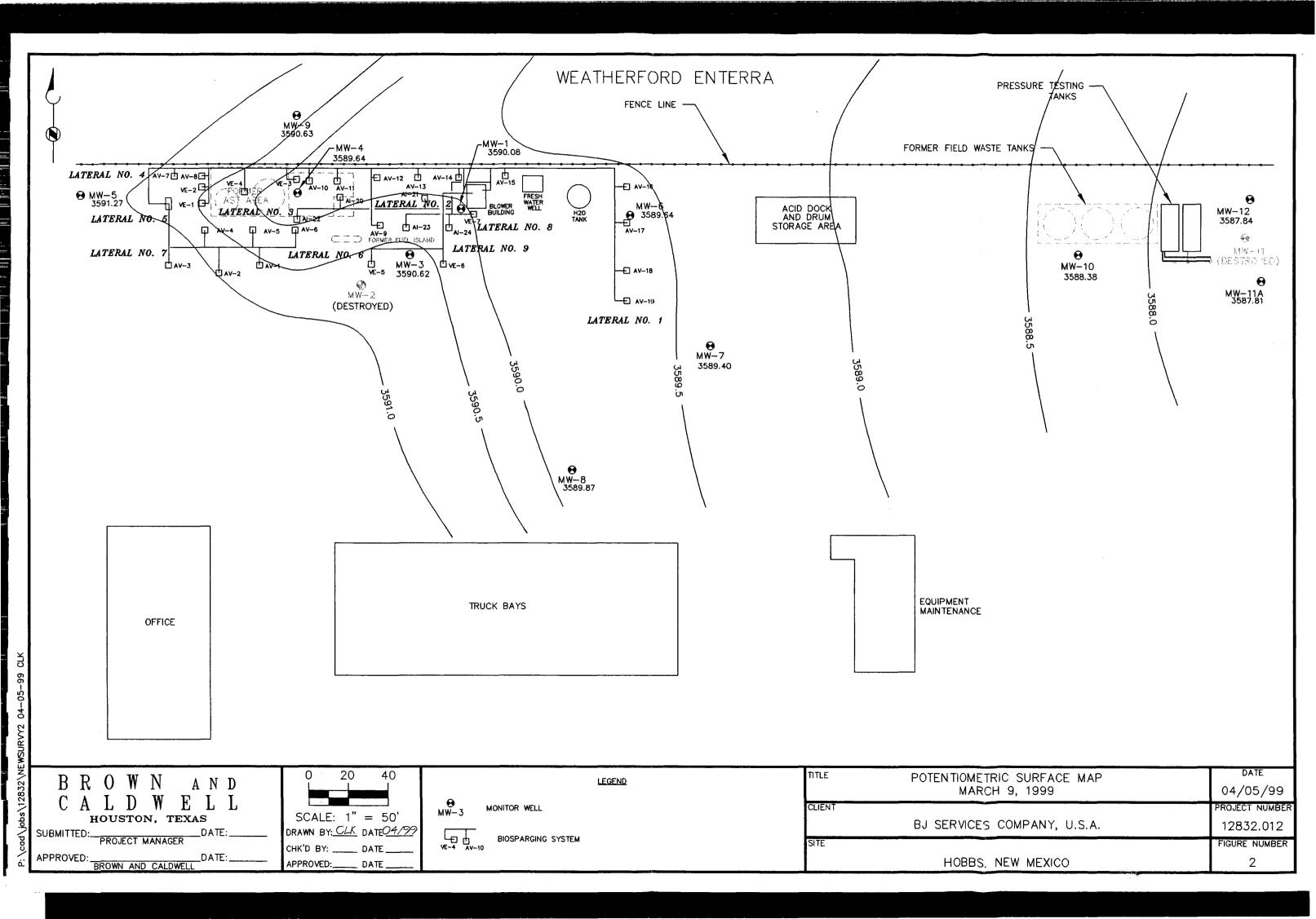
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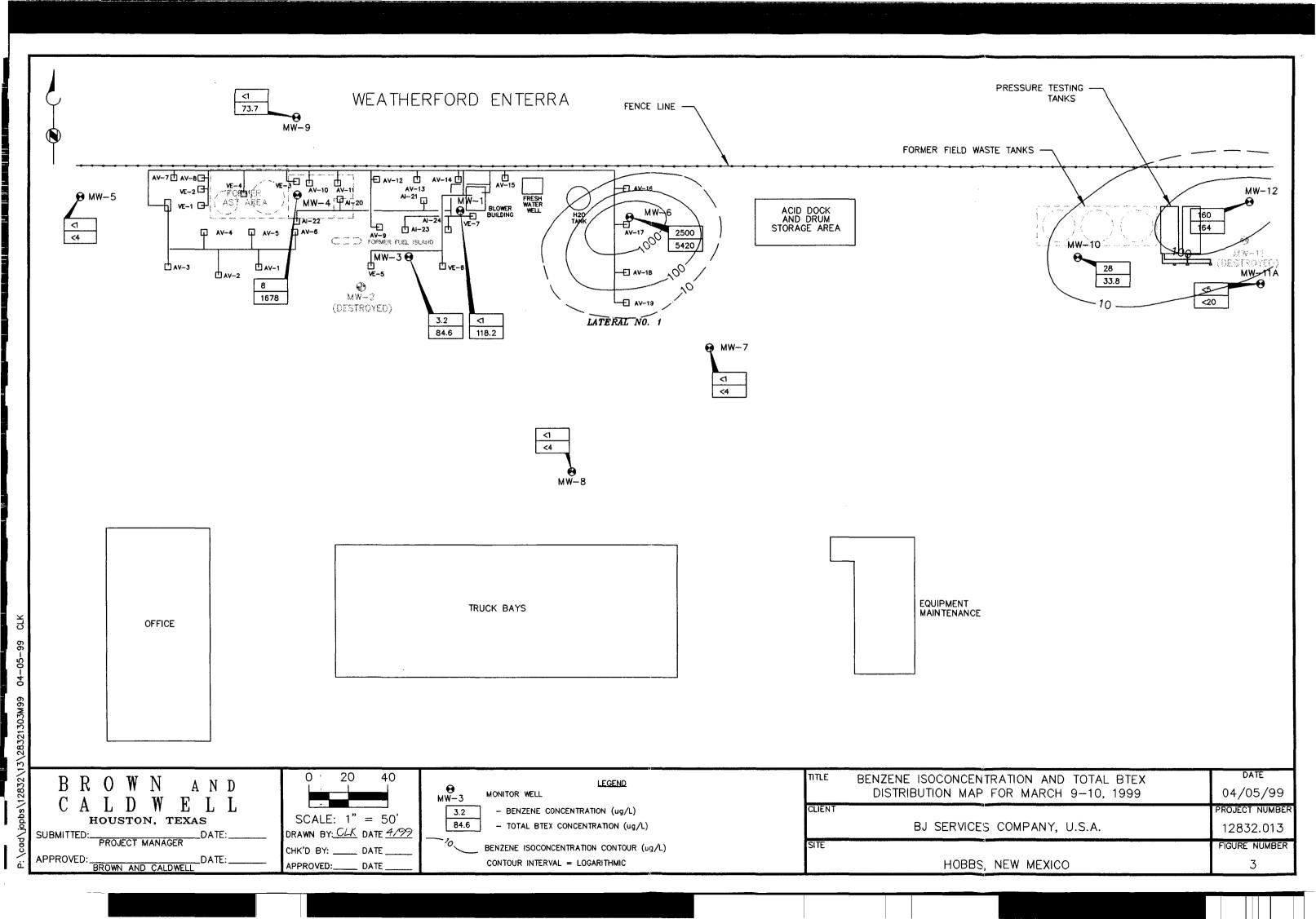
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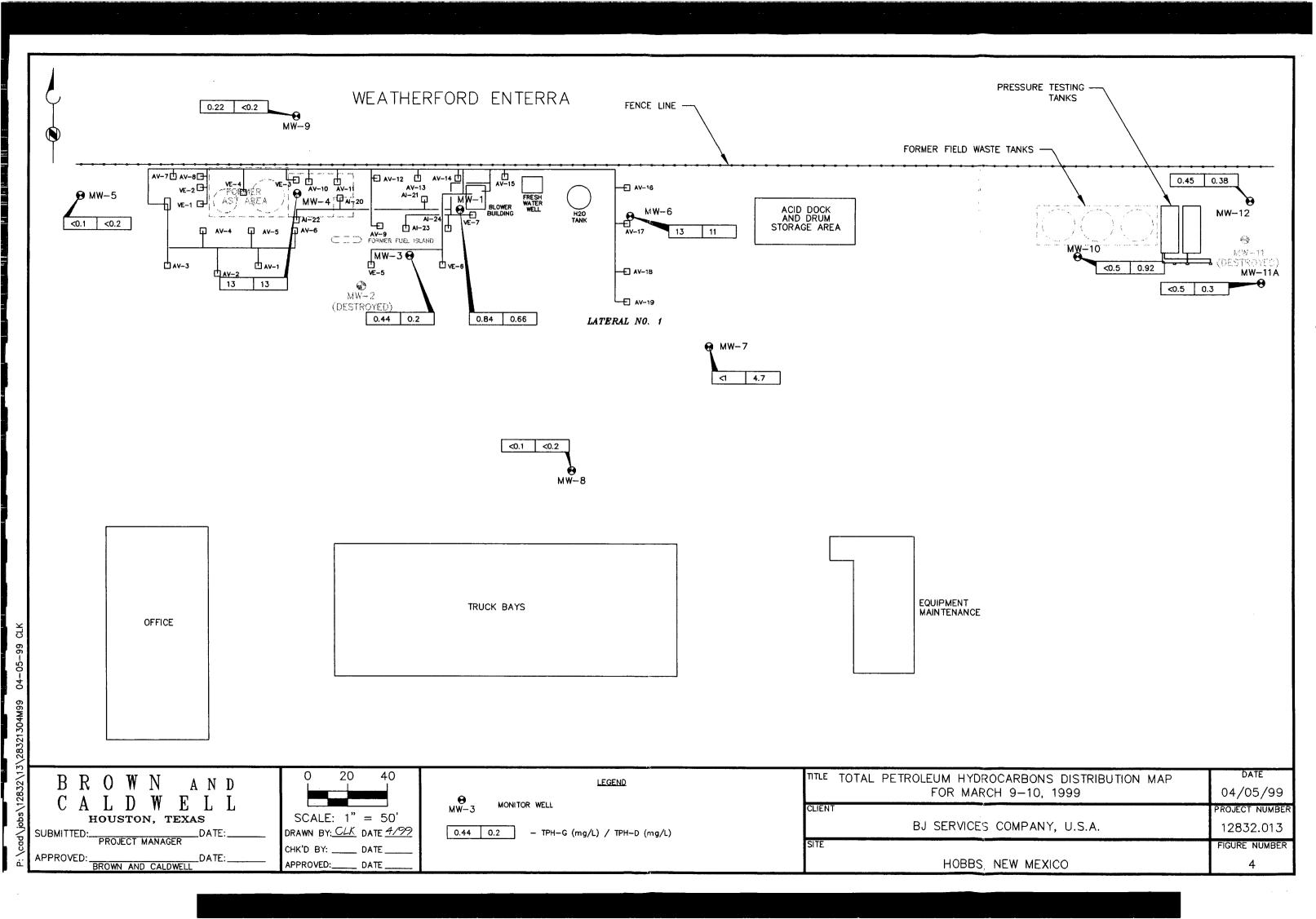
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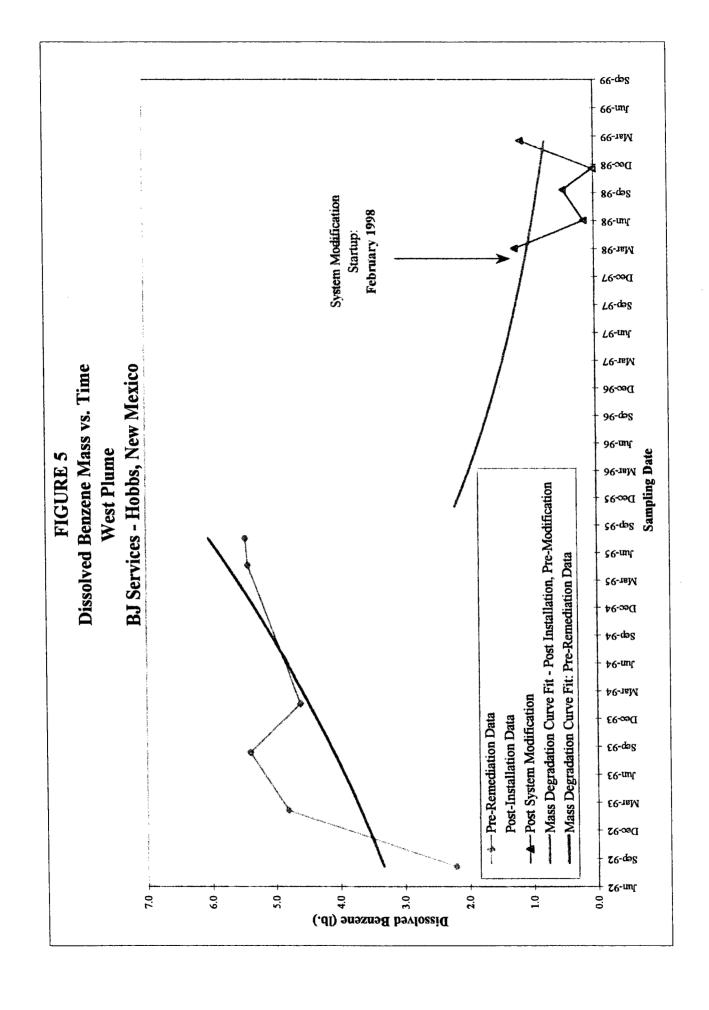
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TABLES

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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 handaugured 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.
March 9-10, 1999	Brown and Caldwell conducted the March 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	
MW-2						
	3,647.59	8/10/92	52.82	0.00	3,594.77	(1)
	3,644.84	2/9/93	49.60	0.00	3,595.24	
	3,644.84	8/18/93	49.71	0.00	3,595.13	
	3,644.84	1/26/94	49.97	0.00	3,594.87	
		5/3/95				(4)

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

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-3					-	
	3,647.68	8/10/92	52.99	0.00	3,594.69	(1)
	3,647.68	2/9/93	52.72	0.00	3,594.96	
	3,647.68	8/18/93	52.82	0.00	3,594.86	
	3,647.68	1/26/94	53.05	0.00	3,594.63	
	3,647.68	5/3/95	54.31	0.00	3,593.37	
	3,645.00	7/31/95	51.24	0.00	3,593.76	
	3,645.00	11/14/95	51.10	0.00	3,593.90	
	3,645.00	2/23/96	51.68	0.00	3,593.32	
	3,645.00	5/31/96	51.45	0.00	3,593.55	
	3,645.00	8/23/96	51.55	0.00	3,593.45	
	3,645.00	12/2/96	52.23	0.00	3,592.77	
	3,645.00	3/12/97	52.67	0.00	3,592.33	(3)
	3,645.00	6/12/97	52.68	0.00	3,592.32	ν-,
	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	
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	(0)
	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	i di i dileeli
	3,645.28	6/23/98	53.82	0.22	3,591.64	
	3,645.28	9/30/98	53.96	0.00	3,591.04	200 ml PSH
	3,645.28	12/9/98	54.27	0.00	3,591.01	200 1111 011
	3,645.28	3/10/99	54.69	0.04	3,590.62	

Table printed: 02-Apr-99

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	
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	

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	
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	

Table printed: 02-Apr-99

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	
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	

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

Monitoring Well	TOC Elevation	Date Measured	Depth to GW (ft)	Free Product Thickness (ft)	GW Elevation (ft MSL)	Comments
MW-11					•	
	3,643.78	8/18/93	51.92	0.00	3,591.86	(1)
	3,643.78	1/26/94	52.32	0.00	3,591.46	
	3,643.78	5/3/95	53.38	0.00	3,590.40	
	3,643.78	7/31/95	53.35	0.00	3,590.43	
	3,643.78	11/14/95	52.96	0.00	3,590.82	
	3,643.78	2/23/96	53.50	0.00	3,590.28	
	3,643.78	5/31/96	53.25	0.00	3,590.53	
	3,643.78	8/23/96	53.49	0.00	3,590.29	
	3,643.78	12/2/96	53.79	0.00	3,589.99	
	3,643.78	3/12/97	53.81	0.00	3,589.97	(3)
	3,643.78	6/12/97	53.96	0.00	3,589.82	
	3,643.78	9/12/97	52.93	0.00	3,590.85	
		12/10/97				(5)
MW-11A						
	3,644.24	3/23/98	54.79	0.00	3,589.45	(6)
	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	
MW-12						
	3,644.29	3/23/98	54.72	0.00	3,589.57	(6)
	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	

- (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 and is assumed detroyed after January, 1994.
- (5) MW-11 could not be located and is assumed detroyed after September 12, 1997.
- (6) TOC elevations for MW-11A and MW-12 estimated relative to TOC elevation for MW-10.

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

							Dissolved	Ferrous	
Monitor	Date	Well	pН	Temperature	Conductivity	Redox	Oxygen	Iron	Alkalinity
Well	Measured	Volume	•	оC	(umhos)	(mV)	(mg/L)	(mg/L)	(mg/L)
MW-1	3/10/99	0	8.46	22.24	836.0	64.2	6.47	NM	NM
''''	2710.77	1	7.56	17.79	828.0	-8.5	3.13	NM	NM
[2	7.63	17.82	799.0	-44.5	4.85	NM	NM
i		3	7.63 7.67	17.82	799.0 791.0	-59.9	4.83 5.43	5	140
MW-3	03/10/99	0	7.49	19.07	949.0		4.23	NM	NM
IVI W - 3	03/10/99	1	7.49	18.60	949.0 951.0	71.1 49.9	3.03	NM NM	NM NM
		2	7.24	18.62	967.0			NM	NM
		3	7.17	18.67	1004.0	48.3 55.2	2.57 2.15	0	380
MW-4	03/10/99	0	NS	NS	NS	NS	NS	NM	NM
101 00 -4	03/10/99	1	NS NS	NS NS	NS NS	NS NS	NS NS	NM	NM NM
l l		2	NS NS	NS NS	NS NS	NS NS	NS NS	NM NM	NM NM
l		3	NS NS	NS NS	NS NS	NS NS	NS NS	0	380
MW-5	03/09/99	0	7.96	20.41	1092	31.5	8.11	NM	NM
WIW-5	03/09/99	1	7.98	18.85	1092	61.9	7.17	NM NM	NM NM
		2	7.28	18.83	979			NM NM	
		3	7.20	18.86	979	78.3 84.5	6.28 6.06	0	NM 360
MW-6	03/10/99	0	7.18	19.96	1148.0	53.2	7.09	NM	NM
MW-6	03/10/99	1	7.60	18.8	1270.0	34.3	Į.	NM NM	NM NM
		2	7.50	18.94	1291.0	-23.3	7.63	0	380
1		3	7.5 D	D 16.94	D 1291.0	-23.3 D	7.54 D	NM	NM
MW-7	03/09/99	0	7.28	20.98	1418	173.7	5.85	NM	NM
101 44-7	03/03/33	1	6.73	20.47	1323	185.5	4.62	NM	NM
		2	6.73	21.1	1332	188.9	4.45	0	>400
		3	D D	D	D 1332	D	D 4.43	NM	NM
MW-8	03/09/99	0	7.82	23.02	1135	139.3	6.23	NM	NM
1444-6	05/07/77	1	7.01	20.06	1346	109.4	4.08	0	>400
1		2	D D	D	D D	D D	D 7.00	NM	NM
		3	D	D	D	D	D	NM	NM
MW-9	03/10/99	0	7.69	18.95	982.0	82.8	4.11	NM	NM
"""	05, 10, 27	1	7.18	19.05	957.0	71.5	3.21	NM	NM
		2	7.21	20.09	946.0	80.1	4.21	NM	NM
		3	7.2	19.91	933.0	91.8	3.95	0	340
MW-10	03/09/99	0	7.59	20.38	2908	-15.8	5.21	NM	NM
, 10		1	6.82	19.68	2911	-69.4	1.82	NM	NM
		2	6.89	20.28	3443	-92.4	1.15	NM	NM
		3	6.94	20.66	3591	-111.6	0.78	4.0	>400
MW-11A	03/10/99	0	7.14	19.72	2063.0	81.8	5.93	NM	NM
1		1	6.88	19.0	2091	10.8	0.57	NM	NM
i		2	6.86	18.96	2223	-27.6	0.31	NM	NM
		3	6.85	18.98	2426	-57.1	0.31	6	>400
MW-12	03/10/99	0	7.29	18.96	1278	-44.3	4.02	NM	NM
		1	7.06	18.69	1351	-81.8	0.5	NM	NM
		2	7.01	18.77	1381	-87.9	0.3	NM	NM
	1	3	7.00	18.82	1380	-93.11	0.3	3	> 400

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

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

NM=Not Measured

D=Well went dry

NS=Not Screened due to Phase Separated Hydrocarbons

Table 4

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

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре		microgran	ns per liter, ug/l		milligrams p	er liter, mg/L
MW-1	040/07			40000	0400		A 1 A	k) c
	8/10/92	Regular	5550	12090	2160	7370	NA 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
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		1						
	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	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		1		1		1	0.44
	03/10/99	Regular	3.2	7.4	42	32	0.2	(

Table 4

Cummulative Analytical Results for Groundwater Samples

Hobbs, New Mexico Facility

BJ Services Company, U.S.A.

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре		microgran	ns per liter, ug/l		milligrams p	er 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
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 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	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
MW-6		1.	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

Table 4

Cummulative Analytical Results for Groundwater Samples
Hobbs, New Mexico Facility

BJ Services Company, U.S.A.

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре			ns per liter, ug/l		milligrams pe	· · · · · · · · · · · · · · · · · · ·
	11/15/95	Regular	8900	17000	2900	5500	NA NA	57
	2/23/96	Regular	8100	10000	2300	4000	NA	58
	5/31/96	Regular	83	150	15	51	NA 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
l	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
8-WM		_			1		1	ļ
	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

Table 4

Cummulative Analytical Results for Groundwater Samples

Hobbs, New Mexico Facility

BJ Services Company, U.S.A.

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре		microgran	ns per liter, ug/l		milligrams p	er liter, mg/
	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	<0.2	<0.1
MW-9								
	4/22/93	Regular	570	380	< 50	870	NA	NA
	7/15/93	Regular	121	7.3	3	458	NA	NA
	8/19/93	Regular	390	290	40	250	NA	NA
	1/27/94	Regular	327	357	51.1	293	NA	NA
	5/3/95	Regular	380	110	19	120	NA	NA
	8/1/95	Regular	660	410	91	310	NA	6.2
	11/15/95	Regular	240	24	11	140	NA	1.5
	11/15/95	Duplicate	170	18	10 ⁻	120	NA	1.9
	2/23/96	Regular	170	18	2.3	160	NA	4.3
	5/31/96	Regular	120	16	3	200	NA	NA
	8/23/96	Regular	82	13	6	270	NA	4
	8/23/96	Duplicate	76	14	4.8	250	NA	4.4
	12/2/96	Regular	61	< 25	< 25	210	2.6	2.8
	12/2/96	Duplicate	86	13	2.4	270	3.7	2.9
	3/12/97	Regular	30	48	420	880	8.2	19
	6/12/97	Regular	4.7	2.1	11	97	2.6	2.2
	6/12/97	Duplicate	< 5	< 5	6.6	69	5.2	1.9
	9/12/97	Regular	2.1	2.3	2.1	120	1.2	1.9
	12/10/97	Regular	4.9	9	6.8	62	0.86	0.92
	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
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

Table 4

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

Monitor	Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH-D	TPH-G
Well	Date	Туре		microgran	ns per liter, ug/l		milligrams p	er liter, mg/L
	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
MW-11		_						
	8/19/93	Regular	< 2	< 2	< 2	< 2	NA	NA
	1/27/94	Regular	< 1	< 1	< 1	< 1	NA	NA
	5/4/95	Regular	< 0.3	< 0.3	< 0.3	< 0.6	NA	NA
	8/1/95	Regular	44	29	5.5	13	NA	0.2
	11/15/95	Regular	190	2.8	6.2	11	NA	0.4
	2/23/96	Regular	49	1.2	0.51	4	NA	0.25
	5/31/96	Regular	300	83	12	28	NA	0.8
	8/23/96	Regular	100	1.2	0.3	4.7	NA	0.26
	12/2/96	Regular	970	< 5	6	8.1	2	1.3
	3/12/97	Regular	130	< 5	13	5.8	0.42	< 0.5
	3/12/97	Duplicate	100	< 5	10	5.1	0.43	< 0.5
	6/12/97	Regular	150	23	19	< 5	1.1	0.55
	9/12/97	Regular	220	15	27	13	1	0.46
MW-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	<.5
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

MW-2 destroyed after January, 1994

MW-11 destroyed after September, 1997

NA=Not Analyzed

NS=Not Sampled

NSP=Not Sampled due to Phase Separated Hydrocarbons

Summary of Detected Analytes for PAHs, Metals, SVOCs and Groundwater Quality Parameters Hobbs, New Mexico Facility BJ Services Company, U.S.A. Table 5

NW-1 NW-3 NW-4 NW-5 NW-6 NW-7 NW-8 NW-9 NW-10 NW-11 NW-1 NW-1 NW-5 NW-6 NW-7 NW-8 NW-9 NW-10 NW-11 NW-								Monito	Monitor Wells					
mpf.T 380 430 490 290 670 440 360 570 560 821956 310 310 210 270 120 440 360 570 550 450 821396 310 310 210 270 120 440 280 390 550 450 3472-2498 286 214 175 247 180 260 390 557 NA 81053 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10	AnalyteName	Sample Date	MW-1	MW-3	MW-4	MW-5	9-MM	MW-7	MW-8	6-WW	MW-10		MW-11A	MW-12
81/95 380 430 430 230 670 440 360 570 550 560 872396 310 310 210 270 120 400 280 390 520 430 392-2498 286 214 175 247 180 309 260 306 557 NA 81/95 <10	Alkalinity	mg/L												
817396 330 430 430 430 521 430 532396 331 331 331 332 340 340 340 340 340 340 340 340 340 340	Bicarbonate, as CaC	03												
8/23/96 310 310 210 270 120 400 280 390 520 430 302-3408 286 214 115 247 180 309 260 396 557 NA 39-1099 92 309 186 283 247 180 309 260 306 557 NA 81/95 <10		8/1/95	380	430	490	290	0/9	440	360	570	520	260	NA	NA V
3/23-24/98 286 214 175 247 180 399 260 306 557 NA 3/9-10/99 92 309 186 283 286 358 317 333 278 NA 81/95 <10		8/23/96	310	310	210	270	120	400	280	390	520	430	NA	NA
8/1099 92 309 186 283 286 358 317 333 278 NA 8/1095 <10		3/23-24/98	286	214	175	247	180	309	260	306	557	A	319	451
8/1955 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 <		3/9-10/99	92	309	186	283	286	358	317	333	278	NA	335	386
8/1954 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 <	Carbonate													
8/23/96 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10		8/1/95	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	01	ΑN	NA
3/23-24/98		8/23/96	< 10	< 10	< 10	< 10	< 10	> 10	< 10	< 10	< 10	< 10	NA	NA
39-1099 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <t< td=""><td></td><td>3/23-24/98</td><td>~</td><td>~</td><td><u>~</u></td><td>^</td><td>~</td><td><u>~</u></td><td><u>~</u></td><td><u>~</u></td><td>۲ ۲</td><td>NA</td><td>^</td><td><1</td></t<>		3/23-24/98	~	~	<u>~</u>	^	~	<u>~</u>	<u>~</u>	<u>~</u>	۲ ۲	NA	^	<1
03 3/23-24/98 430 430 275 342 440 670 740 510 1450 NA 3/9-10/99 250 440 310 340 640 780 680 370 720 NA 8/1/95 <10 <10 <10 <10 <10 <10 <10 <10 <10 <10		3/9-10/99	⊽	⊽	⊽	7	⊽	⊽	⊽	⊽	7	NA	7	7
3/23-24/98 430 430 275 342 440 670 740 510 1450 NA 3/9-10/99 250 440 310 340 640 780 680 370 720 NA 8/1/95 <10	Hardness-Total as Ca	1003												
3/9-10/99 250 440 310 340 640 780 680 370 720 NA 8/19/5 < 10		3/23-24/98	430	430	275	342	044	0/9	740	510	1450	N A	1000	1600
8/1/95 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 <		3/9-10/99	250	440	310	340	040	780	089	370	720	ΑN	1150	460
8/1955 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 <	Hydroxide													
8/23/96 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10 < 10		8/1/95	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	AN	NA
mg/L 150 310 380 310 350 110 2200 3400 8/1/95 160 150 310 130 380 310 350 110 2200 3400 8/23-24/98 130 140 100 99 210 250 360 140 2000 2900 3/23-24/98 212 206 126 151 183 223 364 164 2390 NA 3/23-24/98 163 156 142 155 411 238 274 123 1160 NA 3/23-24/98 0.9 1.5 1.1 0.8 0.9 1.3 6.1 NA 3/23-24/98 1.54 1.44 1.84 4.93 NA 3/23-24/98 <0.0012		8/23/96	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	× 10	< 10	AN	Y Z
8/1/95 160 150 310 380 310 350 110 2200 3400 8/23/96 130 140 100 99 210 250 360 140 2000 2900 3/23-24/98 212 206 126 151 183 223 364 164 2390 NA 3/23-24/98 212 206 126 155 411 238 274 123 1160 NA 3/23-24/98 0.9 1.2 1.2 1.6 1.1 0.8 0.9 1.3 1160 NA 3/23-24/98 0.9 1.5 1.1 0.8 0.9 1.3 0.9 NA NA NA 3/23-24/98 0.0012 0	Anions	mg/L												
8/1/95 160 150 310 130 380 310 350 110 2200 3400 8/23/96 130 140 100 99 210 250 360 140 2000 2900 3/23-24/98 212 206 126 151 183 223 364 164 2390 NA 3/9-10/99 163 156 142 155 411 238 274 123 1160 NA 3/9-10/99 163 1.2 1.2 1.5 411 0.8 0.9 1.3 6.1 NA 3/9-10/99 1.54 1.44 1.84 4.93 NA 3/9-10/99 NA NA <0.0012	Chloride													
8/23/96 130 140 100 99 210 250 360 140 2000 2900 3/23-24/98 212 206 126 151 183 223 364 164 2390 NA 3/9-10/99 163 156 142 155 411 238 274 123 1160 NA 3/23-24/98 0.9 1.2 1.2 0.6 1.1 0.8 0.9 1.3 6.1 NA 3/9-10/99 1.54 1.46 1.5 1.38 1.79 1.56 1.44 1.84 4.93 NA 3/9-10/99 NA NA NA NA NA NA NA NA NA 8/1/95 4.7 5.6 1.5 1.2 0.0012 <0.0012		8/1/95	160	150	310	130	380	310	350	110	2200	3400	ΝΑ	Ϋ́
3/23-24/98 212 206 126 151 183 223 364 164 2390 NA 3/23-24/98 163 156 142 155 411 238 274 123 1160 NA 3/23-24/98 0.9 1.2 1.2 0.6 1.1 0.8 0.9 1.3 6.1 NA 3/23-24/98 3/23-24/98 0.9 1.54 1.46 1.5 1.38 1.79 1.56 1.44 1.84 4.93 NA 3/23-24/98 3/20-24/98 0.0012 0.0012 0.0012 0.0012 0.0012 0.0012 0.039 0.0012 0.035 NA NA NA NA NA 0.0012 0.0		8/23/96	130	140	100	66	210	250	360	140	2000	2900	AN A	NA V
3/9-10/99 163 156 142 155 411 238 274 123 1160 NA 3/23-24/98 0.9 1.2 1.2 0.6 1.1 0.8 0.9 1.3 6.1 NA 3/23-24/98 0.99 1.54 1.56 1.44 1.84 4.93 NA 3/23-24/98 0.00012 0.0012		3/23-24/98	212	506	126	151	183	223	364	164	2390	NA	940	1200
3/23-24/98 0.9 1.2 1.2 0.6 1.1 0.8 0.9 1.3 6.1 NA 3/9-10/99 1.54 1.46 1.5 1.38 1.79 1.56 1.44 1.84 4.93 NA 3/23-24/98 <0.0012		3/9-10/99	163	156	142	155	411	238	274	123	1160	NA	834	314
3/23-24/98 0.9 1.2 1.2 0.6 1.1 0.8 0.9 1.3 6.1 NA 3/23-24/98 1.54 1.46 1.5 1.38 1.79 1.56 1.44 1.84 4.93 NA 3/23-24/98 	Fluoride													
3/9-10/99 1.54 1.54 1.84 1.84 4.93 NA 3/9-10/99 1.54 1.56 1.44 1.84 4.93 NA 3/9-10/99 NA NA 0.0012 <0.0012		3/23-24/98	6:0	1.2	1.2	9.0	1:1	0.8	6.0	1.3	6.1	ΑΝ	2.9	4.2
3/9-10/99 NA NA NA < 0.0012 < 0.0012 < 0.0012 < 0.0012 < 0.0012 < 0.0012 < 0.0012 < 0.0012 < 0.0012		3/9-10/99	1.54	1.46	1.5	1.38	1.79	1.56	4.1	1.84	4.93	ΝΑ	3.08	3.13
3/9-10/99 NA NA NA C0.0012 NA	Methane			-										
3/9-10/99 NA NA A.00012 NA NA NA NA NA NA NA NA 8/1/95 4.7 5.6 15 28 1.3 9.2 11 38 <0.1		3/23-24/98	< 0.0012	< 0.0012	< 0.0012	< 0.0012	< 0.0012	< 0.0012	0.039	< 0.0012	0.91	ΑΝ	0.14	< 0.0012
8/1/95 4.7 5.6 15 28 1.3 9.2 11 38 < 0.1 5.5 11 3.8 3.2 3.2 4.7 5.6 12 < 0.5 10 8.6 24 < 5 11 3.3 3.3 3.2 3.9 3.0 7 2.1 2.6 NA < 0.1 3.3 0.7 3.7 NA NA NA		3/9-10/99	Y.	NA	NA A	<0.0012	NA	NA	NA	AN	0.035	Ϋ́	0.094	<0.0012
4.7 5.6 15 28 1.3 9.2 11 38 < 0.1	Nitrate (Nitrogen as l	F												
11 7.6 7.6 12 <0.5 10 8.6 24 <5 11 1.78 3.07 2.59 3.87 0.69 3.92 1.84 4.27 0.07 NA 0.7 2.1 2.6 NA <0.1 3.3 0.7 3.7 NA NA		8/1/95	4.7	9.6	15	28	1.3	9.2	=======================================	38	< 0.1	5.5	N A	Z A
1.78 3.07 2.59 3.87 0.69 3.92 1.84 4.27 0.07 NA O.1 3.3 0.7 3.7 NA NA NA		8/23/96	11	7.6	9.7	12	< 0.5	01	9.8	24	<\$	=	NA	NA A
0.7 2.1 2.6 NA <0.1 3.3 0.7 3.7 NA NA		3/23-24/98	1.78	3.07	2.59	3.87	69:0	3.92	1.84	4.27	0.07	NA	< 0.05	< 0.05
		3/9-10/99	0.7	2.1	2.6	N A	0.1	3.3	0.7	3.7	A'A	NA	₽0.1	40.1

Summary of Detected Analytes for PAHs, Metals, SVOCs and Groundwater Quality Parameters Hobbs, New Mexico Facility BJ Services Company, U.S.A. Table 5

							Monit	Monitor Wells					
AnalyteName Sample Date	Sample Date	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	6-WW	MW-10	MW-11	MW-11 MW-11A	MW-12
Sulfate													
	8/1/95	150	150	210	230	6.7	180	160	150	130	230	ΑΝ	NA
	8/23/96	130	150	150	140	82	80	991	180	120	130	ΑN	NA
	3/23-24/98	130	180	160	190	230	310	250	230	320	NA	190	240
	3/9-10/99	196	162	178	195	72	246	240	146	223	NA	227	193
Cations	mg/L												
Calcium													
	8/1/95	120	120	220	160	320	300	300	180	610	490	NA	NA
	8/23/96	120	130	68	110	62	270	230	190	390	440	A A	Ϋ́
	3/23-24/98	129	122	62	109	94	208	215	142	417	ΝA	259	388
	3/9-10/99	80.2	129	8.06	116	141	233	197	122	214	N A	308	148
Magnesium													
	8/1/95	8	36	58	72	72	42	49	43	130	130	Ϋ́	Ϋ́Α
	8/23/96	120	32	21	18	28	\$	48	4	2	120	Š	NA A
	3/23-24/98	36	30	18	20	42	47	52	36	130	NA A	96	108
	3/9-10/99	19.7	31.5	20.4	21.6	62.2	54.4	47.7	28.5	43	NA V	101	32.1
Potassium													
	8/1/95	2.4	2.6	3.5	4.2	6	3.4	S	4.1	35	46	NA	Y Y
	8/23/96	2.4	6	2.2	3.1	2.4	3.7	3.9	2.6	41	53	ΝΑ	Ϋ́
	3/23-24/98	< 20	< 20	< 20	× 20	< 20	< 20	< 20	< 20	20	NA	30	70
	3/9-10/99	3	4	6	4	4	6	4	3	15	Y.	21	101
Sodium													
	8/1/95	001	93	140	110	130	92	94	86	099	2000	ΝΑ	NA
	8/23/96	100	110	88	120	120	96	100	83	096	2600	Ϋ́	ZA
	3/23-24/98	113	126	109	130	100	92	101	118	1090	NA	312	381
	3/9-10/99	126	135	124	155	141	110	115	122	856	NA V	225	180

Summary of Detected Analytes for PAHs, Metals, SVOCs and Groundwater Quality Parameters Hobbs, New Mexico Facility

BJ Services Company, U.S.A. Table 5

							Monite	Monitor Wells					
AnalyteName	Sample Date	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	6-MW	MW-10	MW-11	MW-11A	MW-12
Metals	mg/L												
Arsenic													
	8/1/95	9/00.0	0.0043	< 0.002	0.0059	0.028	0.0033	0.0034	0.0055	0.015	9800:0	Ϋ́	NA A
	8/23/96	0.0078	9900:0	0.0059	0.0067	0.018	0.0036	0.0033	0.0044	0.028	0.011	NA	NA
	3/23-24/98	0.007	0.007	0.008	0.007	0.013	< 0.005	< 0.005	0.005	0.035	NA	0.019	0.013
	3/9-10/99	0.013	600.0	0.012	0.005	0.02	9000	0.005	0.007	970.0	ΑΝ	0.036	990.0
Barium													
	8/1/95	690:0	0.38	0.34	0.049	1.1	0.069	0.075	0.089	0.37	0.2	NA	٧X
	8/23/96	0.064	0.24	690.0	0.038	0.29	0.061	990:0	680.0	0.26	0.2	NA	NA
	3/23-24/98	0.11	0.182	0.044	0.044	0.208	0.059	0.074	990:0	0.287	AN	0.163	0.157
	3/9-10/99	0.058	0.059	0.045	0.054	0.555	9/0.0	0.052	0.043	0.17	NA	0.174	0.144
Cadmium													
	8/1/95	< 0.001	< 0.001	0.0052	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	A A	ΝΑ
	8/23/96	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	NA	ΝΑ
	3/23-24/98	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	AN	< 0.005	< 0.005
	3/9-10/99	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	Ϋ́	<0.005	<0.005
Chromium													
	8/23/96	< 0.01	< 0.01	< 0.01	< 0.01	0.049	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	AN	NA
	3/23-24/98	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	NA A	< 0.01	< 0.01
	3/9-10/99	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	40.01	10:0>	Z Y	40.01	<0.01
Mercury													
	8/23/96	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	ΑΝ	NA
	3/23-24/98	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0003	< 0.0002	< 0.0002	NA	< 0.0002	< 0.0002
	3/9-10/99	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	N A	<0.0002	<0.0002

Summary of Detected Analytes for PAHs, Metals, SVOCs and Groundwater Quality Parameters Hobbs, New Mexico Facility BJ Services Company, U.S.A. Table 5

							Monit	Monitor Wells					
AnalyteName	Sample Date	MW-1	MW-3	MW-4	MW-5	9-MW	MW-7	MW-8	MW-9	MW-10	MW-11	MW-11 MW-11A	MW-12
PAHs	µg/L												
Naphthalene													
	8/1/95	<5	210	1700	<5	470	<\$	<\$	15	92	<5	Y Y	NA V
	8/23/96	230	110	54	<\$	< 30	<5	<5	< 84	> 76	< 5	NA VA	NA A
	3/23-24/98	130	23	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	4	•	NA	8:0	11
	3/9-10/99	10	00	170	0.1	160	Ø.1	Ø.1		9	NA	₽.1	19
SVOCs	µg/L												
2,4-Dimethylphenol													
	8/1/95	< 50	6	> 500	< 5	42	<\$	<5	<5	<5	< 5	Y.	NA
	8/23/96	NA	NA A	N.	NA	AN	A A	A'A	NA	NA	NA	Y.	NA
2-Methylnaphthalene	ě												
	8/1/95	280	62	1500	< \$	150	<\$	<5	36	23	< 5	N A	NA
	8/23/96	NA	NA	ΑN	NA	AN	N A	A'A	NA	NA	NA	Y.	Z,
2-Methylphenol													
	8/1/95	< 50	99	< 500	<5	< 30	<5	< 5	< 5	<\$	< 5	A V	NA
	8/23/96	A A	AN	NA A	NA A	N A	N A	ΝA	Ϋ́	Ą	NA	NA A	NA
4-Methylphenol													
	8/1/95	08 >	< 20	008 >	« V	150	∞ V	 V	% V	% V	« V	A A	NA
	8/23/96	Ä	NA	NA	NA	A N	A A	NA	NA	NA	N A	Ą	NA
Bis(2-ethylhexyl)phthalate	thalate												
	8/1/95	750	< 20	10000	9	× 40	<7	<7	<7	<7	<7	NA AN	Y Y
	8/23/96	Ϋ́	AN	N.	NA	N A	A A	NA	NA	Ϋ́	NA	NA A	NA
Phenol													
	8/1/95	< 50	< 10	< 500	< 5	< 30	<\$	< >	<\$	8.2	<5	A A	NA
	8/23/96	Ϋ́	NA	NA	NA	NA	N A	ΑN	NA	NA	NA	A A	NA
1						•	•						

MW-2 Destroyed on May 3, 1995, MW-11 destroyed after September 1997.

NA= Not Analyzed.
PAHs = Polyaromatic Hydrocarbons.

Table 6 Laboratory Analytical Results for Natural Attenuation Evaluation Parameters BJ Services Company, U.S.A.

Hobbs, New Mexico

Well	Analytical Method (1)	Nitrate (mg/L)	Sulfate (mg/L)	Dissolved Methane(2) (ppm)	
MW-5	300.0	<0.1	131	<0.0012	
MW-3	353.3/375.4	NA	195	<0.0012	
MW-7	300.0	NA	NA	NA	
101 00 - 7	353.3/375.4	3.3	246	NA	
M337 0	300.0	NA	NA	NTA	
	353.3/375.4 0.7		240	NA	
MW-10	300.0	<0.1	142	0.035	
WIW-10	353.3/375.4	NA	223	0.053	
MW-11A	300.0	<0.1	164	0.094	
IVI W - I I A	353.3/375.4	<0.1	227	0.094	
MW-12	300.0	<0.1	137	<0.0012	
101 00 -12	353.3/375.4	<0.1	193	QU.0012	

1=By EPA Method 300, except as noted (Method 353.3 for nitrate, Method 375.4 for sulfate).

2 = Method RSK-147

NA = Not analyzed

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

							Discharge	Benzene	Total BTEX	TPH
Sample	Sample	Benzene	Toluene	Ethylbenzene	Xylenes	TPH	Rate,	Emission	Emission	Emission
Number	Date		parts per	parts per million by volume, ppmv	e, ppmv		scfm	Rate, lb/hr	Rate, lb/hr	Rate, lb/hr
Extraction-1	9/19/95	790	1100	340	920	9200	132.47	1.235	5.943	16.31
Effluent-1	9/20/95	066	2500	260	1600	16000	135.76	1.575	10.939	27.37
Effluent-2	9/28/95	13	28	9	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	9	44	12	40	066	124.68	0.009	0.189	1.56
Effluent 042496-01	4/25/96	4	37	10	36	006	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	Ą	12	۵	ζ,	200	126.18	0.007	0.047	0.31
Effluent 120296-01	12/2/96	~	7	7	7	Ą	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	76/2/1	7	6.3	2.4	8.6	65	109.90	0.001	0.028	80.0
Monitor 970912 (1)	9/12/97	NA	NA	NA	NA	340	105.40	AN	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)	9/30/68	NA	NA	NA A	NA	200	123.74	NA A	Y	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
			-		E		100 00 00 00 00 00 00 00 00 00 00 00 00	15. PTEV -0	O 001 15.05. RTEV >0.01 15.05 and TDH <0.01 1b.05	0.01 11/1/15

Emission rates reported for 1202/96 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

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

APPENDIX A

Groundwater Sampling Forms

P:\Wp\BJSERV\12832\046r.doc
"Use or disclosure of data contained on this sheet is subject to the restriction specified at the beginning of this document."

WELLID: MW.

Groundwater Sampling Field Data Sheet

Project Number: 12832 Task Number: 336

Date: 3.10.99

Casing Diameter	Purge Equipment	Geochemical Parameters	
Inches		Ferrous iron:	O mg/l
Total Depth of Well from TOC	p~~p		_
G4-5 feet		Dissolved oxygen:	5.0 mg/l
Static Water from TOC	Sample Equipment		
-54-45 feet	ł	Nitrate:	mg/t
Product Level from TOC			
feet		Alkalinity:	143 mg/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)		ı
13.05 feet	YSI, HACK KIT	Sulfate:	mg/l
Well Volume	Lopping Kar		
/. 6 ga		Sample Time:	13:15
Screened Interval (from GS)			
45-64.5 feet		Note: 2" well= .167 gal/ft.,4	well=.667gal/ft.

Time	Gallons Removed	рH	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
13:50		8.46	22-24	836	64.2	6.47	clour
13:06	1-5	7.56	17.79	828	-8.5	343	Clear
13:10	3. s	7.63	17.82	799	-44.5	4.85	clar
13:14	4.5	7.67	17.51	791	-54.9	5.43	Clar
13:15	5.0	7.67	17.82	791	-61.1	5.48	Cleur

Comments:		4		
	Collaged	deplicate sample	Fra mwil	
		,		

PPE Worn:	Sampler's Signature:
SLoves	
Disposition of Purge Water:	
10.	141
dispused unsite	

BROWN and CALDWELL

WELL ID: MW.3

Groundwater Sampling Field Data Sheet

Project Number: /노워노	Task Number:	Date: 3.13.55

Casing Diameter	Purge Equipment	Geochemical Parameters	
Z Inches	2	Ferrous iron:	
Total Depth of Well from TOC	$\rho \sim \rho$		
62.08 tee		Dissolved oxygen:	4. 3 mg/l
Static Water from TOC	Sample Equipment	1	l
54,72 fee	purp	Nitrate:	mg/l
Product Level from TOC		•	
fee	t	Alkalinity:	38° mg/1
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)		
7-63 fee	YSE Hach Kit	Sulfate:	mg/l
Well Volume			
/ - 2 ge	1	Sample Time:	12:15
Screened Interval (from GS)			
45-62 fee	at .	Note: 2" well= .167 gal/ft.,	1"well=.667gal/ft.

Time	Gallons Removed	pН	Temp	Conductivity	Redox	Dissolved Oxvgen	Visual Description
[3:5]	********	7.49	19.57	549	71-1	4.23	Clour
وايرا	1.0	フムリ	18.60	951	49.9	3.53	Cleev
12:13	2.4	7.17	18-62	967	48.3	2.57	CLCAV
12:14	3-0	7.11	18.66	997	558	2.20	<l 4<="" =="" td=""></l>
12:15	3·5	7.10	1867	1004	55.2	2-15	Clear

Comments:			

PPE Worn:	Sampler's Signature:
96,003	
Disposition of Purge Water:	
.	
disposed on site	
Disposition of Purge Water:	

WELLID: MW-4

Groundwater Sampling Field Data Sheet

Project Number: / \ 83\-	Task Number: 36	Date: 3-10-39
		

Casing Diameter	Purge Equipment	Geochemical Parameters		
2 Inches		Ferrous iron:	0	mg/l
Total Depth of Well from TOC	purp			
60.14 feet	,	Dissolved oxygen:	7.0	mg/l
Static Water from TOC	Sample Equipment			
54.69 fee	purp	Nitrate:		mg/l
Product Level from TOC	(°			
54-65 fee		Alkalinity:	>420	mg/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)			
SL/S tee	Hach Kits	Sulfate:		mg/l
J. S. ga		Sample Time:	16:00	
Screened Interval (from GS)				
45-60 fee	t .	Note: 2" well= .167 gal/ft.,4	weil=.667gal	/ft.

Time	Gallons Removed	pН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual Description
15:53							silty/sheen
15:56	1.0						cler-Ishee
15:58	2.0						clar/shren
16:04	3.3						clos-/shain

Comments:						
	YST	NOT Used	due ;	+ = PSH	In well	
				•		
	<u> </u>					

PPE Worn:	Sampler's Signature:
Disposition of Purge Water:	
disposed on site	
31	<u> </u>

WELL ID: MWS

Groundwater Sampling Field Data Sheet

Project Number: 12832 Task Number: 036

Date: 3. 9.99

Casing Diameter	Purge Equipment	Geochemical Parameters		
J. inches		Ferrous iron:	0	mg/l
Total Depth of Well from TOC	pl~p	Dissolved oxygen:	5.0	mg/l
Static Water from TOC	Sample Equipment	1		
56:45 feet	pump	Nitrate:	364	mg/l
Product Level from TOC	·	Alkalinity:	364	mg/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)	- Circumity.		1119/1
8 28 feel	11 H K.45	Sulfate:		mg/l
Well Volume	-			
/. 3 ga		Sample Time:	17:30	
Screened Interval (from GS)				
45-60 fee		Note: 2" well= .167 gal/ft.,4	"well≃.667ga	/ft.

Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual Description
17:17		7.96	20.41	1292	31.5	8-11	clerr
17:20	ر . د	7.28	18.85	1007	61.9	7.17	Clear
17:23	2-0	プムし	18.84	552	74.2	6.55	Clour
17:26	3.0	ブスコ	18:83	579	78.3	6-28	Cleir
17:30	4-0	7.18	18.86	374	84).5	6.06	Cleux

Comments:				
	 	 	·	
		-		
	 	 	······································	

PPE Worn:	Sampler's Signature:
76000	
Disposition of Purge Water:	1/1/2
die . 1	1-100
stisposed in site	

WELL ID: MW-6

Groundwater Sampling Field Data Sheet

Project Number:	12832	Task Number:	036
	17-3 V		

Date: 3.10.99

Casing Diameter	Purge Equipment	Geochemical Parameters		
2 inches	0	Ferrous Iron:	0	mg/l
Total Depth of Well from TOC	pump		_	
5"5.52 teet	•	Dissolved oxygen:	<u>S: 2</u>	mg/l
Static Water from TOC	Sample Equipment			
55.10 feet	pump	Nitrate:		mg/l
Product Level from TOC				
feet		Alkalinity:	380	mg/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)			
4.82 feet	YSI Hach Kits	Sulfate:		mg/l
Well Volume				
J.8 gai		Sample Time:	14:15	
Screened Interval (from GS)				
45-64 feet	·	Note: 2" well= .167 gal/ft.,4	"well=.667ga	al/ft.

Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual Description
14:13	. Чуранара	7.86	19.96	1448	532	209	ct Pinc
1484	5.8	7.60	1880	1270	34.3	7.63	Closer
14:75	1.2	7.50	18-54	1251	-23.3	7-54	clour

Comments:					
	dry	Q	1.2 gallons		

PPE Worn:	Sampler's Signature:
gloves	
Disposition of Purge Water:	
disposed on site	
<u> </u>	1

WELL ID: MW

Groundwater Sampling Field Data Sheet

Project Number: 12832 Task Number: 036

Date: 3-5-55

Casing Diameter	Purge Equipment	Geochemical Parameters		\Box
2" 55+5 inches Total Depth of Well from TOC	ρωφ	Ferrous iron:	<u> </u>	1g/l
62.211 100		Dissolved oxygen:	4.5 m	ng/l
Static Water from TOC	Sample Equipment		_	_
55-15 fee	pump	Nitrate:	-9900 m	ng/l
Product Level from TOC			7 400	- 1
iee		Alkalinity:		ng/I
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)			_
7.09 fee	YST, HACK KITS	Sulfate:	π	ng/l
Well Volume	1 2			_
/° r	1	Sample Time:	14:45	
Screened Interval (from GS)				
45-60 fee		Note: 2" well= .167 gal/ft.,4	"well=.667gal/ft.	

Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual Description
14:41		128	22.58	1418	173.7	5.85	Clar
<i>14:4</i> ን-	0.5	6.76	20.30	1348	181-0	4.61	clear
14:43	1.0	6.73	ראנג	1323	185-5	4.62	clour
14:44	1.5	6.22	23.87	1329	188.7	448	clar
14:45	2.0	6.73	21-10	1332	188.9	4-45	Clear

Comments:	
2-4 a 1-5 gallon-s	-

PPE Worn: らしょひでら	Sampler's Signature:
Disposition of Purge Water:	A h
Lienar Langelow	
disposed on site	

WELL ID: MW 8

Groundwater Sampling Field Data Sheet

Project Number: 12432 Task Number: 036

Date: 3. 9.99

Casing Diameter	Purge Equipment	Geochemical Parameters	-	
inches Total Depth of Well from TOC	p~~p	Ferrous iron:		ıg/l
62.35 feet		Dissolved oxygen:	<u></u>	ng/l
Static Water from TOC	Sample Equipment			
55.00 fee	pu~p	Nitrate:	m	ng/l
Product Level from TOC				
fee		Alkalinity:	>4730 m	1g/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)			
7.35 fee	YSI, Lluch Freed Kits	Sulfate:	m	ng/l
Well Volume			·	
/· 2 ga	1	Sample Time:	16:00	
Screened Interval (from GS)				
45-60 lee	t .	Note: 2" well= .167 gal/ft.,4	"well=.667gal/ft.	

Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual Description
15:36	e e e e e e e e e e e e e e e e e e e	7.82	23.02	1/35	135.3	6.73	Clenz
15:59	1.0	7:01	22:36	1346	129-4	4.08	Clev
16:00	1.5	6.99	2047	1351	14.5	4.62	clau

1 m 100

	Sampler's Signature:
560608	
Disposition of Purge Water:	
disputed sinsife	
	<u> </u>

WELL ID: nw. 9

Groundwater Sampling Field Data Sheet

Project Number: 12432 Task Number: 036

Date: 31/2-99

Casing Diameter	Purge Equipment	Geochemical Parameters		
2 Inches		Ferrous iron:	ا ح	ng/l
Total Depth of Well from TOC	ρ.~γ	Dissolved oxygen:	3. o m	ng/l
Static Water from TOC	Sample Equipment			
54.15 feet	$p_{V} \sim p$	Nitrate:	n	ng/l
Product Level from TOC	•			
feet		Alkalinity:	340	ng/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)			
7. 02 leet	YSI, Hock Kits	Sulfate:		ng/l
Well Volume	[[[]			
- gal		Sample Time:	19:00	
Screened Interval (from GS)				
45-60 feet		Note: 2" well= .167 gal/ft.,4	"well=.667gal/ft	

Time	Gallons Removed	pН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual Description
9:54	<u>-</u>	7-69	18.95	582	82-8	4.11	Clour
9:56	1.5	7.18	19.05	957	71.5	3.21	Cl ov r
9°.58	2-0	7.21	25.09	546	82.1	4.21	Clour
10:50	3. s	7.20	19.91	633	51.8	3.55	Cler

Comments:				
	***	- · · · · · · · · · · · · · · · · · · ·		

PPE Worn:	Sampler's Signature:
Disposition of Purge Water:	
disposal on site	7 00
3/1-2	l

WELL ID: MW 10

Groundwater Sampling Field Data Sheet

Project Number: 12832 Task Number: 036

Date: 3, 5,95

Casing Diameter	Purge Equipment	Geochemical Parameters	
inches	Pu-p	Ferrous iron:	4.0 mg/l
Total Depth of Well from TOC			
62-81 feet		Dissolved oxygen:	O mg/l
Static Water from TOC	Sample Equipment		
56-9 9 feet	parp	Nitrate:	mg/l
Product Level from TOC	,		
feet		Alkalinity:	プイン2 mg/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)		
6.72 feet	YSI, Hach Kits	Sulfate:	mg/l
Well Volume			
/- / gal		Sample Time:	16:45
Screened Interval (from GS)			
46-62 teet		Note: 2" well= .167 gal/ft.,4	l"well=.667gal/ft.

Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxvaen	Visual Description
16:38	_	7.59	20.38	2908	-15-8	5.21	clour
16:41	1.0	6.82	19.68	2911	-69-4	1.82	cleur
16:43	۷- ٥	6.89	20.28	3443	-92.4	1.15	cleur
16:45	}	હ. જા	23.66	3551	-111-6	0.78	cla-

Comments:		
	 <u> </u>	

PPE Worn:	Sampler's Signature:
5Cobes	
Disposition of Purge Water:	142
disposed on site	
——————————————————————————————————————	<u> </u>

BROWN AND CALDWELL

WELL ID: MW-11A

Groundwater Sampling Field Data Sheet

Project Number: 12832 Task Number: 036

Date: <u>3^/⊅ ⋅ ? ใ</u>

Casing Diameter	Purge Equipment	Geochemical Parameters		
2 inches		Ferrous iron:	6.0	mg/l
Total Depth of Well from TOC	pump			
63.58 feet	,	Dissolved oxygen:	2.3	mg/l
Static Water from TOC	Sample Equipment			
56-43 feet	pump	Nitrate:		mg/l
Product Level from TOC	(- 1
fee		Alkalinity:	2420	mg/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)			
7·/5	YST, Hach Kits	Sulfate:		mg/l
Well Volume				
/·2 ga		Sample Time:	11:00	
Screened Interval (from GS)		<u> </u>		
45-62 tee		Note: 2" well= .167 gal/ft.,4	"well=.667gal/f	t.

Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
10:51		7-14	19.72	2063	31.8	5.43	muddy
10:54	1. 0	6.88	18.95	2041	12.8	0-57	Cl one
10:56	2.0	6.86	18.96	2223	-276	0.31	Clour
13:58	3. s	6.85	18.97	人384	-49.7	0.30	Clecr
11:34	4.0	6.85	18.98	2426	-57.1	0.31	Clar

Comments:			

PPE Worn:	Sampler's Signature:
GLoves	11 6
Disposition of Purge Water:	
dian la sta	
dispisod on site	

BROWN AND CALDWELL

WELL ID: MW-12

Groundwater Sampling Field Data Sheet

Project Number: 12832 Task Number: 336

Date: 310.59

Casing Diameter	Purge Equipment	Geochemical Parameters		
<u>inches</u>	Ø. 2002	Ferrous iron:	3.0	mg/l
Total Depth of Well from TOC	p~~φ			
6/·/6 feet		Dissolved oxygen:	2	mg/l
Static Water from TOC	Sample Equipment			
56.45 reet	ρν~φ	Nitrate:		mg/l
Product Level from TOC	·			
feet		Alkalinity:	2433	mg/l
Length of Water Column	Analytical Equipment (pH, DO, Redox, filtration, etc.)			
4.71 feet	YST, Hach Kit	Sulfate:		mg/l
Well Volume	1.3			
フ· 8 ga		Sample Time:	1/:30	
Screened Interval (from GS)				
45-60 feet		Note: 2" well= .167 gal/ft.,4	well=.667ga	l/ft.

Time	Gallons Removed	рН	Temp	Conductivity	Redox	Dissolved Oxygen	Visual Description
11:26		7.29	18.96	1278	-44.3	4.02	Clour
1172)	<i>j.</i> ა	7.06	18.65	1351	-81.8	248	4000
1/28	2.0	7.01	18.77	1381	-87.9	3.34	Cleur
11:25	3.0	7000	18.82	1350	-53.4	0.30	Clear
//:70	3.5	6-99	18.83	1387	-95-1	3.29	Clar

PPE Worn:	Sampler's Signature:
Thous	
Disposition of Purge Water:	
A. a	
disposal on sire	

APPENDIX B

Laboratory Analytical Reports for Groundwater Samples





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

March 25, 1999

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

The following report contains analytical results for the sample(s) received at Southern Petroleum Laboratories (SPL) on March 10, 1999. The sample(s) was assigned to Certificate of Analysis No. (s) 9903411 and analyzed for all parameters as listed on the chain of custody.

Your sample ID: MW-7 (SPL ID: H9-9903411-01) was randomly selected for the use in SPL's Quality Control program for the Total Metals analysis by SW846 method 6010. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) was outside of the advisable quality control limits for Calcium, the MSD was also out for Sodium, due to matrix interference. The Relative Percent Difference was outside the QC limits for Calcium and Sodium. 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).

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

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

Southern Petroleum Laboratories

Bernadette A. Fini

Senior Project Manager



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

Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 99-03-411

Approved for Release by:

Senior Project Manager

Greg Grandits Laboratory Director

Idelis Williams Corporate Quality Assurance Director

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory. The results relate only to the samples tested.

Results reported on a Wet Weight Basis unless otherwise noted.



HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9903411-01

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

DATE: 03/24/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/09/99 14:45:00

SAMPLE ID: MW-7 DATE RECEIVED: 03/10/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.10 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/17/99	% Recovery 87 80		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND ND ND ND	1.0 P 1.0 P 1.0 P 1.0 P	ug/I ug/I ug/I ug/I ug/I
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/17/99	% Recovery 107 93		
Total Petroleum Hydrocarbons-Diesel	4.7	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: RR Date: 03/24/99 03:51:00	% Recovery 54		

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Pef: Togt Mothods for Evaluating Solid Magte EPA SWAAC and Ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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



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

Certificate of Analysis No. H9-9903411-01

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

SAMPLE ID: MW-7

MATRIX: WATER
DATE SAMPLED: 03/09/99 14:45:00

SAMPLED BY: Brown & Caldwell

DATE RECEIVED: 03/10/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B Analyzed by: Date:	JM	15:51:00	ND	0.01	mg/L
Arsenic, Total Method 6010B Analyzed by: Date:	EG	17:20:00	0.006	0.005	mg/L
Barium, Total Method 6010B Analyzed by: Date:	JM	15:51:00	0.076	0.005	mg/L
Calcium, Total Method 6010B Analyzed by: Date:	JM	15:51:00	233	0.1	mg/L
Cadmium, Total Method 6010B Analyzed by: Date:	JM	15:51:00	ND	0.005	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24

that resemble a diesel pattern.(c10-c24) RR



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

Certificate of Analysis No. H9-9903411-01

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 14:45:00

SAMPLE ID: MW-7

DATE RECEIVED: 03/10/99

ANALYTIC	AL DATA		
PARAMETER	RESULTS	DETECTION	UNITS
Chromium, Total	ND	LIMIT 0.01	mg/L
Method 6010B ***		V V V	9/ =
Analyzed by: JM			
Date: 03/11/99 15:51:00			
Mercury, Total	ND	0.0002	mg/L
Method 7470 A***			•
Analyzed by: AG			
Date: 03/23/99 14:43:00			
Hardness-Total as CaCO3	780	10	mg/L CaCO3
Method 130.2 *			_
Analyzed by: CV			
Date: 03/18/99 10:30:00			
Potassium, Total	9	2	mg/L
Method 6010B ***			3 ,
Analyzed by: JM			
Date: 03/11/99 15:51:00			
Magnesium, Total	54.4	0.1	mg/L
Method 6010B ***			•
Analyzed by: JM			
Date: 03/11/99 15:51:00			
Sodium, Total	110	0.5	mg/L
Method 6010B ***			<u> </u>
Analyzed by: JM			
Date: 03/11/99 15:51:00			

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24

that resemble a diesel pattern.(c10-c24) RR

QUALITY ASSURANCE: These analyses are performed in accordance

with EPA guidelines for quality assurance.



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

DATE: 03/24/99

Certificate of Analysis No. H9-9903411-01

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

SAMPLE ID: MW-7

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 14:45:00 DATE RECEIVED: 03/10/99

ANALYTICAL DATA PARAMETER RESULTS DETECTION UNITS LIMIT Acid Digestion-Aqueous, ICP 03/10/99 Method 3010A *** Analyzed by: EE Date: 03/10/99 15:15:00 Lead, Total ND 0.005 mg/L Method 6010B *** Analyzed by: EG Date: 03/11/99 17:20:00 Selenium, Total 0.005 0.005 mq/L Method 6010B *** Analyzed by: EG Date: 03/11/99 17:20:00 Chloride 238 5 mg/L Method 325.3 * Analyzed by: CV Date: 03/15/99 12:00:00 Fluoride 1.56 0.50 mg/L Method 300.0 * Analyzed by: ELS Date: 03/15/99 09:00:00 Nitrate nitrogen (as N) 3.3 0.1 mg/L Method 353.3 * Analyzed by: CV

ND - Not detected.

Date: 03/11/99 14:30:00

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24

that resemble a diesel pattern. (c10-c24) RR

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



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

Certificate of Analysis No. H9-9903411-01

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 14:45:00

SAMPLE ID: MW-7

DATE RECEIVED: 03/10/99

ANALYTICAL I	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Sulfate Method 375.4 * Analyzed by: ELS Date: 03/22/99 14:00:00	246	10	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/10/99 14:00:00	ND	1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/10/99 14:00:00	358	1	mg/L

ND - Not detected.

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

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24

that resemble a diesel pattern. (c10-c24) RR



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

> HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9903411-01

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

03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832 MATRIX: WATER SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/09/99 14:45:00

SAMPLE ID: MW-7 DATE RECEIVED: 03/10/99

A	NALYTICAL DATA				
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		ND	0.1		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene	•	ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene	•	ND	0.1		${\tt ug/L}$
Benzo (a) pyrene	•	ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT SPIKED	% RECC	OVERY	LOWER LIMIT	UPPER LIMIT
1-Fluoronaphthalene	0.50 ug/L		51	50	150
Phenanthrene d-10	0.50 ug/L		64	50	150

ANALYZED BY: KA DATE/TIME: 03/13/99 00:31:59 EXTRACTED BY: KL DATE/TIME: 03/11/99 10:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

* - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



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

Certificate of Analysis No. H9-9903411-02

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

MATRIX: WATER SITE: Hobbs, NM

DATE SAMPLED: 03/09/99 16:00:00 SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-8 DATE RECEIVED: 03/10/99

ANALYTICAL 1	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.10 P	mg/L
Surrogate	% Recovery		
4-Bromofluorobenzene	87		
1,4-Difluorobenzene Method 8015B *** for Gasoline	87		
Analyzed by: CJ Date: 03/17/99			
BENZENE	ND	1.0 P	ug/L
TOLUENE	ND	1.0 P	ug/L
ETHYLBENZENE	ND	1.0 P	ug/L
TOTAL XYLENE	ND	1.0 P	ug/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	ND		ug/L
Surrogate	% Recovery		
1,4-Difluorobenzene	97		
4-Bromofluorobenzene	93		
Method 8020A ***			
Analyzed by: CJ			
Date: 03/17/99			
Total Petroleum Hydrocarbons-Diesel	ND	0.20 P	mg/L
Surrogate	% Recovery		
n-Pentacosane	46		
Method 8015B *** for Diesel			
Analyzed by: RR			
Date: 03/24/99 04:36:00			

ND - Not detected.

(P) - Practical Quantitation Limit

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



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

Certificate of Analysis No. H9-9903411-02

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 16:00:00

SAMPLE ID: MW-8

DATE RECEIVED: 03/10/99

÷	ANALYTICAL	DATA		
PARAMETER		RESULTS	DETECTION	UNITS
Silver, Total Method 6010B *** Analyzed by: JM	; /11/99 15:51:00	ND	LIMIT 0.01	mg/L
Arsenic, Total Method 6010B *** Analyzed by: EG	·	0.005	0.005	mg/L
Barium, Total Method 6010B *** Analyzed by: JM Date: 03/	/ 11/99 15:51:00	0.052	0.005	mg/L
Calcium, Total Method 6010B *** Analyzed by: JM Date: 03/	/ 11/99 15:51:00	197	0.1	mg/L
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 03/	· /11/99 15:51:00	ND	0.005	mg/L
Chromium, Total Method 6010B *** Analyzed by: JM Date: 03,	* /11/99 15:51:00	ND	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9903411-02

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 16:00:00

SAMPLE ID: MW-8

DATE RECEIVED: 03/10/99

	ANALYTICA	L DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Mercury, Total		ND	0.0002	mg/L
Method 7470 A**				
Analyzed by: AG				
Date: 03	/23/99 14:43:00			
Hardness-Total a	s CaCO3	680	10	mg/L CaCO3
Method 130.2 *				J.
Analyzed by: CV		,		
Date: 03	/18/99 10:30:00			
Potassium, Total		4	2	mg/L
Method 6010B **	*			٥,
Analyzed by: JM				
Date: 03	/11/99 15:51:00			
Magnesium, Total		47.7	0.1	mg/L
Method 6010B **	*			57
Analyzed by: JM				
Date: 03	/11/99 15:51:00			
Sodium, Total		115	0.5	mg/L
Method 6010B **	*			9/ =
Analyzed by: JM				
Date: 03	/11/99 15:51:00			
Acid Digestion-A	queous, ICP	03/10/99		
Method 3010A **		,, 55		
Analyzed by: EE				
Date: 03	/10/99 15:15:00			

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



BB0 INTERCHANGE DRIVE HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9903411-02

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

DATE: 03/24/99

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/09/99 16:00:00

SAMPLE ID: MW-8 DATE RECEIVED: 03/10/99

		ANALYTICAL DATA			
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Lead, Total Method 6010B Analyzed by: Date:		17:20:00	ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	17:20:00	ND	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		12:00:00	274	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		09:00:00	1.44	0.50	mg/L
Nitrate nitro Method 353.3 Analyzed by: Date:	*	14:30:00	0.7	0.1	mg/L
Sulfate Method 375.4 Analyzed by: Date:		14:00:00	240	20	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9903411-02

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

DATE SAMPLED: 03/09/99 16:00:00

SAMPLED BY: Brown & Caldwell SAMPLE ID: MW-8

DATE RECEIVED: 03/10/99

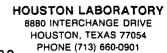
ANALYTICAL DATA						
PARAMETER	RESULTS	DETECTION LIMIT	UNITS			
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/10/99 14:00:00	ND	1	mg/L			
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/10/99 14:00:00	317	1	mg/L			

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



Certificate of Analysis No. H9-9903411-02

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

03/24/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: Hobbs, NM

MATRIX: WATER

52

78

50

50

150

150

DATE SAMPLED: 03/09/99 16:00:00 SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-8 DATE RECEIVED: 03/10/99

ANA	LYTICAL DATA		
PARAMETER	RESULTS	PQL*	UNITS
Naphthalene	ND	0.1	ug/L
Acenaphthylene	ND	0.1	ug/L
Acenaphthene	ND	0.1	ug/L
Fluorene	ND	0.1	ug/L
Phenanthrene	ND	0.1	ug/L
Anthracene	ND	0.1	ug/L
Fluoranthene	ND	0.1	ug/L
Pyrene	ИD	0.1	ug/L
Chrysene	ND	0.1	ug/L
Benzo (a) anthracene	ND	0.1	\mathtt{ug}/\mathtt{L}
Benzo (b) fluoranthene	ND	0.1	ug/L
Benzo (k) fluoranthene	ND	0.1	ug/L
Benzo (a) pyrene	ND	0.1	ug/L
Dibenzo (a,h) anthracene	ND	0.1	ug/L
Benzo (g,h,i) perylene	ND	0.1	ug/L
Indeno (1,2,3-cd) pyrene	ND	0.1	ug/L
SURROGATES	AMOUNT % SPIKED RE		WER UPPER

0.50 ug/L

0.50 ug/L

ANALYZED BY: KA DATE/TIME: 03/15/99 20:32:38 EXTRACTED BY: KL DATE/TIME: 03/11/99 10:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

* - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

1-Fluoronaphthalene

Phenanthrene d-10

COMMENTS:



HOUSTON, TEXAS 77054 PHONE (713) 660-0901

DATE: 03/24/99

Certificate of Analysis No. H9-9903411-03

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

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/09/99 16:45:00

SAMPLE ID: MW-10 DATE RECEIVED: 03/10/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.50 P	mg/L
Surrogate 4-Bromofluorobenzene	% Recovery 87		
1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/17/99	87		
BENZENE	28	5.0 P	ug/L
TOLUENE ETHYLBENZENE	ND 5.8	5.0 P 5.0 P	ug/L ug/L
TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND 33.8	5.0 P	ug/L ug/L
Surrogate	% Recovery		
1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/17/99	113 100		
Total Petroleum Hydrocarbons-Diesel	0.92	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel	% Recovery		

ND - Not detected.

Analyzed by: RR

Date: 03/24/99 05:21:00

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24 that do not resemble a diesel pattern.(c10-c24) RR QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.



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

Certificate of Analysis No. H9-9903411-03

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 16:45:00

SAMPLE ID: MW-10

DATE RECEIVED: 03/10/99

						
PARAMETER		ANALYTICAL	DATA	RESULTS	DETECTION LIMIT	UNITS
Methane Ethylene Ethane RSKSOP-147 Analyzed by:	.TDR			ND	0.0012 P 0.0032 P 0.0025 P	mg/L mg/L
	03/15/99	04:51:00				
Silver, Total Method 6010B Analyzed by:		15.51.00		ND	0.01	mg/L
Arsenic, Total Method 6010B Analyzed by:	***			0.026	0.005	mg/L
Barium, Total Method 6010B Analyzed by: Date:		15:51:00		0.170	0.005	mg/L
Calcium, Total Method 6010B Analyzed by: Date:	***	15:51:00		214	0.1	mg/L

(P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

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

DATE: 03/24/99

Certificate of Analysis No. H9-9903411-03

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

PROJECT NO: 12832 PROJECT: BJ-Hobbs

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown & Caldwell **DATE SAMPLED:** 03/09/99 16:45:00

SAMPLE ID: MW-10 DATE RECEIVED: 03/10/99

	ANALYTICAL	DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 03/11/	99 15:51:00	ND	0.005	mg/L
Chromium, Total Method 6010B *** Analyzed by: JM Date: 03/11/	99 15:51:00	ND	0.01	mg/L
Mercury, Total Method 7470 A*** Analyzed by: AG Date: 03/23/	99 14:43:00	ND	0.0002	mg/L
Hardness-Total as Car Method 130.2 * Analyzed by: CV Date: 03/18/		720	10	mg/L CaCO3
Potassium, Total Method 6010B *** Analyzed by: JM Date: 03/11/	99 15:51:00	15	2	mg/L
Magnesium, Total Method 6010B *** Analyzed by: JM Date: 03/11/	99 15:51:00	43.0	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24 that do not resemble a diesel pattern. (c10-c24) RR QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.



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

Certificate of Analysis No. H9-9903411-03

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 16:45:00

SAMPLE ID: MW-10

DATE RECEIVED: 03/10/99

	ANALYTIC	AL DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Sodium, Total Method 6010B Analyzed by: Date:		856	2	mg/L
Method 3010A Analyzed by:		03/10/99		
Lead, Total Method 6010B Analyzed by: Date:		ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	ND	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		1160	10	mg/L
Fluoride Method 300.0 Analyzed by: Date:		4.93	0.50	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24 that do not resemble a diesel pattern.(c10-c24) RR QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.



HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Certificate of Analysis No. H9-9903411-03

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

n c Coldwall

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 16:45:00

SAMPLE ID: MW-10

DATE RECEIVED: 03/10/99

PROJECT NO: 12832

PARAMETER		ANALYTICAL	 RESULTS	DETECTION LIMIT	UNITS
Carbonate, as C Method SM 4500 Analyzed by: A Date: C	0-CO2D **		ND	1	mg/L
Bicarbonate, as Method SM 4500 Analyzed by: A Date: 0	0-CO2D **	•	278	2	mg/L
Nitrate (as NO3 Method 300.0 * Analyzed by: E Date: 0	*	08:00:00	ND	0.1	mg/L NO3
Sulfate Method 375.4 * Analyzed by: E Date: 0		14:00:00	223	10	mg/L
Sulfate Method 300.0 * Analyzed by: E Date: 0		08:00:00	142	2.0	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

COMMENTS: Sample contians petroleum hydrocarbons from C10-c24

that do not resemble a diesel pattern. (c10-c24) RR



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

Certificate of Analysis No. H9-9903411-03

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

03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832 SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/09/99 16:45:00

SAMPLE ID: MW-10 DATE RECEIVED: 03/10/99

AN	ALYTICAL DATA				
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		6	0.5		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT	ૠ		LOWER	UPPER
	SPIKED	RECO	VERY	LIMIT	LIMIT
1-Fluoronaphthalene	$0.50~{ m ug/L}$		64	50	150
Phenanthrene d-10	0.50 ug/L		76	50	150

ANALYZED BY: KA DATE/TIME: 03/15/99 21:09:43 EXTRACTED BY: KL DATE/TIME: 03/11/99 10:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

* - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



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

Certificate of Analysis No. H9-9903411-04

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832 MATRIX: WATER

SITE: Hobbs, NM

DATE SAMPLED: 03/09/99 17:30:00

SAMPLED BY: Brown & Caldwell SAMPLE ID: MW-5

DATE RECEIVED: 03/10/99

ANALYTICAL 1	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	NE	0.10 P	mg/I
Surrogate	% Recovery		
4-Bromofluorobenzene	87		
1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/17/99	83		
BENZENE	NI	1.0 P	ug/L
TOLUENE	NI		ug/L
ETHYLBENZENE TOTAL XYLENE	NI		ug/L
TOTAL VOLATILE AROMATIC HYDROCARBONS	NI NI		ug/L ug/L
Surrogate	% Recovery	,	
1,4-Difluorobenzene	107		
4-Bromofluorobenzene Method 8020A ***	90)	
Analyzed by: CJ			
Date: 03/17/99			
Total Petroleum Hydrocarbons-Diesel	NI	0.20 P	mg/L
Surrogate	% Recovery	<i>r</i>	
n-Pentacosane	34		
Method 8015B *** for Diesel			
Analyzed by: RR			

ND - Not detected.

Date: 03/24/99 06:05:00

(P) - Practical Quantitation Limit

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



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

Certificate of Analysis No. H9-9903411-04

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 17:30:00

SAMPLE ID: MW-5

DATE RECEIVED: 03/10/99

		ANALYTICAL	DATA			
PARAMETER			F	RESULTS	DETECTION LIMIT	UNITS
Methane				ND	0.0012 P	mg/L
Ethylene					0.0032 P	mg/L
Ethane RSKSOP-147				ND	0.0025 P	mg/L
Analyzed by: Date:	JDR 03/15/99	05:02:00				
Silver, Total Method 6010B	***			ND	0.01	mg/L
Analyzed by:						
Date:	03/11/99	15:51:00				
Arsenic, Total				0.005	0.005	mg/L
Method 6010B Analyzed by:						
		17:20:00				
Barium, Total				0.054	0.005	mg/L
Method 6010B Analyzed by:						
		15:51:00				
Calcium, Total				116	0.1	mg/L
Method 6010B Analyzed by:						
	03/11/99	15:51:00				

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

⁽P) - Practical Quantitation Limit



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

Certificate of Analysis No. H9-9903411-04

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-5

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/09/99 17:30:00

DATE RECEIVED: 03/10/99

	ANALYTICAL DATA	A		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 03/11/99	15:51:00	ND	0.005	mg/L
Chromium, Total Method 6010B *** Analyzed by: JM Date: 03/11/99	15:51:00	ND	0.01	mg/L
Mercury, Total Method 7470 A*** Analyzed by: AG Date: 03/23/99	14:43:00	ND	0.0002	mg/L
Hardness-Total as CaCO Method 130.2 * Analyzed by: CV Date: 03/18/99		340	10	mg/L CaCO3
Potassium, Total Method 6010B *** Analyzed by: JM Date: 03/11/99	15:51:00	4	2	mg/L
Magnesium, Total Method 6010B *** Analyzed by: JM Date: 03/11/99	15:51:00	21.6	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9903411-04

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/09/99 17:30:00

SAMPLE ID: MW-5

DATE RECEIVED: 03/10/99

	ANALYTICA	L DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Sodium, Total Method 6010B Analyzed by: Date:		155	0.5	mg/L
Method 3010A Analyzed by:		03/10/99		
Lead, Total Method 6010B Analyzed by: Date:		ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	0.006	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		155	1	mg/L
Fluoride Method 300.0 Analyzed by: Date:		1.38	0.50	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9903411-04

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

DATE: 03/24/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

MATRIX: WATER

DATE SAMPLED: 03/09/99 17:30:00

SAMPLE ID: MW-5

DATE RECEIVED: 03/10/99

PROJECT NO: 12832

ANALYTICAL DAT	A		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/10/99 14:00:00	ND	1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/10/99 14:00:00	283	1	mg/L
Nitrate (as NO3) Method 300.0 * Analyzed by: ELS Date: 03/10/99 08:00:00	ND	0.1	mg/L NO3
Sulfate Method 375.4 * Analyzed by: ELS Date: 03/22/99 14:00:00	195	10	mg/L
Sulfate Method 300.0 * Analyzed by: ELS Date: 03/10/99 08:00:00	131	2.0	mg/L

ND - Not detected.

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



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

Certificate of Analysis No. H9-9903411-04

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

03/24/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/09/99 17:30:00

SAMPLE ID: MW-5 DATE RECEIVED: 03/10/99

ANZ	ALYTICAL DATA	L			
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		0.1	0.1		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		${ t ug/L}$
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		${ m ug/L}$
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		${\tt ug/L}$
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT SPIKED	% %	OVERY	LOWER	UPPER LIMIT
1-Fluoronaphthalene	0.50 ug/L		64	50	150
Phenanthrene d-10	0.50 ug/L		80	50	150

ANALYZED BY: KA DATE/TIME: 03/15/99 21:46:54 EXTRACTED BY: KL DATE/TIME: 03/11/99 10:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



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

Certificate of Analysis No. H9-9903411-05

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

DATE: 03/24/99

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

PROJECT NO: 12832 MATRIX: WATER **DATE SAMPLED:** 03/09/99

DATE RECEIVED: 03/10/99

ANALYTICAL I	DAT	A		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics		ND	0.10 P	mg/L
Surrogate	ક્ષ	Recovery		
4-Bromofluorobenzene		90		
1,4-Difluorobenzene		80		
Method 8015B *** for Gasoline				
Analyzed by: CJ Date: 03/17/99				
Date: 03/17/99				
BENZENE		ND	1.0 P	ug/I
TOLUENE		ND	1.0 P	ug/I
ETHYLBENZENE		ND	1.0 P	ug/I
TOTAL XYLENE		ND	1.0 P	ug/I
TOTAL VOLATILE AROMATIC HYDROCARBONS		ND		ug/I
Surrogate	%	Recovery		
1,4-Difluorobenzene		110		
4-Bromofluorobenzene		93		
Method 8020A ***				
Analyzed by: CJ				
Date: 03/17/99				

ND - Not detected.

(P) - Practical Quantitation Limit

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

QUALITY CONTROL

DOCUMENTATION



SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Gasoline

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Matrix: Aque

Batch Id: VARE990316221800

LABORATORY CONTROL SAMPLE

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

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Duplic	Spike	MS/MSD Relative %		Limits(***) (Advisory)
	<2>	<3>	Result	Recovery	Result	Recovery <5>	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	ND	0.9	0.97	108	0.95	106	1.87	36	36 - 160

Analyst: CJ

Sequence Date: 03/16/99

SPL ID of sample spiked: 9903490-04A

Sample File ID: EEC3096.TX0

Method Blank File ID:

Blank Spike File ID: EEC3080.TX0

Matrix Spike File ID: EEC3104.TX0

Matrix Spike Duplicate File ID: EEC3105.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

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

ND = Not Detected/Below Detection Limit

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9903491-01A 9903491-02A 9903491-03A 9903491-04A 9903491-05A 9903491-06A 9903411-01A 9903411-02A

9903411-03A 9903490-01A 9903490-02A 9903490-03A

9903490-04A 9903490-05A 9903490-06A



SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Gasoline

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 680-0901

Batch Id: VARE990317175800

Matrix Units: Aqueous mg/L

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Result <1>	Spike Recovery	QC Limits(**) (Mandatory) % Recovery Range
Gasoline Range Organics	ND	1.0	1.1	110	64 - 131

MATRIX SPIKES

SPIKE COMPOUNDS	Sample Results	Spike Added	Matrix	Spike	Matrix Duplic	Spike	MS/MSD Relative %		imits(***) (Advisory)
	<2>	<3>	Result	Recovery	Result	Recovery	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	ND	0.9	0.88	97.8	0.89	98.9	1.12	36	36 - 160

Analyst: CJ

Sequence Date: 03/17/99

SPL ID of sample spiked: 9903411-04A

Sample File ID: EEC3130.TX0

Method Blank File ID:

Blank Spike File ID: EEC3122.TX0

Matrix Spike File ID: EEC3125.TX0

Matrix Spike Duplicate File ID: EEC3126.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

 ${\tt NC}$ = ${\tt Not}$ Calculated (Sample exceeds spike by factor of 4 or more)

ND = Not Detected/Below Detection Limit

 $\Re \ \text{Recovery} = [(<1> - <2>) / <3>] x 100$

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

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

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

SAMPLES IN BATCH (SPL ID) :

9903472-05A 9903473-01A 9903473-02A 9903473-03A

9903473-06A 9903473-07A 9903473-08A 9903473-09A

9903411-05A 9903411-04A 9903472-04A



SPL BATCH QUALITY CONTROL REPORT ** METHOD 8020

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Matrix: Units:

Aqueous ug/L

Batch Id: VARE990316215200

LABORATORY CONTROL SAMPLE

SPIKE	Method	Spike	Blank	Spike	QC Limits(**) (Mandatory) % Recovery Range		
COMPOUNDS	Blank Result	Added <3>	Result	Recovery %			
мтве	ND	50	48	96.0	72 - 128		
Benzene	ND	50	46	92.0	61 - 119		
Toluene	ND	50	45	90.0	65 ~ 125		
EthylBenzene	ИD	50	47	94.0	70 - 118		
O Xylene	ND	50	47	94.0	72 - 117		
M & P Xylene	ND	100	92	92.0	72 - 116		

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative %	QC Limits(***) (Advisory)	
	<2>	<3>	Result <1>	Recovery	Result <1>	Recovery	Difference	RPD Max.	Recovery Range
MTBE	ND	20	19	95.0	17	85.0	11.1	20	39 - 150
BENZENE	ND	20	15	75.0	13	65.0	14.3	21	32 - 164
TOLUENE	ND	20	15	75.0	12	60.0	22.2 *	20	38 - 159
ETHYLBENZENE	ND	20	15	75.0	12	60.0	22.2 *	19	52 - 142
O XYLENE	ND	20	16	80.0	13	65.0	20.7 *	18	53 - 143
M & P XYLENE	ND	40	29	72.5	24	60.0	18.9 *	17	53 - 144

Analyst: CJ

Sequence Date: 03/16/99

SPL ID of sample spiked: 9903490-01A

Sample File ID: E_C3090.TX0

Method Blank File ID:

Blank Spike File ID: E_C3079.TX0

Matrix Spike File ID: E_C3081.TX0

Matrix Spike Duplicate File ID: E C3082.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9903624-01A 9903414-07A 9903490-03A 9903490-04A 9903490-05A 9903490-06A 9903351-07A 9903491-01A 9903491-02A 9903491-03A 9903491-04A 9903491-05A 9903491-06A 9903411-01A 9903411-02A 9903411-03A 9903414-08A 9903645-01A 9903490-01A 9903490-02A



SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

PHONE (713) 660-0901

Matrix: Units: Aqueous ug/L Batch Id: VARE990317173100

LABORATORY CONTROL SAMPLE

SPIKE	Method	Spike	Blank	Spike	QC Limits(**)			
COMPOUNDS	Blank Result	Added <3>	Result	Recovery	(Mandatory) % Recovery Range			
мтве	ND	50	49	98.0	72 - 128			
Benzene	ND	50	45	90.0	61 - 119			
Toluene	ND	50	46	92.0	65 - 125			
EthylBenzene	ND	50	47	94.0	70 - 118			
O Xylene	ND	50	45	90.0	72 - 117			
M & P Xylene	ND	100	91	91.0	72 - 116			

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix Spike		Matrix Spike Duplicate		MS/MSD Relative %	QC Limits(***)(Advisory)	
	<2>	<3>	Result <1>	Recovery	Result	Recovery	Difference	RPD Max.	Recovery Range
MTBE	ND	10	16	160 *	17	170 *	6.06	20	39 150
BENZENE	ND	10	8.9	89.0	9.2	92.0	3.31	21	32 - 164
TOLUENE	ND	10	9.2	92.0	9.3	93.0	1.08	20	38 - 159
ETHYLBENZENE	ND	10	9.8	98.0	9.7	97.0	1.03	19	52 - 142
O XYLENE	ND	10	11	110	11	110	0	18	53 - 143
M & P XYLENE	ND	20	19	95.0	19	95.0	0	17	53 - 144

Analyst: CJ

Sequence Date: 03/17/99

SPL ID of sample spiked: 9903638-01A

Sample File ID: E_C3131.TX0

Method Blank File ID:

Blank Spike File ID: E_C3121.TX0
Matrix Spike File ID: E_C3123.TX0

Matrix Spike Duplicate File ID: E C3124.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9903638-03A 9903638-04A 9903638-05A 9903638-06A 9903638-07A 9903472-04A 9903472-05A 9903473-01A 9903473-02A 9903473-03A 9903473-06A 9903473-07A 9903473-08A 9903473-09A 9903411-05A 9903411-04A

9903638-01A 9903638-02A



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

PAGE

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Matrix: Units: Aqueous mg/L Batch Id: HPVV990323223800

BLANK SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Spike MS/MSD Duplicate Relative %		_	QC Limits(**) (Advisory)		
	<2>	<3>	Result	Recovery <4>	Result	Recovery	Difference	RPD Max.	Recovery Range	
DIESEL	ND	5.0	4.0	80.0	3.8	76.0	5.13	39	21 - 175	

Analyst: RR

Sequence Date: 03/23/99

Method Blank File ID:

Sample File ID:

Blank Spike File ID: VVC2134.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

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

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

ND = Not Detected/Below Detection Limit

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

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

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

SAMPLES IN BATCH (SPL ID):

9903411-01B 9903411-02B 9903411-03B 9903411-04B



SPL BATCH QUALITY CONTROL REPORT **

Method 8310 ***

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

Matrix: Units: Aqueous ug/L Batch Id: 2990312002000

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result	Spike Added	Blank Result	Spike Recovery	QC Limits(**) (Mandatory)		
	<2>	<3>	<1>	*	% Recovery Range		
Naphthalene	ND	0.50	0.37	74.0	32 - 148		
Acenaphthylene	ND	0.50	0.52	104	42 - 138		
Acenaphthene	ND	0.50	0.38	76.0	22 - 133		
Fluorene	ND	0.50	0.40	80.0	11 - 148		
Phenanthrene	ND	0.50	0.40	80.0	40 - 121		
Anthracene	ND	0.50	0.34	68.0	32 - 121		
Fluoranthene	ND	0.50	0.41	82.0	45 - 133		
Pyrene	ND	0.50	0.44	88.0	39 - 136		
Chrysene	ND	0.50	0.43	86.0	44 - 122		
Benzo (a) anthracene	ND	0.50	0.41	82.0	53 - 137		
Benzo (b) fluoranthene	ND	0.50	0.46	92.0	62 - 121		
Benzo (k) fluoranthene	ND	0.50	0.46	92.0	66 - 128		
Benzo (a) pyrene	ND	0.50	0.44	88.0	42 - 120		
Dibenzo (a,h) anthracene	ND	0.50	0.40	80.0	59 - 129		
Benzo (g,h,i) perylene	ND	0.50	0.43	86.0	67 - 124		
Indeno (1,2,3-cd) pyrene	ND	0.50	0.47	94.0	65 - 125		

MATRIX SPIKES

SPIKE COMPOU N DS	Sample Results	Spike Added	Matrix	Spike	Matrix Duplic	Spike	MS/MSD Relative %	_	imits(***) (Advisory)
			Result	Recovery	Result	Recovery	Difference	RPD	
	<2>	<3>	<1>	<4>	<1>	<5>		Max.	Recovery Range
NAPHTHALENE	1.0	0.50	1.1	20.0	1.7	140 *	150 *	30	1 - 122
ACENAPHTHYLENE	ND	0.50	0.28	56.0	0.29	58.0	3.51	30	1 - 124
ACENAPHTHENE	ND	0.50	0.22	44.0	0.31	62.0	34.0 *	30	1 - 124
FLUORENE	ND	0.50	0.28	56.0	0.50	100	56.4 *	30	1 - 142
PHENANTHRENE	ND	0.50	0.32	64.0	0.41	82.0	24.7	30	1 - 155
ANTHRACENE	ND	0.50	0.21	42.0	0.34	68.0	47.3 *	30	1 - 126
FLUORANTHENE	ND	0.50	0.34	68.0	0.42	84.0	21.1	30	14 - 123
PYRENE	ND	0.50	0.34	68.0	0.39	78.0	13.7	30	1 - 140
CHRYSENE	ND	0.50	0.32	64.0	0.39	78.0	19.7	30	1 - 199
BENZO (A) ANTHRACENE	ND	0.50	0.30	60.0	0.35	70.0	15.4	30	12 - 135
BENZO (B) FLUORANTHENE	ND	0.50	0.33	66.0	0.40	80.0	19.2	30	6 - 150
BENZO (K) FLUORANTHENE	ND	0.50	0.31	62.0	0.37	74.0	17.6	30	1 - 159
BENZO (A) PYRENE	ND	0.50	0.31	62.0	0.38	76.0	20.3	30	1 - 128
DIBENZO (A,H) ANTHRACENE	ND	0.50	0.24	48.0	0.27	54.0	11.8	30	1 - 110
BENZO (G,H,I) PERYLENE	ND	0.50	0.27	54.0	0.30	60.0	10.5	30	1 - 116
INDENO (1,2,3-CD) PYRENE	ND	0.50	0.29	58.0	0.32	64.0	9.84	30	1 - 116



SPL BATCH QUALITY CONTROL REPORT ** Method 8310 ***

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

Batch Id: 2990312002000

Matrix:

Aqueous

Units:

ug/L

Analyst: KA

Sequence Date: 03/12/99

SPL ID of sample spiked: 9903447-06E

Sample File ID: 990312A\012-1201

Method Blank File ID:

Blank Spike File ID: 990312A\011-1101

Matrix Spike File ID: 990312A\013-1301

Matrix Spike Duplicate File ID: 990312A\014-1401 (***) = Source: Temporary Limits

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9903411-01C 9903411-02C 9903411-03C 9903411-04C

9903447-06E 9903409-01D 9903368-01A 9903447-07E

9903447-08E



Matrix: Water

Units: mg/L

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

Date:031199 Time:1551 File Name: 0311PB2

Laboratory Control Sample

Element		True Value		% Recovery	Lower Limit	Upper Limit
Silver	ND	2.00	2.05	102	1.60	2.40
Aluminum				-		-
Arsenic	ND	4.00	4.17	104	3.20	4.80
Barium	ND	2.00	2.11	106	1.60	2.40
Beryllium	ND	2.00	2.10	105	1.60	2.40
Calcium	ND	20.00	20.14	101	16.00	24.00
Cadmium	ND	2.00	1.99	100	1.60	2.40
Cobalt						
Chromium	ND	2.00	2.07	104	1.60	2.40
Copper	ND	2.00	2.09	105	1.60	2.40
iron						
Potassium	ND	20.00	21.80	109	16.00	24.00
Magnesium	ND	20.00	21.08	105	16.00	24.00
Manganese						
Sodium	ND	20.00	21.42	107	16.00	24.00
Nickel	ND	2.00	2.03	101	1.60	2.40
Lead	ND	2.00	2.04	102	1.60	2.40
Antimony	ND	4.00	4.11	103	3.20	4.80
Selenium	ND	4.00	4.18	105	3.20	4.80
Thallium						
Vanadium						
Zinc	ND	2.00	2.03	102	1.60	2.40

	ers in Batch
Work Order	Fractions
99-03-411	01D-04D
99-03-396	03H
99-03-379	01A
99-03-392	01A
99-03-401	02A,03A

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9903411-01D

Matrix Spike	- Shike pr	iplicate Ke	Work Order Spiked: 9903411-01D										
	Sample	Spike	Matr	ix Spike		Matrix Spi	ke Duplicate		QC L	imits	Spike		QC
Element	Result	Added	Result	Recovery	,	Result	Recovery		% Rec	overy	RPD %		Limits %
Silver	ND	1.0	0.9657	96.6		1.041	104.1		80	120	7.5		20.0
Aluminum												L	
Arsenic	ND	2.0	1.964	98.2		2.157	107.9		80	120	9.4		20.0
Barium	0.0759	1.0	1.041	96.5		1.161	108.5		80	120	11.7	T	20.0
Beryllium	ND	1.0	0.9618	96.2		1.064	106.4		80	120	10.1	П	20.0
Calcium	232.8	10.0	233.5	7.0	*	232.8	0.0	*	80	120	200.0	**	20.0
Cadmium	ND	1.0	0.9305	93.1		1.009	100.9		80	120	8.1	Т	20.0
Cobalt								Γ				Т	
Chromium	ND	1.0	0.9318	93.2		1.031	103.1		80	120	10.1	T	20.0
Copper	ND	1.0	0.9715	97.2		1.076	107.6		80	120	10.2	Τ	20.0
Iron												T	
Potassium	9.135	10.0	19.76	106.3	Π	19.78	106.5		80	120	0.2	Ţ	20.0
Magnesium	54.38	10.0	63.4	90.2		62.92	85.4		80	120	5.5		20.0
Manganese												T	
Sodium	110.4	10.0	119	86.0		116.6	62.0	*	80	120	32.4	**	20.0
Nickel	ND	1.0	0.9143	91.4	Γ	1.002	100.2		80	120	9.2	Т	20.0
Lead	ND	1.0	0.9526	95.3	Π	1.032	103.2	Γ	80	120	8.0	T	20.0
Antimony	ND	2.0	1.943	97.2	Τ	2.133	106.7	Т	80	120	9.3	Т	20.0
Selenium	ND	2.0	1.975	98.8		2.158	107.9	T	80	120	8.9	T	20.0
Thallium												Ι	
Vanadium					T			Γ				T	
Zinc	0.1405	1.0	0.9676	82.7	Τ	1.063	92.3		80	120	10.9		20.0

^{*} Spike Results Outside Method Limits

Elements Post Spiked: K, Na, Ca, and Mg

Checked: 13 3/2/99

^{**} Spike RPD Outside Method Limits

Trace-icp

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: EG



Matrix: Water

Units: mg/L

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Date:031199 Time:1720 File Name: 0311PB1

Laboratory Control Sample

Element		True Value			Lower Limit	Upper Limit
Silver						
Aluminum						
Arsenic	ND	4.00	4.11	103	3.20	4.80
Barium						
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium			<u> </u>			
Copper						
Iron						<u> </u>
Potassium				·		
Magnesium						
Manganese						
Sodium	<u> </u>					
Nickel						
Lead	ND	2.00	2.09	105	1.60	2.40
Antimony	<u> </u>					
Selenium	ND	4.00	3.90	97	3.20	4.80
Thallium	. ND	4.00	4.11	103	3.20	4.80
Vanadium						
Zinc						

	rs in Batch
Work Order	Fractions
99-03-411	01D-04D
99-03-416	01C
99-03-417	01D
99-03-396	03H
99-03-392	01A
99-03-401	02A,03A

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9903411-01D

Matrix Spike				 		r Spiked: 990		7 3		
}	Sample	Spike		ix Spike	1	ike Duplicate	1	imits	Spike	QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Red	covery	RPD %	Limits %
Silver										
Aluminum				<u> </u>	<u> </u>	1	1	11		
Arsenic	ND	2.0	1.851	92.6	2.086	104.3	80	120	11.9	20.0
Barium		,						}		
Beryllium										
Calcium]
Cadmium										
Cobalt		!					T		1	
Chromium			-							
Copper										
Iron										
Potassium							T			
Magnesium							7		· ·	1
Manganese										
Sodium										
Nickel					1					
Lead	ND	1.0	0.9213	92.1	1.044	104.4	80	120	12.5	20.0
Antimony										
Selenium	ND	2.0	1.763	88.2	1.975	98.8	80	120	11.3	20.0
Thallium	ND	2.0	1.81	90.5	2.034	101.7	80	120	11.7	20.0
Vanadium			1				1			
Zinc			 		1		1			



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/23/99

Analyzed on: 03/23/99

Analyst:

AG

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

Mercury, Total Method 7470 A***

SPL Sample ID Number			Measured Concentration ug/L	% Recovery	QC Limits Recovery	
LCS	ND	2.00	2.08	104	80 - 120	

-9903648

Samples in batch:

9903411-01D

9903411-02D

9903411-03D 9903411-04D

COMMENTS:

LCS = SPL ID# 94-452-49-12



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/23/99

Analyzed on: 03/23/99

Analyst: AG

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

Mercury, Total Method 7470 A***

SPL Sample	 Method	 Sample	Spike	 Matri 	ix Spike	!	x Spike licate	RPD		QC LIMITS Advisory)
ID Number		:	•	Result	-	Result ug/L	Recovery	(왕)	RPD Max	% REC
9903411-01D	ND	ND	2.00	1.99	99.5	2.01	100	0.5	20	75 -125

-9903648

Samples in batch:

9903411-01D

9903411-02D

9903411-03D

9903411-04D

COMMENTS:

LCS = SPL ID# 94-452-49-12

ICP

ICP Spectroscopy Method 6010 Quality Control Report

Matrix: Water

Units: mg/L

Analyst: PB

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

Date:032399 Time:0727 File Name: 0323JM7

Laboratory Control Sample

Element		True Value		% Recovery	Lower Limit	Upper Limi
Silver						,
Aluminum						
Arsenic						
Barium						
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium						
Copper						
iron					<u> </u>	
Potassium						
Magnesium						
Manganese						
Sodium	ND	20.00	22.49	112	16.00	24.00
Nickel						
Lead						
Antimony						
Selenium						
Thallium						
Vanadium						
Zinc						

Work Orders in Batch Work Order Fractions

99-03-411 03D

Matrix Spike	e - Spike Di	uplicate Re	sults			r Spiked: 990				
	Sample	Spike	Matr	ix Spike	Matrix Sp	ike Duplicate	QC Li	mits	Spike	QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Rec	overy	RPD %	Limits %
Silver										
Aluminum										
Arsenic										
Barium										
Beryllium										
Calcium										
Cadmium										
Cobalt										
Chromium										
Copper										
Iron										
Potassium										
Magnesium										
Manganese										
Sodium	38.24	10.0	48.56	103.2	47.72	94.8	80	120	8.5	20.0
Nickel										
Lead										
Antimony		1							1	
Selenium		T								
Thallium	I									
Vanadium										1
Zinc										T

Elements Post Spiked:Na

Checked: 18 3/24/99



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

* SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/18/99

Analyzed on: 03/18/99

Analyst: CV

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

Hardness-Total as CaCO3
Method 130.2 *

SPL Sample ID Number	Blank Value mg/L	1	Measured Concentration mg/L	% Recovery	QC Limits Recovery	
LCS	ND	99.7	96.0	96.3	94 - 108	

-9903529

Samples in batch:

9903411-01D	9903411-02D	9903411-03D	9903411-04D
9903464-01D	9903464-02D	9903464-03D	9903464-04D
9903464-05D	9903464-06D	9903464-07D	9903464-08D

COMMENTS:

LCS-SPL ID#95535252-13



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/18/99

Analyzed on: 03/18/99

Analyst: CV

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

Hardness-Total as CaCO3
Method 130.2 *

SPL Sample	 Method	 Sample	Spike	Matrix Spike 		Matrix Spike Duplicate		RPD	•	QC LIMITS Advisory)
ID Number	Blank mg/L	 Result mg/L	Added mg/L	Result mg/L	•	Result	Recovery	(%)	RPD Max	% REC
9903411-04D	ND	34.0	50.0	84.0	100	84.0	100	0	20	80.7 -111

-9903528

Samples in batch:

9903411-01D 9903411-02D 9903411-03D 9903411-04D 9903464-01D 9903464-04D 9903464-04D



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/17/99

Analyzed on: 03/15/99

Analyst:

CV

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

> Chloride Method 325.2 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	105	101.8	97.0	90 - 110

-9903484

Samples in batch:

9903411-01E	9903411-02E	9903411-03E	9903411-04E
9903463-01C	9903464-01E	9903464-02E	9903464-03E
9903464-04E	9903464-05E	9903464-06E	9903464-07E
9903464-08E	9903501-021	9903502-03C	9903502-04C
1 9903504-06I	9903504-091		

COMMENTS:

LCS-SPL ID#94453222-13



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

* SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/17/99

Analyzed on: 03/15/99

Analyst: CV

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

Chloride Method 325.2 *

SPL Sample	Method	 Sample	Spike	Matr:	ix Spike	:	ix Spike	RPD	:	QC LIMIT Advisory	
 ID Number	:	 Result mg/L		Result	Recovery	Result	Recovery	(움)	RPD Max	* RE	C
9903504-061	ND	77.4	50.0	125.8	96.8	125.0	95.2	1.7	20	76 -1	.31

-9903483

Samples in batch:

9903411~01E 99 9903463~01C 99

9903411-02E 9903501-02I 9903411-03E 9903504-06I 9903411-04E

9903504-091



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99

Analyzed on: 03/15/99

Analyst: ELS

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

Fluoride
Method 300.0 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery	
LCS	ND	10.0	9.12	91.2	90 - 110	

-9903455

Samples in batch:

9903411-01E	9903411-02E	9903411-03E	9903411-04E
9903463-01C	9903464-01E	9903464 - 02E	9903464-03E
9903464-04E	9903464-05E	9903464-06E	9903464-07E
9903464-08E			

COMMENTS:

LCS SPL ID# 9779864-8



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99 Analyzed on: 03/15/99

Analyst:

ELS

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

Fluoride Method 300.0 *

SPL Sample	Method	Sample	Spike	Matr	Matrix Spike Matrix Spike Duplicate		RPD	ŀ	QC LIMITS (Advisory)	
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L		Result mg/L	Recovery %	(%)	RPD Max	% REC
9903411-04E	ND	1.38	10.0	10.6	92.2	10.4	90.2	2.2	20	80 -120

-9903454

Samples in batch:

9903411-01E

9903411-02E

9903411-03E

9903411-04E

9903463-01C 9903464-01E

9903464-02E

9903464-03E



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

* SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99

Analyzed on: 03/11/99

Analyst: CV

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

Nitrate nitrogen(as N)
Method 353.3 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	5.0	4.81	96.2	92 - 113

-9903444

Samples in batch:

9903411-01E 9903411-02E 9903463-01C 9903464-01E 9903464-02E 9903464-03E 9903464-04E 9903464-07E

9903464-08E

COMMENTS:

LCS-SPL ID#94453220-10



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

SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99 Analyzed on: 03/11/99 Analyst: CV

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

Nitrate nitrogen(as N) Method 353.3 *

SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)	
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	,	Result mg/L	Recovery %	(%)	RPD Max	% REC
9903411-01E	ND	3.32	5.0	7.65	86.6	7.56	84.8	2.1	12	84 -125

-9903443

Samples in batch:

9903411-01E 9903464-02E 9903464-01E 9903464-07E 9903411-02E 9903463-01C 9903464-03E 9903464-04E



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99

Analyzed on: 03/10/99

Analyst: ELS

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

Nitrate (as NO3)
Method 300.0 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.59	95.9	90 - 110

-9903421

Samples in batch:

9903406-01A	9903406-03A	9903406-04A	9903406-05A
9903406-06A	9903406-07A	9903406-08A	9903408-01A
9903410-01B	9903410-02B	9903410-03B	9903411-03G

9903411-04G

COMMENTS:

LCS SPL ID# 9779864-8



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/15/99 Analyzed on: 03/10/99

Analyst:

ELS

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

Nitrate (as NO3) Method 300.0 *

SPL Sample	Method	Sample	Spike	Matri	ix Spike	l .	ix Spike licate	RPD		ac LII Advis	
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	%	REC
9903410-018	ND	ND	10.0	9.18	91.8	9.01	90.1	1.9	5	86	-115

-9903420

Samples in batch:

9903408-01A 9903411-03G 9903410-01B 9903411-04G

9903410-02B

9903410-03B



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

* SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on:

03/22/99

Analyzed on:

03/22/99

Analyst:

ELS

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

Sulfate Method 375.4 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	26.8	28.1	105	82 - 111

-9903602

Samples in batch:

9903411-01E	9903411-02E	9903411-03G	9903411-04G
9903464-01E	9903464-02E	9903464-03E	9903464-04E
9903464-05E	9903464-06E	9903464-07E	9903464-08E
9903887-01B	9903887-02B		

COMMENTS:

LCS SPL ID# 95535252-14



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/22/99

Analyzed on: 03/22/99

Analyst:

ELS

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

Sulfate Method 375.4 *

 SPL Sample	 Method	 Sample	 Spike	Matri	ix Spike	:	ix Spike licate	RPD	!	QC LIMITS Advisory)
ID Number	Blank mg/L	 Result mg/L	 Added mg/L	Result	_	Result mg/L	Recovery	(%)	RPD Max	% REC
9903411-02E	ND	240	200	455	108	453	106	1.9	9.5	84 -120

-9903601

Samples in batch:

9903411-01E 9903411-02E

9903411-03G

9903411-04G

9903464-01E 9903464-02E 9903464-03E



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

* SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/13/99 Analyzed on: 03/10/99

Analyst: ELS

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

Sulfate Method 300.0 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.61	96.1	90 - 110

-9903379

Samples in batch:

9903219-02B	9903219-03B	9903219-04B	9903239-01B
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	JJ 05 2 2 3 0 1 15	JJ05257 01D
9903239-02B	9903239-03B	9903255-01B	9903255-02B
9903255-03B	9903408-01A	9903410-01B	9903410-02B
9903410-03B	9903411-03G	9903411-04G	

COMMENTS:

LCS SPL ID# 9779864-8



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/13/99

Analyzed on: 03/10/99

Analyst: ELS

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

Sulfate Method 300.0 *

SPL Sample	 Method	Sample	 Spike	Matri	ix Spike	!	x Spike licate	RPD		QC LIMITS Advisory)
ID Number				Result		Result mg/L	Recovery	(%)	RPD Max	% REC
9903255-02B	ND	0.53	10.0	10.1	95.7	10.1	95.7	0	7.0	88 -112

-9903378

Samples in batch:

9903219-02B 9903219-03B 9903255-02B 9903255-03B

9903219-04B

9903255-01B

9903411-03G 9903411-04G



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/10/99

Analyzed on: 03/10/99

Analyst:

AΒ

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

> Carbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9903411-01F	ND	ND	0	5

-9903320

Samples in batch:

9903411-01F

9903411-02F

9903411-03F

9903411-04F



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

SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/10/99

Analyzed on: 03/10/99

Analyst:

AΒ

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

> Bicarbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9903411-01F	357.8	357.8	0	5

-9903318

Samples in batch:

9903411-01F

9903411-02F

9903411-03F

9903411-04F

CHAIN OF CUSTODY AND SAMPLE RECEIPT CHECKLIST

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459-Hughes Drive, Traverse City, MI 49684 (616) 947-5777	rerse City, N	fi 49684 (6)	16) 947-5	<u> </u>												

SPL Houston Environmental Laboratory

Sample Login Checklist

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Dat	te: 3/10/99 Time:	1000			
SPI	L Sample ID: 99034//	······································			
				7	
	1			Yes	<u>No</u>
1	Chain-of-Custody (COC) form is pre-	esent.		V_{λ}	
2	COC is properly completed.				
3	If no, Non-Conformance Worksheet	has been comple	eted.		
4	4 Custody seals are present on the shipping container.				
5	5 If yes, custody seals are intact.				
6	6 All samples are tagged or labeled.				
7	7 If no, Non-Conformance Worksheet has been completed.				
8	8 Sample containers arrived intact				
9	Temperature of samples upon arrival	l:		3	C
10	Method of sample delivery to SPL:	SPL Delivery			
'	Client Delivery FedEx Delivery (airbill #)				
					0126
		Other:			
11	Method of sample disposal: SPL Disposal				
	HOLD				
		nt			
Na	ime:		Date: /	/	
	Mockrum		3/10	199	

APPENDIX B

Laboratory Analytical Reports for Groundwater Samples





B880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054 PHONE (713) 660-0901

March 26, 1999

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

The following report contains analytical results for the sample(s) received at Southern Petroleum Laboratories (SPL) on March 11, 1999. The sample(s) was assigned to Certificate of Analysis No. (s) 9903464 and analyzed for all parameters as listed on the chain of custody.

Your sample ID: MW-6 (SPL ID: H9-9903464-01) was randomly selected for the use in SPL's Quality Control program for the Total Sodium analysis by SW846 method 6010. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) was outside of the advisable quality control, 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).

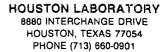
If you have any questions or comments pertaining to this data report, please do not hesitate to contact me. Please reference the above Certificate of Analysis No. during any inquiries.

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

Southern Petroleum Laboratories

Bernadette A. Fini

Senior Project Manager





Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 99-03-464

Approved for Release by:

Bernadette A. Fini, Senior Project Manager

Greg Grandits Laboratory Director

Idelis Williams
Corporate Quality Assurance Director

The attached analytical data package may not be reproduced except in full without the express written approval of this laboratory. The results relate only to the samples tested.

Results reported on a Wet Weight Basis unless otherwise noted.

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

certificate of Analysis No. H9-9903464-01

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

DATE: 03/25/99

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 14:15:00

SAMPLE ID: MW-6 DATE RECEIVED: 03/11/99

ANALYTICAL DATA							
PARAMETER	RESULTS	DETECTION LIMIT	UNITS				
Gasoline Range Organics	13	5 P	mg/I				
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/11/99	% Recovery 93 100						
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	2500 930 590 1400 5420	50 P 50 P 50 P 50 P	ug/I ug/I ug/I ug/I ug/I				
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/11/99	% Recovery 93 93						
Total Petroleum Hydrocarbons-Diesel	11	1.00 P	mg/L				
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: RR Date: 03/24/99 17:18:00	% Recovery 42						

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

Certificate of Analysis No. H9-9903464-01

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

DATE: 03/25/99

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 14:15:00

SAMPLE ID: MW-6 DATE RECEIVED: 03/11/99

ANALYTICAL DATA					
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B Analyzed by: Date:		12:56:00	ND	0.01	mg/L
Arsenic, Total Method 6010B Analyzed by:	***	14.58.00	0.020	0.005	mg/L
Barium, Total Method 6010B Analyzed by:	***		0.555	0.005	mg/L
Calcium, Total Method 6010B Analyzed by:	L ***		141	0.1	mg/L
Cadmium, Total Method 6010B Analyzed by: Date:	***	12:56:00	ND	0.005	mg/L
Chromium, Tota Method 6010B Analyzed by: Date:	***	12:56:00	ND	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

PHONE (713) 660-0901

DATE: 03/25/99

Certificate of Analysis No. H9-9903464-01

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

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SILE: HODDS, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell SAMPLE ID: MW-6

DATE SAMPLED: 03/10/99 14:15:00 DATE RECEIVED: 03/11/99

ANALYTICAL DATA UNITS RESULTS DETECTION PARAMETER LIMIT Mercury, Total ND0.0002 mg/L Method 7470 A*** Analyzed by: AG Date: 03/23/99 14:43:00 Hardness-Total as CaCO3 640 10 mg/L CaCO3 Method 130.2 * Analyzed by: CV Date: 03/18/99 10:30:00 Potassium, Total 4 2 mq/L Method 6010B *** Analyzed by: JM Date: 03/14/99 12:56:00 Magnesium, Total 62.2 0.1 mq/L Method 6010B *** Analyzed by: JM Date: 03/14/99 12:56:00 Sodium, Total 141 0.5 mg/L Method 6010B *** Analyzed by: PB Date: 03/24/99 10:06:00 03/11/99 Acid Digestion-Aqueous, ICP Method 3010A *** Analyzed by: EE

ND - Not detected.

Date: 03/11/99 13:30:00

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

® Certificate of Analysis No. H9-9903464-01

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

DATE: 03/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 14:15:00

SAMPLE ID: MW-6 DATE RECEIVED: 03/11/99

ANALYTICAL DATA						
PARAMETER			RESULTS	DETECTION LIMIT	UNITS	
Lead, Total Method 6010B Analyzed by:		14.58.00	0.013		mg/L	
Selenium, Tota Method 6010B Analyzed by:	al ***		ND	0.005	mg/L	
Chloride Method 325.3 Analyzed by:	*		411	5	mg/L	
Fluoride Method 300.0 Analyzed by: Date:		09:00:00	1.79	0.50	mg/L	
Nitrate nitrog Method 353.3 Analyzed by: Date:	*	14:30:00	ND	0.1	mg/L	
Sulfate Method 375.4 Analyzed by: Date:		14:00:00	72	5	mg/L	

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

certif.

HOUSTON LABORATORY

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

© Certificate of Analysis No. H9-9903464-01

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 14:15:00

SAMPLE ID: MW-6

DATE RECEIVED: 03/11/99

ANALYTIC	AL DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	ND	1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	286	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

© Certificate of Analysis No. H9-9903464-01

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

03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 14:15:00

SAMPLE ID: MW-6

DATE RECEIVED: 03/11/99

ANALYTICAL DATA							
PARAMETER	RES	SULTS	PQL*		UNITS		
Naphthalene		160	20		ug/L		
Acenaphthylene		ND	2.0		ug/L		
Acenaphthene		ND	2.0		ug/L		
Fluorene		ND	2.0		ug/L		
Phenanthrene		ND	2.0		ug/L		
Anthracene		ND	2.0		ug/L		
Fluoranthene		ND	2.0		ug/L		
Pyrene		ND	2.0		ug/L		
Chrysene		ND	2.0		ug/L		
Benzo (a) anthracene		ND	2.0		${\tt ug/L}$		
Benzo (b) fluoranthene		ND	2.0		ug/L		
Benzo (k) fluoranthene		ND	2.0		ug/L		
Benzo (a) pyrene		ND	2.0		ug/L		
Dibenzo (a,h) anthracene		ND	2.0		ug/L		
Benzo (g,h,i) perylene		ND	2.0		ug/L		
Indeno (1,2,3-cd) pyrene		ND	2.0		ug/L		
SURROGATES	AMOUNT	%		LOWER	UPPER		
	SPIKED	RECO	VERY	LIMIT	LIMIT		
1-Fluoronaphthalene	0.50 ug/L	Γ)	50	150		
Phenanthrene d-10	0.50 ug/L	Γ) 	50	150		

ANALYZED BY: KA DATE/TIME: 03/16/99 08:17:37 EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

D - Diluted, control limits not applicable.

COMMENTS:

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

DATE: 03/25/99

ertificate of Analysis No. H9-9903464-02

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

MATRIX: WATER

SITE: Hobbs, NM **SAMPLED BY:** Brown & Caldwell

DATE SAMPLED: 03/10/99 13:15:00

SAMPLE ID: MW-1

DATE RECEIVED: 03/11/99

ANALYTICAL I	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.85	0.1 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline	% Recovery 110 100		
Analyzed by: CJ Date: 03/11/99			
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND 8.2 110 118.2	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/11/99	% Recovery 97 103		
Total Petroleum Hydrocarbons-Diesel	0.62	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: RR	% Recovery 30		

(P) - Practical Quantitation Limit ND - Not detected.

Date: 03/24/99 18:03:00

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

® Certificate of Analysis No. H9-9903464-02

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

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 13:15:00

SAMPLE ID: MW-1

DATE RECEIVED: 03/11/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B Analyzed by:		12.56.00	ND	0.01	mg/L
Arsenic, Total Method 6010B Analyzed by:	l ***		0.013	0.005	mg/L
Barium, Total Method 6010B Analyzed by:	***		0.058	0.005	mg/L
Calcium, Tota Method 6010B Analyzed by: Date:	***	12:56:00	80.2	0.1	mg/L
Cadmium, Tota Method 6010B Analyzed by: Date:	***	12:56:00	ND	0.005	mg/L
Chromium, Tot Method 6010B Analyzed by: Date:	***	12:56:00	ND	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

ertificate of Analysis No. H9-9903464-02

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 13:15:00

SAMPLE ID: MW-1

DATE RECEIVED: 03/11/99

	ANALYTICAL			
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Mercury, Total Method 7470 A*** Analyzed by: AG Date: 03/23/99 14	:43:00	ND	0.0002	mg/I
Hardness-Total as CaCO3 Method 130.2 * Analyzed by: CV Date: 03/18/99 10	:30:00	250	5	mg/L CaCO3
Potassium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 12	:56:00	3	2	mg/I
Magnesium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 12	:56:00	19.7	0.1	mg/I
Sodium, Total Method 6010B *** Analyzed by: PB Date: 03/24/99 10	:06:00	126	0.5	mg/I
Acid Digestion-Aqueous, I Method 3010A *** Analyzed by: EE Date: 03/11/99 13		03/11/99		

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



Certificate of Analysis No. H9-9903464-02

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

ATTN: Rick Rexroad DATE: 03/25/99

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 13:15:00

SAMPLE ID: MW-1 DATE RECEIVED: 03/11/99

PARAMETER		ANALYTICAL	DATA RESULTS	DETECTION	UNITS
Lead, Total Method 6010B Analyzed by: Date:		14:58:00	ND	LIMIT 0.005	mg/L
Selenium, Tota Method 6010B Analyzed by:	al ***		0.005	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		12:00:00	163	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		09:00:00	1.54	0.50	mg/L
Nitrate nitro Method 353.3 Analyzed by: Date:	*	14:30:00	0.7	0.1	mg/L
Sulfate Method 375.4 Analyzed by: Date:		14:00:00	196	10	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

@ Certificate of Analysis No. H9-9903464-02

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

DATE: 03/25/99

PROJECT: BJ-Hobbs SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 13:15:00

SAMPLE ID: MW-1

DATE RECEIVED: 03/11/99

ANALYTICAL PARAMETER	DATA RESULTS	DETECTION	UNITS
		LIMIT	
Carbonate, as CaCO3 Method SM 4500-CO2D **	ND	1	mg/L
Analyzed by: AB			
Date: 03/11/99 10:00:00			
Bicarbonate, as CaCO3	92	1	mq/L
Method SM 4500-CO2D **			3.
Analyzed by: AB			
Date: 03/11/99 10:00:00			

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054

PHONE (713) 660-0901

ertificate of Analysis No. H9-9903464-02

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

03/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: Hobbs, NM MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 13:15:00

SAMPLE ID: MW-1 DATE RECEIVED: 03/11/99

7.17	ATUMTOAT DAMA				
PARAMETER	ALYTICAL DATA	ULTS	DOT +		UNITS
	Can		PQL*		
Naphthalene		10	1.0		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	1.0		ug/L
Fluorene		ND	1.0		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
		112	0.1		ug/ L
SURROGATES	AMOUNT	8		LOWER	UPPER
	SPIKED	=	VERY	LIMIT	LIMIT
1-Fluoronaphthalene	0.50 ug/L		04	50	150
Phenanthrene d-10	0.50 ug/L	_	77	50	150
	5:55 dg/H		, , 	50	130

ANALYZED BY: KA DATE/TIME: 03/16/99 03:57:58 EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



Certificate of Analysis No. H9-9903464-03

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

DATE: 03/25/99

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 16:00:00

SAMPLE ID: MW-4 DATE RECEIVED: 03/11/99

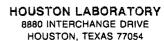
ANALYTICAL 1	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	13	0.5 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/12/99	% Recovery 113 100		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	8.0 20 250 1400 1678	5.0 P 5.0 P 5.0 P 5.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/12/99	% Recovery 93 127		
Total Petroleum Hydrocarbons-Diesel	13	1.00 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: RR Date: 03/24/99 23:17:00	% Recovery 44		

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



PHONE (713) 660-0901

DATE: 03/25/99

ertificate of Analysis No. H9-9903464-03

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

MATRIX: WATER SITE: Hobbs, NM DATE SAMPLED: 03/10/99 16:00:00 SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-4 DATE RECEIVED: 03/11/99

	ANALYTICA	L DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B *** Analyzed by: JM Date: 03/14/9	9 12:56:00	ND	0.01	mg/L
Arsenic, Total Method 6010B *** Analyzed by: EG Date: 03/16/9	99 14:58:00	0.012	0.005	mg/L
Barium, Total Method 6010B *** Analyzed by: JM Date: 03/14/9	99 12:56:00	0.045	0.005	mg/L
Calcium, Total Method 6010B *** Analyzed by: JM Date: 03/14/9	99 12:56:00	90.8	0.1	mg/L
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 03/14/9	99 12:56:00	ND	0.005	mg/L
Chromium, Total Method 6010B *** Analyzed by: JM Date: 03/14/9	99 12:56:00	ND	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



DATE: 03/25/99

Certificate of Analysis No. H9-9903464-03

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

MATRIX: WATER

SITE: Hobbs, NM SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 16:00:00

SAMPLE ID: MW-4

DATE RECEIVED: 03/11/99

	ANALYTICAL	DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Mercury, Total Method 7470 A*** Analyzed by: AG Date: 03/23/99 1	4:43:00	ND	0.0002	mg/L
Hardness-Total as CaCO3 Method 130.2 * Analyzed by: CV Date: 03/18/99 1	.0:30:00	310	5	mg/L CaCO3
Potassium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 1	.2:56:00	3	2	mg/L
Magnesium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 1	.2:56:00	20.4	0.1	mg/L
Sodium, Total Method 6010B *** Analyzed by: PB Date: 03/24/99 1	.0:06:00	124	0.5	mg/L
Acid Digestion-Aqueous, Method 3010A *** Analyzed by: EE Date: 03/11/99 1		03/11/99		

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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® Certificate of Analysis No. H9-9903464-03

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 16:00:00

SAMPLE ID: MW-4

DATE RECEIVED: 03/11/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Lead, Total Method 6010B Analyzed by: Date:		14:58:00	ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	14:58:00	ND	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		12:00:00	142	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		09:00:00	1.50	0.50	mg/L
Nitrate nitro Method 353.3 Analyzed by: Date:	*	14:30:00	2.6	0.1	mg/L
Sulfate Method 375.4 Analyzed by: Date:		14:00:00	178	10	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

Certificate of Analysis No. H9-9903464-03

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 16:00:00

SAMPLE ID: MW-4

DATE RECEIVED: 03/11/99

ANALYTICAL DATA					
PARAMETER	RESULTS	DETECTION LIMIT	UNITS		
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	ND	1	mg/L		
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	186	1	mg/L		

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

Certificate of Analysis No. H9-9903464-03

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

03/25/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-4

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99 16:00:00

DATE RECEIVED: 03/11/99

AN	ALYTICAL DATA	A			
PARAMETER	RES	SULTS	PQL*		UNITS
Naphthalene		170	10		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	2.0		ug/L
Fluorene		ND	2.0		ug/L
Phenanthrene		2	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		0.4	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		0.2	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		0.2	0.1		ug/L
Benzo (a) pyrene		0.2	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT	ૠ		LOWER	UPPER
	SPIKED	REC	OVERY	LIMIT	LIMIT
1-Fluoronaphthalene	$0.50~\mathrm{ug/L}$	444		50	150
Phenanthrene d-10	0.50 ug/L	<u>.</u>	119	50	150

ANALYZED BY: KA DATE/TIME: 03/16/99 04:35:05 EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

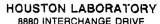
METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

MI - Matrix Interference.

COMMENTS:



® Certificate of Analysis No. H9-9903464-04

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 12:15:00

SAMPLE ID: MW-3

DATE RECEIVED: 03/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.44	0.1 P	mg/I
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/11/99	% Recovery 120 107		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	3.2 7.4 42 32 84.6		ug/I ug/I ug/I ug/I ug/I
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/11/99	% Recovery 97 103		
Total Petroleum Hydrocarbons-Diesel	0.24	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: RR Date: 03/24/99 07:34:00	% Recovery 76		

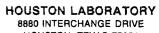
(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Pof: Togt Methods for Evaluating Solid Magter & BDA SMAGE 2nd Rd.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



HOUSTON, TEXAS 77054 PHONE (713) 660-0901

DATE: 03/25/99

Certificate of Analysis No. H9-9903464-04

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 12:15:00

SAMPLE ID: MW-3

SITE: Hobbs, NM

DATE RECEIVED: 03/11/99

	ANALYTICA	L DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B *** Analyzed by: JM Date: 03/14/	99 12:56:00	ND	0.01	mg/L
Arsenic, Total Method 6010B *** Analyzed by: EG Date: 03/16/	99 14:58:00	0.009	0.005	mg/L
Barium, Total Method 6010B *** Analyzed by: JM Date: 03/14/	99 12:56:00	0.059	0.005	mg/L
Calcium, Total Method 6010B *** Analyzed by: JM Date: 03/14/	99 12:56:00	129	0.1	mg/L
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 03/14/	99 12:56:00	ND	0.005	mg/L
Chromium, Total Method 6010B *** Analyzed by: JM Date: 03/14/	99 12:56:00	ND	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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

ertificate of Analysis No. H9-9903464-04

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 12:15:00

SAMPLE ID: MW-3

DATE RECEIVED: 03/11/99

	ALYTICAL DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Mercury, Total	ND	0.0002	mg/L
Method 7470 A***			_
Analyzed by: AG			
Date: 03/23/99 14:4	: 00		
Hardness-Total as CaCO3	440	10	mg/L CaCO3
Method 130.2 *			
Analyzed by: CV			
Date: 03/18/99 10:3	: 00		
Potassium, Total	4	2	mg/L
Method 6010B ***			
Analyzed by: JM			
Date: 03/14/99 12:5	:00		
Magnesium, Total	31.5	0.1	mg/L
Method 6010B ***			Ç.
Analyzed by: JM			
Date: 03/14/99 12:5	: 00		
Sodium, Total	135	0.5	mg/L
Method 6010B ***			5.
Analyzed by: PB			
Date: 03/24/99 10:0	:00		
Acid Digestion-Aqueous, IC	03/11/99		
Method 3010A ***			
Analyzed by: EE			
Date: 03/11/99 13:3	:00		

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

Certificate of Analysis No. H9-9903464-04

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

DATE: 03/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 12:15:00

SAMPLE ID: MW-3 DATE RECEIVED: 03/11/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Lead, Total Method 6010B Analyzed by: Date:		14:58:00	ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	14:58:00	0.006	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		12:00:00	156	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		09:00:00	1.46	0.50	mg/L
Nitrate nitro Method 353.3 Analyzed by: Date:	*	14:30:00	2.1	0.1	mg/L
Sulfate Method 375.4 Analyzed by: Date:		14:00:00	162	20	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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© Certificate of Analysis No. H9-9903464-04

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER DATE SAMPLED: 03/10/99 12:15:00

SAMPLED BY: Brown & Caldwell

DATE RECEIVED: 03/11/99

SAMPLE ID: MW-3

ANALYTICAL	DATA	·	
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	ND	1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	309	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



® Certificate of Analysis No. H9-9903464-04

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

03/25/99

PROJECT: BJ-Hobbs

MATRIX: WATER

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 12:15:00

SAMPLE ID: MW-3

DATE RECEIVED: 03/11/99

PROJECT NO: 12832

AN	ALYTICAL DATA	i			
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		8	1.0		${\tt ug/L}$
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		${ t ug/L}$
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		${\tt ug/L}$
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT	%		LOWER	UPPER
	SPIKED	REC	OVERY	LIMIT	LIMIT
1-Fluoronaphthalene	$0.50 \mathrm{ug/L}$		67	50	150
Phenanthrene d-10	0.50 ug/L		76	50	150

ANALYZED BY: KA DATE/TIME: 03/16/99 05:12:13 EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

* - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



© Certificate of Analysis No. H9-9903464-05

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

DATE: 03/25/99

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 11:30:00

SAMPLE ID: MW-12 DATE RECEIVED: 03/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.45	0.1 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/12/99	% Recovery 120 107		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	160 1.1 ND 2.9 164.0	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/12/99	% Recovery 100 107		
Total Petroleum Hydrocarbons-Diesel	0.38	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel Analyzed by: RR	% Recovery 52		

Analyzed by: RR

Date: 03/24/99 08:19:00

(P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



® Certificate of Analysis No. H9-9903464-05

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 11:30:00

SAMPLE ID: MW-12

DATE RECEIVED: 03/11/99

		ANALYTICAL	DATA			
PARAMETER			F	RESULTS	DETECTION LIMIT	ON UNITS
Methane				ND	0.0012 P	mg/L
Ethylene				ND	0.0032 P	mg/L
Ethane				ND	0.0025 P	mg/L
RSKSOP-147	TDD					
Analyzed by:		04:25:00		,		
Date:	03/13/33	04.25.00				
Silver, Total				ND	0.01	mg/L
Method 6010B	***					3,
Analyzed by:						
Date:	03/14/99	12:56:00				
Arsenic, Total				0 066	0.005	mg/L
Method 6010B	***			0.000	0.005	mg/ n
Analyzed by:						
Date:	03/16/99	14:58:00				
Darium Total				0 144	0 005	a. /T
Barium, Total Method 6010B	***			0.144	0.005	mg/L
Analyzed by:						
		12:56:00				
						4
Calcium, Total Method 6010B				148	0.1	mg/L
Analyzed by:						
		12:56:00				

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054 ertificate of Analysis No. H9-9903464-05 PHONE (713) 660-0901

DATE: 03/25/99

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

PROJECT: BJ-Hobbs PROJECT NO: 12832

SITE: Hobbs, NM MATRIX: WATER SAMPLED BY: Brown & Caldwell **DATE SAMPLED:** 03/10/99 11:30:00

SAMPLE ID: MW-12 DATE RECEIVED: 03/11/99

ANALYTICAL DATA	A.		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total	ND	0.005	mg/L
Method 6010B ***			_
Analyzed by: JM			
Date: 03/14/99 12:56:00			
Chromium, Total	ND	0.01	mg/L
Method 6010B ***			
Analyzed by: JM			
Date: 03/14/99 12:56:00			
Mercury, Total	ND	0.0002	mg/L
Method 7470 A***			
Analyzed by: AG			
Date: 03/23/99 14:43:00			
Hardness-Total as CaCO3	460	10	mg/L CaCO3
Method 130.2 *			
Analyzed by: CV			
Date: 03/18/99 10:30:00			
Potassium, Total	101	2	mg/L
Method 6010B ***			.
Analyzed by: JM			
Date: 03/14/99 12:56:00			
Magnesium, Total	32.1	0.1	mg/L
Method 6010B ***			3,
Analyzed by: JM			
Date: 03/14/99 12:56:00			

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



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© Certificate of Analysis No. H9-9903464-05

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 11:30:00 DATE RECEIVED: 03/11/99

SAMPLE ID: MW-12

	ANALYTICAI	DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Sodium, Total Method 6010B Analyzed by: Date:		180	0.5	mg/L
Acid Digestion Method 3010A Analyzed by: Date:	***	03/11/99		
Lead, Total Method 6010B Analyzed by: Date:		ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	ND	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		314	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		3.13	0.50	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

Ref. lest Methods for Evaluating Solid Waste, EFA Swo46, 31d Ed.

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© Certificate of Analysis No. H9-9903464-05

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 11:30:00

SAMPLE ID: MW-12

DATE RECEIVED: 03/11/99

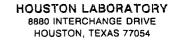
ANALYTICAL DAT	A		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
<pre>Nitrate nitrogen(as N) Method 353.3 * Analyzed by: CV</pre>	ND	0.1	mg/L
Nitrate (as NO3) Method 300.0 * Analyzed by: ELS Date: 03/11/99 08:00:00	ND	0.1	mg/L NO3
Sulfate Method 375.4 * Analyzed by: ELS Date: 03/22/99 14:00:00	193	10	mg/L
Sulfate Method 300.0 * Analyzed by: ELS Date: 03/11/99 08:00:00	137	2.0	mg/L
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	ND	1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	386	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



PHONE (713) 660-0901

ertificate of Analysis No. H9-9903464-05

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

03/25/99

PROJECT: BJ-Hobbs PROJECT NO: 12832 SITE: Hobbs, NM

MATRIX: WATER

95

50

150

SAMPLED BY: Brown & Caldwell **DATE SAMPLED:** 03/10/99 11:30:00

SAMPLE ID: MW-12 DATE RECEIVED: 03/11/99

ANALYTICAL DATA								
RESUI	TS	PQL*		UNITS				
	19	2.0		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
	ND	0.1		ug/L				
λ M∩TINT	Q.		T OWED	UPPER				
	-	OTTED V						
0.50 ug/L	REC	91	50	LIMIT 150				
	RESUI AMOUNT SPIKED	RESULTS 19 ND	RESULTS PQL* 19 2.0 ND 0.1 RESULTS PQL* 19 2.0 ND 0.1					

0.50 ug/L

ANALYZED BY: KA DATE/TIME: 03/16/99 05:49:19 EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

* - Practical Quantitation Limit NOTES: ND - Not Detected

NA - Not Analyzed

Phenanthrene d-10

COMMENTS:

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

DATE: 03/25/99

© Certificate of Analysis No. H9-9903464-06

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

PROJECT: BJ-Hobbs PROJECT NO: 12832

MATRIX: WATER SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 11:00:00

SAMPLE ID: MW-11A DATE RECEIVED: 03/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	ND	0.5 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/12/99	% Recovery 100 100		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND ND ND ND	5.0 P 5.0 P 5.0 P 5.0 P	ug/I ug/I ug/I ug/I ug/I
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/12/99	% Recovery 100 93		
Total Petroleum Hydrocarbons-Diesel	0.30	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel	% Recovery		

Analyzed by: RR

Date: 03/24/99 09:04:00

ND - Not detected.

(P) - Practical Quantitation Limit

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

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® Certificate of Analysis No. H9-9903464-06

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

DATE: 03/25/99

PROJECT: BJ-Hobbs SITE: Hobbs, NM

PROJECT NO: 12832 MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 11:00:00

SAMPLE ID: MW-11A

DATE RECEIVED: 03/11/99

		ANALYTICAL	DATA			
PARAMETER				RESULTS	DETECTION LIMIT	UNITS
Methane				0.094	0.0012 P	mg/L
Ethylene					0.0032 P	mg/L
Ethane RSKSOP-147				ND	0.0025 P	mg/L
Analyzed by:	JDR					
	03/15/99	04:37:00				
Cilvon Total				NITO	0.01	
Silver, Total Method 6010B	***			ND	0.01	mg/L
Analyzed by:						
Date:	03/14/99	12:56:00				
Arsenic, Total	L			0.036	0.005	mg/L
Method 6010B		•				3, =
Analyzed by:						
Date:	03/16/99	14:58:00				
Barium, Total				0.174	0.005	mq/L
Method 6010B						3.
Analyzed by:		10 56 00				
Date:	03/14/99	12:56:00				
Calcium, Total				308	0.1	mg/L
Method 6010B						
Analyzed by:	JM 03/14/99	12.56.00				
Date:	03/14/33	12:50:00				

(P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

DATE: 03/25/99

® Certificate of Analysis No. H9-9903464-06

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

PROJECT: BJ-Hobbs PROJECT NO: 12832

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell DATE SAMPLED: 03/10/99 11:00:00

SAMPLE ID: MW-11A DATE RECEIVED: 03/11/99

ANALYTICAL DATA	7		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 12:56:00	ND	0.005	mg/I
Chromium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 12:56:00	ND	0.01	mg/L
Mercury, Total Method 7470 A*** Analyzed by: AG Date: 03/23/99 14:43:00	ND	0.0002	mg/L
Hardness-Total as CaCO3 Method 130.2 * Analyzed by: CV Date: 03/18/99 10:30:00	1150	25	mg/L CaCO3
Potassium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 12:56:00	21	2	mg/L
Magnesium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99 12:56:00	101	0.1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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® Certificate of Analysis No. H9-9903464-06

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

DATE: 03/25/99

PROJECT: BJ-Hobbs SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 11:00:00

SAMPLE ID: MW-11A

DATE RECEIVED: 03/11/99

	Al	ALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Sodium, Total Method 6010B Analyzed by: Date:		00	225	0.5	mg/L
Method 3010A Analyzed by:		00	03/11/99		
Lead, Total Method 6010B Analyzed by: Date:		:00	0.009	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	:00	ND	0.005	mg/I
Chloride Method 325.3 Analyzed by: Date:		:00	834	5	mg/I
Fluoride Method 300.0 Analyzed by: Date:		:00	3.08	0.50	mg/I

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA
**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



DATE: 03/25/99

ertificate of Analysis No. H9-9903464-06

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

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99 11:00:00

SAMPLE ID: MW-11A

SAMPLED BY: Brown & Caldwell

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

DATE RECEIVED: 03/11/99

	ANALYTICAL	DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Nitrate nitrog Method 353.3 Analyzed by: Date:	*	ND	0.1	mg/L
Nitrate (as NO Method 300.0 Analyzed by: Date:	*	ND	0.1	mg/L NO3
Sulfate Method 375.4 Analyzed by: Date:		227	10	mg/L
Sulfate Method 300.0 Analyzed by: Date:		164	2.0	mg/L
Carbonate, as Method SM 450 Analyzed by: Date:	00-CO2D **	ND	1	mg/L
Bicarbonate, a Method SM 450 Analyzed by: Date:	00-CO2D **	335	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

ertificate of Analysis No. H9-9903464-06

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

03/25/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-11A

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99 11:00:00

DATE RECEIVED: 03/11/99

	· · · · · · · · · · · · · · · · · · ·				
AN	ALYTICAL DATA				
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		ND	0.1		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		${\tt ug/L}$
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT SPIKED	% ጽድሮር	OVERY	LOWER LIMIT	UPPER LIMIT
1-Fluoronaphthalene	0.50 ug/L	111101	57 57	50	150
Phenanthrene d-10	0.50 ug/L		71	50	150

DATE/TIME: 03/16/99 06:26:25 ANALYZED BY: KA EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

* - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:

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

ertificate of Analysis No. H9-9903464-07

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell SAMPLE ID: MW-9

DATE SAMPLED: 03/10/99 10:00:00 DATE RECEIVED: 03/11/99

ANALYTICAL DATA PARAMETER RESULTS DETECTION UNITS LIMIT Gasoline Range Organics 0.22 0.1 P mg/L Surrogate % Recovery 4-Bromofluorobenzene 97 1,4-Difluorobenzene 100 Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/12/99 BENZENE ND1.0 P ug/L TOLUENE ND 1.0 P ug/L 5.7 1.0 P ETHYLBENZENE ug/L TOTAL XYLENE 68 1.0 P ug/L TOTAL VOLATILE AROMATIC HYDROCARBONS 73.7 ug/L Surrogate % Recovery 1,4-Difluorobenzene 97 4-Bromofluorobenzene 97 Method 8020A *** Analyzed by: CJ Date: 03/12/99 Total Petroleum Hydrocarbons-Diesel ND 0.20 P mg/L Surrogate % Recovery

n-Pentacosane

Method 8015B *** for Diesel

Analyzed by: RR

Date: 03/24/99 09:49:00

(P) - Practical Quantitation Limit

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

PHONE (713) 660-0901

DATE: 03/25/99

® Certificate of Analysis No. H9-9903464-07

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

PROJECT NO: 12832

MATRIX: WATER

SITE: Hobbs, NM SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 10:00:00

SAMPLE ID: MW-9

PROJECT: BJ-Hobbs

DATE RECEIVED: 03/11/99

	ANA	LYTICAL DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B Analyzed by: Date:		0 ND	0.01	mg/L
Arsenic, Total Method 6010B Analyzed by: Date:	***		0.005	mg/L
Barium, Total Method 6010B Analyzed by: Date:			0.005	mg/L
Calcium, Total Method 6010B Analyzed by: Date:	***	122	0.1	mg/L
Cadmium, Tota Method 6010B Analyzed by: Date:	***	ND 0	0.005	mg/L
Chromium, Tota Method 6010B Analyzed by: Date:	***	ND	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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DATE: 03/25/99

© Certificate of Analysis No. H9-9903464-07

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 10:00:00 DATE RECEIVED: 03/11/99

SAMPLE ID: MW-9

	ANALYTICAL	DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Mercury, Total Method 7470 A*** Analyzed by: AG Date: 03/23/99	14:43:00	ND	0.0002	mg/L
Hardness-Total as CaCO3 Method 130.2 * Analyzed by: CV Date: 03/18/99		370	5	mg/L CaCO3
Potassium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99	12:56:00	3	2	mg/L
Magnesium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99	12:56:00	28.5	0.1	mg/L
Sodium, Total Method 6010B *** Analyzed by: PB Date: 03/24/99	10:06:00	122	0.5	mg/L
Acid Digestion-Aqueous, Method 3010A *** Analyzed by: EE Date: 03/11/99		03/11/99		

ND - Not detected.

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

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

DATE: 03/25/99

ertificate of Analysis No. H9-9903464-07

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

PROJECT: BJ-Hobbs

PROJECT NO: 12832

MATRIX: WATER SITE: Hobbs, NM DATE SAMPLED: 03/10/99 10:00:00 SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-9 DATE RECEIVED: 03/11/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Lead, Total Method 6010B Analyzed by: Date:		14:58:00	ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	14:58:00	ND	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		12:00:00	123	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		09:00:00	1.84	0.50	mg/L
Nitrate nitro Method 353.3 Analyzed by: Date:	*	14:30:00	3.7	0.1	mg/L
Sulfate Method 375.4 Analyzed by: Date:		14:00:00	146	10	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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© certificate of Analysis No. H9-9903464-07

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

PROJECT NO: 12832

SITE: Hobbs, NM

MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99 10:00:00

SAMPLE ID: MW-9

DATE RECEIVED: 03/11/99

ANALYTIC	CAL DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	ND	1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	333	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

03/25/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

SAMPLE ID: MW-9

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99 10:00:00

DATE RECEIVED: 03/11/99

			······································		
AN	ALYTICAL DATA				
PARAMETER	RESU	JLTS	PQL*		UNITS
Naphthalene	-	ND	0.1		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		ND	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT	ૠ		LOWER	UPPER
	SPIKED	REC	OVERY	LIMIT	LIMIT
1-Fluoronaphthalene	$0.50~\mathrm{ug/L}$	38	MI	50	150
Phenanthrene d-10	0.50 ug/L		61	50	150

ANALYZED BY: KA DATE/TIME: 03/16/99 07:03:29 EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

* - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

MI - Matrix Interference.

COMMENTS:



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

Certificate of Analysis No. H9-9903464-08

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

DATE: 03/25/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

SAMPLE ID: Duplicate

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99

DATE RECEIVED: 03/11/99

ANALYTICAL 1	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Gasoline Range Organics	0.84	0.1 P	mg/L
Surrogate 4-Bromofluorobenzene 1,4-Difluorobenzene Method 8015B *** for Gasoline Analyzed by: CJ Date: 03/12/99	% Recovery 110 100		
BENZENE TOLUENE ETHYLBENZENE TOTAL XYLENE TOTAL VOLATILE AROMATIC HYDROCARBONS	ND ND 7.9 110 117.9	1.0 P 1.0 P 1.0 P 1.0 P	ug/L ug/L ug/L ug/L ug/L
Surrogate 1,4-Difluorobenzene 4-Bromofluorobenzene Method 8020A *** Analyzed by: CJ Date: 03/12/99	% Recovery 97 100		
Total Petroleum Hydrocarbons-Diesel	0.66	0.20 P	mg/L
Surrogate n-Pentacosane Method 8015B *** for Diesel	% Recovery		

Analyzed by: RR

Date: 03/24/99 10:33:00

(P) - Practical Quantitation Limit ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

© Certificate of Analysis No. H9-9903464-08

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

DATE: 03/25/99

PROJECT: BJ-Hobbs SITE: Hobbs, NM SAMPLED BY: Brown & Caldwell SAMPLE ID: Duplicate PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99

DATE RECEIVED: 03/11/99

	ANALYTICAL	DATA		
PARAMETER		RESULTS	DETECTION LIMIT	UNITS
Silver, Total Method 6010B *** Analyzed by: JM Date: 03/14/99	12:56:00	ND	0.01	mg/L
Arsenic, Total Method 6010B *** Analyzed by: EG Date: 03/16/99		0.014	0.005	mg/L
Barium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99	12:56:00	0.049	0.005	mg/L
Calcium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99	12:56:00	77.7	0.1	mg/L
Cadmium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99	12:56:00	ND	0.005	mg/L
Chromium, Total Method 6010B *** Analyzed by: JM Date: 03/14/99	12:56:00	ND	0.01	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

© Certificate of Analysis No. H9-9903464-08

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

DATE: 03/25/99

PROJECT: BJ-Hobbs SITE: Hobbs, NM SAMPLED BY: Brown & Caldwell SAMPLE ID: Duplicate PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99

DATE RECEIVED: 03/11/99

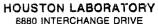
PARAMETER ANALYTICA	L DATA RESULTS	DETECTION	UNITS
Mercury, Total	ND	LIMIT 0.0002	mg/I
Method 7470 A***			
Analyzed by: AG Date: 03/23/99 14:43:00			
Hardness-Total as CaCO3	240	5	mg/L CaCO
Method 130.2 *			
Analyzed by: CV Date: 03/18/99 10:30:00			
Potassium, Total	2	2	mg/
Method 6010B ***	2	2	ilig/
Analyzed by: JM			
Date: 03/14/99 12:56:00			
Magnesium, Total	18.4	0.1	mg/
Method 6010B ***			
Analyzed by: JM Date: 03/14/99 12:56:00			
Date: 03/14/99 12:30:00			
Sodium, Total	122	0.5	mg/
Method 6010B *** Analyzed by: PB			
Date: 03/24/99 10:06:00			
Acid Digestion-Aqueous, ICP	03/11/99		
Method 3010A ***	. ,		
Analyzed by: EE			
Date: 03/11/99 13:30:00			

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.



6880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054 PHONE (713) 660-0901

DATE: 03/25/99

certificate of Analysis No. H9-9903464-08

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

PROJECT NO: 12832

MATRIX: WATER

PROJECT: BJ-Hobbs SITE: Hobbs, NM SAMPLED BY: Brown & Caldwell SAMPLE ID: Duplicate

DATE SAMPLED: 03/10/99 **DATE RECEIVED:** 03/11/99

		ANALYTICAL	DATA		
PARAMETER			RESULTS	DETECTION LIMIT	UNITS
Lead, Total Method 6010B Analyzed by: Date:		14:58:00	ND	0.005	mg/L
Selenium, Tota Method 6010B Analyzed by: Date:	***	14:58:00	0.006	0.005	mg/L
Chloride Method 325.3 Analyzed by: Date:		12:00:00	150	5	mg/L
Fluoride Method 300.0 Analyzed by: Date:		09:00:00	1.43	0.50	mg/L
Nitrate nitro Method 353.3 Analyzed by: Date:	*	14:30:00	0.8	0.1	mg/L
Sulfate Method 375.4 Analyzed by: Date:		14:00:00	166	10	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA

**Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

HOUSTON LABORATORY 8880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054

® HOUSTON, TEXAS 77054 Certificate of Analysis No. H9-9903464-08 PHONE (713) 660-0901

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

DATE: 03/25/99

PROJECT: BJ-Hobbs
SITE: Hobbs, NM

PROJECT NO: 12832
MATRIX: WATER

SAMPLED BY: Brown & Caldwell

DATE SAMPLED: 03/10/99

SAMPLE ID: Duplicate

DATE RECEIVED: 03/11/99

ANALYTICAL	DATA		
PARAMETER	RESULTS	DETECTION LIMIT	UNITS
Carbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	ND	1	mg/L
Bicarbonate, as CaCO3 Method SM 4500-CO2D ** Analyzed by: AB Date: 03/11/99 10:00:00	99	1	mg/L

ND - Not detected.

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

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

© Certificate of Analysis No. H9-9903464-08

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

03/25/99

PROJECT: BJ-Hobbs

SITE: Hobbs, NM

SAMPLED BY: Brown & Caldwell

SAMPLE ID: Duplicate

PROJECT NO: 12832

MATRIX: WATER

DATE SAMPLED: 03/10/99

DATE RECEIVED: 03/11/99

AN	ALYTICAL DATA				
PARAMETER	RES	ULTS	PQL*		UNITS
Naphthalene		16	1.0		ug/L
Acenaphthylene		ND	0.1		ug/L
Acenaphthene		ND	0.1		ug/L
Fluorene		ND	0.1		ug/L
Phenanthrene		0.1	0.1		ug/L
Anthracene		ND	0.1		ug/L
Fluoranthene		ND	0.1		ug/L
Pyrene		ND	0.1		ug/L
Chrysene		ND	0.1		ug/L
Benzo (a) anthracene		ND	0.1		ug/L
Benzo (b) fluoranthene		ND	0.1		ug/L
Benzo (k) fluoranthene		ND	0.1		ug/L
Benzo (a) pyrene		ND	0.1		ug/L
Dibenzo (a,h) anthracene		ND	0.1		ug/L
Benzo (g,h,i) perylene		ND	0.1		ug/L
Indeno (1,2,3-cd) pyrene		ND	0.1		ug/L
SURROGATES	AMOUNT SPIKED	% REC	OVERY	LOWER LIMIT	UPPER LIMIT
1-Fluoronaphthalene	0.50 ug/L		136	50	150
Phenanthrene d-10	0.50 ug/L		105	50	150

ANALYZED BY: KA DATE/TIME: 03/16/99 07:40:34 EXTRACTED BY: KL DATE/TIME: 03/12/99 12:00:00

METHOD: 8310 Polynuclear Aromatic Hydrocarbons

NOTES: * - Practical Quantitation Limit ND - Not Detected

NA - Not Analyzed

COMMENTS:



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

® Certificate of Analysis No. H9-9903464-09

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

DATE: 03/25/99

PROJECT: BJ-Hobbs SITE: Hobbs, NM SAMPLED BY: Provided By SPL **SAMPLE ID:** Trip Blank 3/1/99

PROJECT NO: 12832 MATRIX: WATER **DATE SAMPLED:** 03/10/99 DATE RECEIVED: 03/11/99

A	ALYTICAL DATA		
PARAMETER	RESULTS	DETECTION	UNITS
Gasoline Range Organics	ND	LIMIT 0.1 P	mg/L
Surrogate	% Recovery		
4-Bromofluorobenzene	93		
1,4-Difluorobenzene	103		
Method 8015B *** for Gasoli	le		
Analyzed by: CJ Date: 03/11/99			
DENGENE	ND	1 O D	/T
BENZENE TOLUENE	ND ND	1.0 P 1.0 P	ug/L
ETHYLBENZENE	ND ND		ug/L ug/L
TOTAL XYLENE	ND	1.0 P	ug/L
TOTAL VOLATILE AROMATIC HYD		1.0 1	ug/L
Surrogate	% Recovery		
1,4-Difluorobenzene	97		
4-Bromofluorobenzene	93		
Method 8020A ***			
Analyzed by: CJ			
Date: 03/11/99			

ND - Not detected.

(P) - Practical Quantitation Limit

Notes: *Ref: Methods for Chemical Analysis of Water and Wastes, 1983, EPA **Ref: Standard Methods for Examination of Water & Wastewater, 18th ed.

***Ref: Test Methods for Evaluating Solid Waste, EPA SW846, 3rd Ed.

QUALITY CONTROL DOCUMENTATION



SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Gasoline

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

Batch Id: HP S990310183400

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Result Recovery		QC Limits(**) (Mandatory) % Recovery Range
Gasoline Range Organics	ND	1.0	1.0	100	64 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Duplic	Spike	MS/MSD Relative %	-	Limits(***) (Advisory)
	<2>	<3>	Result <1>	Recovery <4>	Result	Recovery	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	ND	0.9	1.2	133	1.2	133	0	36	36 - 160

Analyst: CJ

Sequence Date: 03/10/99

SPL ID of sample spiked: 9903257-04A

Sample File ID: SSC2093.TX0

Method Blank File ID:

Blank Spike File ID: SSC2086.TX0

Matrix Spike File ID: SSC2089.TX0

Matrix Spike Duplicate File ID: SSC2090.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

9903257-02A 9903257-03A 9903275-01B 9903275-02B 9903275-03B 9903275-04B 9903254-01A 9903464-09A 9903464-02A 9903464-01A 9903464-04A 9903254-04A

9903257-04A 9903254-06A 9903257-01A



SPL BATCH QUALITY CONTROL REPORT **

Method Modified 8015B*** for Gasoline

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

Batch Id: HP S990311204800

LABORATORY CONTROL SAMPLE

S P I K E C O M P O U N D S	Method Blank Result <2>	Spike Added <3>	Blank Spike Result Recovery <1> %		QC Limits(**) (Mandatory) % Recovery Range
Gasoline Range Organics	ND	1.0	1.0	100	64 - 131

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Duplic	Spike	MS/MSD Relative %	_	Limits(***) (Advisory)
	<2>	<3>	Result	Recovery	Result <1>	Recovery	Difference	RPD Max.	Recovery Range
GASOLINE RANGE ORGANICS	0.84	0.9	1.3	51.1	1.3	51.1	0	36	36 - 160

Analyst: CJ

Sequence Date: 03/11/99

SPL ID of sample spiked: 9903464-08A

Sample File ID: SSC2129.TX0

Method Blank File ID:

Blank Spike File ID: SSC2122.TX0

Matrix Spike File ID: SSC2125.TX0

Matrix Spike Duplicate File ID: SSC2126.TX0

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID) :

9903464-03A 9903464-06A 9903464-07A 9903464-08A

9903464-05A



SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE

3880 INTERCHANGE DRIVE HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Units: ug/L

Batch Id: HP_S990310180600

LABORATORY CONTROL SAMPLE

SPIKE COMPOUNDS	Method Blank Result <2>	Spike Added <3>	Blank Spike Result Recovery <1> %		QC Limits(**) (Mandatory) % Recovery Range
мтве	ND	50	56	112	72 - 128
Benzene	ND	50	50	100	61 - 119
Toluene	ND	50	50	100	65 - 125
EthylBenzene	ND	50	50	100	70 - 118
O Xylene	ND	50	52	104	72 - 117
M & P Xylene	ND	100	100	100	72 - 116

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix Spike		Matrix Spike Duplicate		· 1		Limits(***) (Advisory)
	<2>	<3>	Result	Recovery	Result	Recovery	Difference	RPD Max.	Recovery Range
мтве	220	20	200	NC	250	NC	NC	20	39 - 150
BENZENE	2.0	20	25	115	24	110	4.44	21	32 - 164
TOLUENE	ND	20	23	115	22	110	4.44	20	38 - 159
ETHYLBENZENE	ND	20	22	110	22	110	0	19	52 - 142
O XYLENE	ND	20	22	110	23	115	4.44	18	53 - 143
M & P XYLENE	ND	40	46	115	46	115	0	17	53 - 144

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

Sequence Date: 03/10/99

Method Blank File ID:

Sample File ID: S_C2092.TX0

SPL ID of sample spiked: 9903254-04A

Blank Spike File ID: S_C2085.TX0

Matrix Spike File ID: S_C2087R.TX0

Matrix Spike Duplicate File ID: S_C2088.TX0

Analyst: CJ

9903257-02A 9903257-03A 9903373-03A 9903373-04A 9903373-07A 9903254-01A 9903464-09A 9903464-02A

9903464-01A 9903464-04A 9903254-04A 9903257-04A

9903254-06A 9903257-01A



SPL BATCH QUALITY CONTROL REPORT **
METHOD 8020

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE

HOUSTON, TEXAS 77054 PHONE (713) 660-0901

Units: ug/L

Batch Id: HP_S990311202100

LABORATORY CONTROL SAMPLE

SPIKE	Method	Spike	Blank	Spike	QC Limits(**)
COMPOUNDS	Blank Result	Added <3>	Result <1>	Recovery %	(Mandatory) % Recovery Range
мтве	ND	50.0	52	104	72 - 128
Benzene	ND	50.0	49	98.0	61 - 119
Toluene	ND	50.0	49	98.0	65 - 125
EthylBenzene	ND ·	50.0	48	96.0	70 - 118
O Xylene	ND	50.0	49	98.0	72 - 117
M & P Xylene	ND	100.0	100	100	72 - 116

MATRIX SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Spike Duplicate		MS/MSD Relative %	1		
	<2>	<3>	Result	Recovery	Result	Recovery	Difference	RPD Max.	Recovery Range	
мтве	ND	20	23	115	21	105	9.09	20	39 - 150	
BENZENE	ND	20	18	90.0	17	85.0	5.71	21	32 - 164	
TOLUENE	ND	20	18	90.0	18	90.0	0	20	38 - 159	
ETHYLBENZENE	5.7	20	22	81.5	21	76.5	6.33	19	52 - 142	
O XYLENE	31	20	47	80.0	45	70.0	13.3	18	53 - 143	
M & P XYLENE	37	40	67	75.0	65	70.0	6.90	17	53 - 144	

* = Values outside QC Range due to Matrix Interference (except RPD)

« = Data outside Method Specification limits.

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

ND = Not Detected/Below Detection Limit

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

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

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

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

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

SAMPLES IN BATCH (SPL ID):

Sequence Date: 03/11/99

Method Blank File ID:

Sample File ID: S C2128.TX0

SPL ID of sample spiked: 9903464-07A

Blank Spike File ID: S C2121.TX0

Matrix Spike File ID: S_C2123.TX0

Matrix Spike Duplicate File ID: S C2124.TX0

Analyst: CJ

9903352-02A 9903352-03A 9903352-04A 9903352-05A 9903352-07A 9903464-03A 9903464-06A 9903352-06A 9903352-05A 9903352-01A 9903352-01A 9903352-01A 9903352-01A 9903352-01A



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

PAGE

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

Batch Id:

HPVV990323223800

BLANK SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	Matrix Duplic	Spike	MS/MSD Relative %	_	Limits(**) (Advisory)
	<2>	<3>	Result	Recovery	Result <1>	Recovery <5>	Difference	RPD Max.	Recovery Range
DIESEL	ND	5.0	4.0	80.0	3.8	76.0	5.13	39	21 - 175

Analyst: RR

Sequence Date: 03/23/99

Method Blank File ID:

Sample File ID:

Blank Spike File ID: VVC2134.TX0

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

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

ND = Not Detected/Below Detection Limit

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

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

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

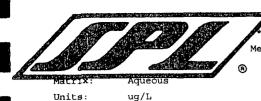
SAMPLES IN BATCH (SPL ID):

9903464-06B 9903464-07B 9903464-08B 9903489-02A

9903489-03A 9903489-04A 9903464-01B 9903464-02B

9903489-01A 9903464-03B 9903411-01B 9903411-02B

9903411-03B 9903411-04B 9903464-04B 9903464-05B



SPL BATCH QUALITY CONTROL REPORT **
Method 8310 ***

PAGE

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

Batch Id:

2990315000100

BLANK SPIKES

S P I K E C O M P O U N D S	Sample Results	Spike Added	Matrix	Spike	MatrixDuplic	Spike cate	MS/MSD Relative %	_	imits(**) Advisory)
	<2>	<3>	Result	Recovery <4>	Result	Recovery <5>	Difference	RPD Max.	Recovery Range
naphthalene	ND	0.50	0.36	72.0	0.29	58.0	21.5	30	33 - 122
ACENAPHTHYLENE	ND	0.50	0.40	80.0	0.32	64.0	22.2	30	42 - 138
ACENAPHTHENE	ND	0.50	0.36	72.0	0.29	58.0	21.5	30	25 - 123
FLUORENE	ND	0.50	0.35	70.0	0.32	64.0	8.96	30	19 - 142
PHENANTHRENE	ND	0.50	0.38	76.0	0.39	78.0	2.60	30	40 - 121
ANTHRACENE	ND	0.50	0.31	62.0	0.31	62.0	0	30	32 - 121
FLUORANTHENE	ND	0.50	0.31	62.0	0.38	76.0	20.3	30	51 - 119
PYRENE	ND	0.50	0.37	74.0	0.39	78.0	5.26	30	45 - 117
CHRYSENE	ND	0.50	0.41	82.0	0.43	86.0	4.76	30	44 - 122
BENZO (A) ANTHRACENE	ND	0.50	0.37	74.0	0.39	78.0	5.26	30	57 - 118
BENZO (B) FLUORANTHENE	ND	0.50	0.42	84.0	0.44	88.0	4.65	30	62 - 121
BENZO (K) FLUORANTHENE	ND	0.50	0.44	88.0	0.46	92.0	4.44	30	63 - 117
BENZO (A) PYRENE	ND	0.50	0.41	82.0	0.43	86.0	4.76	30	42 - 120
DIBENZO (A,H) ANTHRACENE	ND	0.50	0.35	70.0	0.36	72.0	2.82	30	53 - 116
BENZO (G,H,I) PERYLENE	ND	0.50	0.37	74.0	0.39	78.0	5.26	30	51 - 116
INDENO (1,2,3-CD) PYRENE	ND	0.50	0.42	84.0	0.44	88.0	4.65	30	60 - 110

Analyst: KA

Sequence Date: 03/16/99

Method Blank File ID:

Sample File ID:

Blank Spike File ID: 990315B\013-1301

Matrix Spike File ID:

Matrix Spike Duplicate File ID:

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

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

ND = Not Detected/Below Detection Limit

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

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

(**) = Source: SPL Temporary Limits

SAMPLES IN BATCH (SPL ID):

9903464-05C 9903464-06C 9903464-07C 9903464-08C

9903464-01C 9903288-03C 9902A72-02A 9903291-01C

9903464-02C 9903464-03C 9903464-04C



Matrix: Water

Units: mg/L

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

Date:031499 Time:1256 File Name: 0314JM6

Laboratory Control Sample

Element		True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver	ND .	2.00	2.00	100	1.60	2.40
Aluminum						
Arsenic						
Barium	ND	2.00	1.92	96	1.60	2.40
Beryllium	ND	2.00	1.93	97	1.60	2.40
Calcium						
Cadmium	ND	2.00	1.90	95	1.60	2.40
Cobalt						
Chromium	ND	2.00	1.95	98	1.60	2.40
Copper	ND	2.00	1.93	96	1.60	2.40
Iron						
Potassium	ND	20.00	20.42	102	16.00	24.00
Magnesium	ND	20.00	19.34	97	16.00	24.00
Manganese	1			1		
Sodium						
Nickel	ND	2.00	1.92	96	1.60	2.40
Lead		ļ				
Antimony						
Selenium						
Thallium						
Vanadium						
Zinc	ND	2.00	1.90	95	1.60	2.40

	ers in Batch
Work Order	Fractions
99-03-447	01C,03C
	04C,05C
99-03-445	01B
99-03-464	01D-08D
99-03-434	01G

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9903447-01C

Matrix Spike	3 - Shike Di	iplicate Re	suits			r Spikea: 990	13441-0	10		
	Sample	ı Spike	ivlati	ix Spike	Matrix Sp	ike Duplicate	QCL	imits	Spike	QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Red	covery	RPD %	Limits %
Silver	ND	1.0	0.9951	99.5	1.043	104.3	80	120	4.7	20.0
Aluminum										
Arsenic										
Barium	0.0586	1.0	1.011	95.2	1.091	103.2	80	120	8.1	20.0
Beryllium	ND	1.0	0.9615	96.2	1.041	104.1	80	120	7.9	20.0
Calcium										
Cadmium	ND	1.0	0.9443	94.4	1.013	101.3	80	120	7.0	20.0
Cobalt										
Chromium	ND	1.0	0.9583	95.8	1.044	104.4	80	120	8.6	20.0
Copper	ND	1.0	0.9591	95.9	1.033	103.3	80	120	7.4	20.0
Iron										
Potassium	6.187	10.0	16.18	99.9	17.31	111.2	80	120	10.7	20.0
Magnesium	5.006	100	14.5	94.9	15.8	107.9	80	120	12.8	20.0
Manganese										
Sodium										
Nickel	ND	1.0	0.9543	95.4	1.037	103.7	80	120	8.3	20.0
Lead										
Antimony							1			
Selenium										
Thallium			1				1			
Vanadium			 		İ			1		
Zinc	0.0477	1.0	0.9875	94.0	1.085	103.7	80	120	9.9	20.0

Checked: PB 3/19/99

ICP

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: JM



Matrix: Water

Units:, mg/L

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

Date:031499 Time:1256 File Name: 0314JM10

Laboratory Control Sample

Element		True Value		% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum						
Arsenic						
Barium						
Beryllium						
Calcium	ND	20.00	19.26	96	16.00	24.00
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Potassium						
Magnesium						
Manganese						
Sodium						
Nickel						
Lead						
Antimony						
Selenium						
Thallium						
Vanadium						
Zinc						

Work Orders in Batch
Work Order Fractions

99-03-464 01D-08D

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9903447-01C

	Sample	Spike	Matr	ix Spike	Matrix Sp	ike Duplicate	QCL	imits	Spike	QC
Element	Result	Added	Result	Recovery	Result	Recovery	% Red	covery	RPD %	Limits %
Silver										
Aluminum										
Arsenic		ļ								
Barium										
Beryllium										
Calcium	46.35	10.0	56.13	97.8	55.82	94.7	80	120	3.2	20.0
Cadmium										
Cobalt										
Chromium										
Copper										
Iron										
Potassium										
Magnesium										
Manganese										
Sodium										
Nickel										
Lead										
Antimony										
Selenium										
Thallium										
Vanadium										
Zinc										

Checked: 3/26/97

Trace-icp

ICP Spectroscopy Method 6010 Quality Control Report

Analyst: EG



Matrix: Water

Units: mg/L

Date:031699 Time:1458 File Name: 0316PB7

HOUSTON LABORATORY

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

	La	boratory Co	ntrol Sam	ple		
Element	Mth. Blank	True Value	Result	% Recovery	Lower Limit	Upper Limit
Silver						
Aluminum						
Arsenic	ND	4.00	4.25	106	3.20	4.80
Barium						
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Potassium						
Magnesium						
Manganese						
Sodium]					
Nickel						
Lead	ND	2.00	2.11	105	1.60	2.40
Antimony	ND	4.00	4.19	105	3.20	4.80
Selenium	ND	4.00	4.00	100	3.20	4.80
Thallium	ND	4.00	4.12	103	3.20	4.80
Vanadium						
Zinc						

Work Orders in Batch Work Order Fractions 99-03-447 03C-05C 99-03-434 01G

01D-08D

99-03-464

Matrix Spike	- Spike Du	iplicate Re	sults		Work Order Spiked: 9903447-03C							
	Sample	Spike	Mati	ix Spike	Matrix Spi	ke Duplicate	QC L	imits	Spike	QC		
Element	Result	Added	Result Recovery		Result	Recovery	% Rec	overy	RPD %	Limits %		
Silver												
Aluminum												
Arsenic	ND	2.0	1.78	89.0	1.794	89.7	80	120	0.8	20.0		
Barium												
Beryllium												
Calcium												
Cadmium							1					
Cobalt												
Chromium												
Copper		_										
Iron												
Potassium												
Magnesium												
Manganese												
Sodium												
Nickel												
Lead	0.2083	1.0	1.04	83.2	1.037	82.9	80	120	0.4	20.0		
Antimony	ND	2.0	1.729	86.5	1.741	87.1	80	120	0.7	20.0		
Selenium	ND	2.0	1.618	80.9	1.637	81.9	80	120	1.2	20.0		
Thallium	ND	2.0	1.642	82.1	1.652	82.6	80	120	0.6	20.0		
Vanadium			1				1					
Zinc												

Checked: <u>tG.3/17/</u>99



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

* SPL QUALITY CONTROL REPORT **

Matrix: A

Aqueous

Reported on:

03/23/99

Analyzed on:

03/23/99

Analyst:

AG

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

Mercury, Total Method 7470 A***

SPL Sample ID Number	Blank Value ug/L		Measured Concentration ug/L	% Recovery	QC Limits Recovery	3
LCS	ND	2.00	2.24	112	80 - 120)

-9903647

Samples in batch:

_9903379-01A	9903447-01C	9903447-03C	9903447-04C
9903447-05C	9903464-01D	9903464-02D	9903464-03D
9903464-04D	9903464-05D	9903464-06D	9903464-07D
9903464-08D	9903568-01F	9903761-08C	9903761-09C
9 903761-10C	9903761-11C		

COMMENTS:

LCS = SPL ID# 94-452-49-12



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous Reported on: 03/23/99 Analyzed on: 03/23/99

Analyst: AG

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

Mercury, Total Method 7470 A***

 SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)		
 ID Number 		•	 Added ug/L	Result	: -	Result ug/L	Recovery	(ቴ)	RPD Max	8	REC
9903761-08C	ND	ND	2.00	2.14	107	2.18	109	1.8	20	 75	-125

-9903647

Samples in batch:

9903379-01A	9903447-01C	9903447-03C	9903447-04C
9903447-05C	9903464-01D	9903464-02D	9903464-03D
9903464-04D	9903464-05D	9903464-06D	9903464-07D
9903464-08D	9903568-01F	9903761-08C	9903761-09C
9903761-10C	9903761-11C		

COMMENTS:

LCS = SPL ID# 94-452-49-12

ICP Spectroscopy Method 6010 Quality Control Report

Matrix: Water

Units: mg/L

HOUSTON LABORATORY

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

4840-4

99-03-464

Date:032499 Time:1006 File Name: 0324MR4

Laboratory Control Sample

Element		True Value		% Recovery	Lower Limit	Unper Limit
Silver	Willi. Dialik	True value	Result	78 Recovery	Lower Limit	Opper Limit
Aluminum						
Arsenic						
Barium	·					
Beryllium						
Calcium						
Cadmium						
Cobalt						
Chromium						
Copper						
Iron						
Potassium						
Magnesium						
Manganese						
Sodium	ND	20.00	21.51	108	16.00	24.00
Nickel						
Lead						
Antimony						
Selenium						
Thallium						
Vanadium						
Zinc						

Work Order Fractions

01D-08D

Analyst: PB

Matrix Spike - Spike Duplicate Results

Work Order Spiked: 9903464-01D

Matrix Opine	t opike - opike Dupilcate Results						Work Order Opiked. 3303404-01D					
	Sample	Spike	Mati	ix Spike	П	Matrix Spi	ke Duplicate	;	QC L	imits	Spike	QC
Element	Result	Added	Result	Recovery	<u>′</u> _]	Result	Recovery	,	% Rec	overy	RPD %	Limits %
Silver								T				
Aluminum								Τ				
Arsenic					П			Τ				
Barium					П			Τ				
Beryllium					П			Т				
Calcium					П			7				
Cadmium					П			T				
Cobalt					П			Т				
Chromium					П			Т				
Copper					П			\top				
Iron					П			\top				
Potassium					П						1	
Magnesium					П			T				
Manganese								1		i		
Sodium	141	10.0	146.7	57.0	*	147.1	61.0	*	80	120	6.8	20.0
Nickel								1	1			
Lead					П			1	1			
Antimony								\top				
Selenium					П			T				
Thallium		· · · · · · · · · · · · · · · · · · ·	1	<u> </u>	Г			T	1			
Vanadium		1			Г			T				
Zinc			+		\top			\top	<u> </u>			T

^{*} Spike Results Outside Method Limits Elements Post Spiked:Na

Checked: 9m 3/24/59



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

* SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/18/99

Analyzed on:

03/18/99

Analyst:

CV

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

Hardness-Total as CaCO3
Method 130.2 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	99.7	96.0	96.3	94 - 108

-9903529

Samples in batch:

_9903411-01D	9903411-02D	9903411-03D	9903411-04D
9903464-01D	9903464-02D	9903464-03D	9903464-04D
9903464-05D	9903464-06D	9903464-07D	9903464-08D

COMMENTS:

LCS-SPL ID#95535252-13



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

* SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/18/99 Analyzed on: 03/18/99

Analyst:

CV

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

Hardness-Total as CaCO3 Method 130.2 *

 SPL Sample	 Method	 Sample	 Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)	
ID Number		Result mg/L	:	Result		Result mg/L	Recovery	(왕)	RPD Max	% REC
9903411-04D	ND	34.0	50.0	84.0	100	84.0	100	0	20	80.7 -111

-9903528

Samples in batch:

9903411-01D 9903411-02D 9903411-03D 9903411-04D 9903464-01D 9903464-04D 9903464-04D



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/18/99 Analyzed on: 03/18/99

Analyst:

CV

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

> Hardness-Total as CaCO3 Method 130.2 *

SPL Sample	Method	 Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD		QC LIMITS Advisory)
 ID Number 	 Blank mg/L	 Result mg/L	 Added mg/L	Result		/ Result Recovery mg/L		(%)	RPD Max	% REC
9903464-05D	ND	46.0	50.0	94.0	96.0	96.0	100	4.1	20	80.7 -111

-9903530

Samples in batch:

9903464-05D

9903464-06D

9903464-07D

9903464-08D

COMMENTS:

LCS-SPL ID#95535252-13



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

* SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/17/99

Analyzed on:

03/15/99

Analyst:

CV

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

Chloride Method 325.2 *

SPL Sample ID Number	Blank Value mg/L	LCS Concentration mg/L	Measured Concentration mg/L	% Recovery	QC Limits Recovery	
LCS	ND	105	101.8	97.0	90 - 110	

-9903484

Samples in batch:

_9903411-01E	9903411-02E	9903411-03E	9903411-04E
9903463-01C	9903464-01E	9903464-02E	9903464-03E
9903464-04E	9903464-05E	9903464-06E	9903464-07E
9903464-08E	9903501-02I	9903502-03C	9903502-04C
■ 9903504-06I	9903504-09I		

COMMENTS:

LCS-SPL ID#94453222-13



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SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/17/99 Analyzed on: 03/15/99

Analyst:

CV

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

> Chloride Method 325.2 *

 SPL Sample	Method	 Sample	Spike	Matrix Spike		Matríx Spíke Duplicate		RPD	QC LIMITS (Advisory)		
ID Number	Blank mg/L	 Result mg/L	 Added mg/L	Result		Result	Recovery	(%)	RPD Max	8	REC
9903464-02E	ND	32.6	50.0	82.8	100	81.7	98.2	1.8	20	76	-131

-9903485

Samples in batch:

9903464-01E

9903464-02E

9903464-03E

9903464-04E

9903464-05E 9903464-08E 9903464-06E 9903464-07E

COMMENTS:

LCS-SPL ID#94453222-13



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** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/15/99

Analyzed on:

03/15/99

Analyst:

ELS

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

Fluoride
Method 300.0 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.12	91.2	90 - 110

-9903455

Samples in batch:

9903411-01E	9903411-02E	9903411-03E	9903411-04E
9903463-01C	9903464-01E	9903464-02E	9903464-03E
9903464-04E	9903464-05E	9903464-06E	9903464-07E

9903464-08E

COMMENTS:

LCS SPL ID# 9779864-8



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SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/15/99 Analyzed on: 03/15/99

Analyst:

ELS

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

> Fluoride Method 300.0 *

SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)		
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	% REC	
9903411-04E	ND	1.38	10.0	10.6	92.2	10.4	90.2	2.2	20	80 -120	0

-9903454

Samples in batch:

9903411-01E

9903411-02E

9903411-03E

9903411-04E

9903463-01C 9903464-01E 9903464-02E 9903464-03E



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** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99 Analyzed on: 03/15/99

Analyst:

ELS

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

Fluoride Method 300.0 *

SPL Sample	Method	Sample	Spike	Matri	x Spike		ix Spike licate	RPD		C LIMITS Advisory)
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	% REC
9903464-08E	ND	1.43	10.0	10.6	91.7	10.4	89.7	2.2	20	80 -120

-9903456

Samples in batch:

9903464-04E 9903464-08E 9903464-05E

9903464-06E

9903464-07E



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SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/15/99

Analyzed on:

03/11/99

Analyst:

CV

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

> Nitrate nitrogen(as N) Method 353.3 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	5.0	4.81	96.2	92 - 113

-9903444

Samples in batch:

9903411-01E

9903411-02E

9903463-01C

9903464-01E

9903464-02E

9903464-03E

9903464-04E

9903464-07E

9903464-08E

COMMENTS:

LCS-SPL ID#94453220-10



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/15/99

Analyzed on:

03/12/99

Analyst:

CV

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

Nitrate nitrogen(as N)
Method 353.3 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	5.0	4.90	98.0	92 - 113

-9903448

Samples in batch:

9903464-05E

9903464-06E

COMMENTS:

LCS-SPL ID#94453220-10



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99 Analyzed on: 03/11/99

Analyst:

cv

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

Nitrate nitrogen(as N) Method 353.3 *

SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)		
ID Number	1	Result mg/L	Added mg/L	Result mg/L		Result mg/L	Recovery %	(%)	RPD Max	%	REC
9903411-01E	ND	3.32	5.0	7.65	86.6	7.56	84.8	2.1	12	84	-125

-9903443

Samples in batch:

9903411-01E 9903461-02E 9903463-01C 9903464-01E 9903464-03E 9903464-04E 9903464-07E



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** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99 Analyzed on: 03/12/99

Analyst:

CV

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

Nitrate nitrogen(as N) Method 353.3 *

SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)		
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	% F	EC
9903464-05E	ND	ND	5.0	4.46	89.2	4.45	89.0	0.2	12	84 -	125

-9903446

Samples in batch:

9903464-05E

9903464-06E



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

** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99 Analyzed on: 03/11/99

Analyst:

CV

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

Nitrate nitrogen(as N) Method 353.3 *

SPL Sample	Method	Sample	Spike	Matrix Spike		Matrix Spike Duplicate		RPD	QC LIMITS (Advisory)		
ID Number	Blank mg/L	Result mg/L	Added mg/L	Result mg/L	,	Result mg/L	Recovery %	(%)	RPD Max	% REC	
9903464-08E	ND	0.77	5.0	4.99	84.4	4.98	84.2	0.2	12	84 -125	

-9903445

Samples in batch:

9903464-08E

COMMENTS:

LCS-SPL ID#94453220-10



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** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on:

03/15/99

Analyzed on:

03/11/99

Analyst:

ELS

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

Nitrate (as NO3)
Method 300.0 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.77	97.7	90 - 110

-9903431

Samples in batch:

9903455-01B	9903455-02B	9903455 - 03B	9903457-01B
9903457-02B	9903457-03B	9903457-04B	9903457-05B
9903457-06B	9903458-16A	9903458-18A	9903458-19A
9903464-05E	9903464-06E	*	

COMMENTS:

LCS SPL ID# 9779864-8



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** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/15/99 Analyzed on: 03/11/99

Analyst:

ELS

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

Nitrate (as NO3) Method 300.0 *

SPL Sample	Method	Sample	Spike	Matr	ix Spike	,	ix Spike licate	RPD	l .	QC LIMITS Advisory)
ID Number		Result mg/L	Added mg/L	Result mg/L	Recovery %	Result mg/L	Recovery %	(%)	RPD Max	% REC
9903458-16A	ND	0.213	10.0	9.88	96.7	10.1	98.9	2.2	5	86 -115

-9903430

Samples in batch:

9903455-01B 9903455-02B 9903458-18A 9903458-19A 9903455-03B

9903458-16A

9903458-19A 9903464-05E

9903464-06E

COMMENTS:



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* SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/22/99

Analyzed on: 03/22/99

Analyst: ELS

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

Sulfate
Method 375.4 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	26.8	28.1	105	82 - 111

-9903602

Samples in batch:

_9903411-01E	9903411-02E	9903411-03G	9903411-04G
9903464-01E	9903464-02E	9903464-03E	9903464-04E
■ 9903464-05E	9903464-06E	9903464-07E	9903464-08E
9903887-01B	9903887-02B		

COMMENTS:

LCS SPL ID# 95535252-14



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** SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/22/99 Analyzed on: 03/22/99 Analyst: ELS

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

Sulfate Method 375.4 *

 SPL Sample	 Method	 Sample	Spike	Matri	x Spike	!	ix Spike licate	RPD		QC LIM Adviso	
ID Number	:	Result mg/L		Result mg/L	-	Result mg/L	Recovery	(%)	RPD Max	} 	REC
9903411-02E	ND	240	200	455	108	453	106	1.9	9.5	84	-120

-9903601

Samples in batch:

9903411-01E 9903411-02E 9903411-03G 9903411-04G

9903464-01E 9903464-02E 9903464-03E



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SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/22/99 Analyzed on: 03/22/99

Analyst:

ELS

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

> Sulfate Method 375.4 *

 SPL Sample	 Method	 Sample	Spike	Matri	ix Spike	!	ix Spike	RPD		QC LI Advis	
ID Number	 Blank mg/L	Result	!	Result	•	Result mg/L	Recovery	(왕)	RPD Max	\ %	REC
9903464-04E	ND	162	200	374	106	378	108	1.9	9.5	84	-120

-9903603

Samples in batch:

9903464-04E 9903464-05E

9903464-06E

9903464-07E

9903464-08E 9903887-01B 9903887-02B



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SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on: 03/16/99

Analyzed on: 03/11/99

Analyst: ELS

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

Sulfate Method 300.0 *

SPL Sample ID Number	Blank Value mg/L		Measured Concentration mg/L	% Recovery	QC Limits Recovery
LCS	ND	10.0	9.67	96.7	90 - 110

-9903460

Samples in batch:

_9903455-01B	9903455-02B	9903 4 55-03B	9903457-01B
9903457-02B	9903457-03B	9903457-04B	9903457-05B
■9903457-06B	9903459-01B	9903459-02B	9903464-05E
9903464-06E			

COMMENTS:

LCS SPL ID# 9779864-8



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

** SPL QUALITY CONTROL REPORT **

Matrix:

Aqueous

Reported on: 03/16/99

Analyzed on: 03/11/99

Analyst: ELS

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

Sulfate Method 300.0 *

 SPL Sample	 Method	 Sample	Spike	Matri	x Spike	•	ix Spike licate	RPD		QC LIMITS Advisory)
ID Number	Blank mg/L	 Result mg/L	 Added mg/L	Result mg/L	-	Result mg/L	Recovery	(%)	RPD Max	% REC
9903459-02B	ND	313	1000	1290	97.7	1290	97.7	0	7.0	88 -112

-9903459

Samples in batch:

9903455-01B 9903455-02B

9903455-03B

9903459-01B

9903459-02B 9903464-05E 9903464-06E



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SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

Reported on:

03/11/99

Analyzed on:

03/11/99

Analyst:

AΒ

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Carbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9903463-01C	ND	ND	0	5

-9903335

Samples in batch:

9903463-01C 9903464-01F 9903464-02F 9903464-03F 9903464-04F 9903464-05F 9903464-06F 9903464-07F 9903464-08F



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SPL QUALITY CONTROL REPORT **

Matrix: Aqueous

* *

Reported on: 03/11/99 Analyzed on: 03/11/99

Analyst: AB

This sample was randomly selected for use in the SPL quality control program. The results are as follows:

Bicarbonate, as CaCO3 Method SM 4500-CO2D **

-- DUPLICATE ANALYSIS --

SPL Sample ID	Original Sample Concentration mg/L	Duplicate Sample mg/L	RPD	RPD Max.
9903463-01C	230	230.2	0.1	5

-9903337

Samples in batch:

9903463-01C 9903464-01F 9903464-02F 9903464-03F 9903464-04F 9903464-05F 9903464-06F 9903464-07F 9903464-08F

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SAMPLE RECEIPT CHECKLIST

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SPL Houston Environmental Laboratory

Sample Login Checklist

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	3/11/99	1000			
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PPL	, Sample ID:				
	9903464			,	
<u> </u>				<u>Yes</u>	No
1	Chain-of-Custody (COC) form is pre	sent.		v	
2	COC is properly completed.				
3	If no, Non-Conformance Worksheet	has been completed.			
4	Custody seals are present on the ship	pping container.			
5	If yes, custody seals are intact.				
6	All samples are tagged or labeled.				
7	If no, Non-Conformance Worksheet	has been completed.			
8	Sample containers arrived intact				
9	Temperature of samples upon arrival	:	_		2 c
10	Method of sample delivery to SPL:	SPL Delivery			
		Client Delivery			
		FedEx Delivery (airbill	#)	80819	848614
		Other:			
11	Method of sample disposal:	SPL Disposal			
		HOLD			
<u> </u>		Return to Client			
Nai	me:	Date:	111/9	G	

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