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REPORTS

YEAR(S):

1994

BROWN AND CALDWELL

REMEDIAL ACTION PLAN FOR SOIL AND GROUNDWATER

THE WESTERN COMPANY OF NORTH AMERICA

HOBBS, NEW MEXICO
MAY, 1994

REMEDIAL ACTION PLAN FOR SOIL AND GROUNDWATER

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

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CHAPTER 1

EXECUTIVE SUMMARY

Based on the information from previous investigations conducted by Brown and Caldwell and Roberts/Schornick and Associates, Inc. (RSA), the groundwater and soil below the aboveground diesel and gasoline storage tanks have been impacted by hydrocarbons at The Western Company of North America (Western) - Hobbs Facility. Using the results of the investigations, Brown and Caldwell selected biosparging as the system of remediation for the hydrocarbon impacted area at the Hobbs facility. Biosparging is an integrated remediation system that simultaneously addresses cleanup of both soil and groundwater. Details of the proposed remediation system, the remediation goals and a preliminary project schedule are presented in subsequent sections of this remedial action plan. It is anticipated that the remediation goals will be achieved in a period of four years. A preliminary cost estimate for the remediation system is also presented.

CHAPTER 2

INTRODUCTION

This chapter includes facility information, a chronology of project related events, and summaries of the findings from previous investigations and studies conducted at the site.

Site Background

The Western Company of North America (Western) facility at Hobbs, New Mexico (Hobbs Facility) is a truck operation and maintenance center for Western's oil field service business. The Hobbs facility is located north of Hobbs at 2708 West County Road (Figure 2-1). Pertinent regulatory identification information is as follows:

EPA ID No.:	NMD 052377637
Owner's Address:	The Western Company of North America 515 Post Oak Blvd, Suite 915 Houston, TX 77027
Owner's Representative:	Mr. Philip Box, Manager Real Estate and Environmental Compliance
Owner's Telephone Number:	(713) 629 2861
Facility Address:	The Western Company of North America 2708 West County Road Hobbs, New Mexico 88240
Facility Representative:	Mr. Teddy Grandy, District Manager
Facility Telephone Number:	(505) 392 5556
Regulatory Agency:	New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division Hobbs District Office (505) 393 6161

The Hobbs Facility maintains a fueling operation on the north side of the service yard (Figure 2-2). The fuel island dispenses diesel and unleaded gasoline to service vehicles. The diesel fuel is stored in a 22,500 gallon aboveground storage tank (AST) and the unleaded gasoline is stored in a 5,500 gallon AST. Fuel is transferred from the ASTs to dispenser pumps through underground fuel lines. The underground fuel lines are buried two to three feet below ground surface.

Chronology of Events

The subsurface contamination near the ASTs was first detected by the New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division (OCD) during an on-site inspection on February 7, 1991. Since then several investigations have been performed at the site which are presented in a chronological order in Table 2-1.

Table 2-1 Chronology of Events
The Western Company of North America, Hobbs, New Mexico Facility

Date	Activity
February 7, 1991	The State of New Mexico Oil Conservation Division (OCD) conducts an on-site inspection, including sampling of the on-site fresh water well.
August 6, 1991	OCD requests submittal of an investigation work plan.
September 5, 1991	Roberts/Schornick and Associates, Inc. (RSA) submits Technical Work Plan for soil and groundwater investigation to the OCD.
November 15, 1991	The OCD approves Technical Work Plan submitted by RSA.
December 16, 1991	RSA samples the fresh water well. Analytical results are submitted to the OCD.
February 21, 1992	Western samples the fresh water well. Analytical results are submitted to the OCD.
July 29 - August 10, 1992	Brown and Caldwell conducts a soil and groundwater investigation according to the approved Technical Work Plan. Investigation included drilling and sampling 9 soil borings, sampling 6 hand-augered soil borings, the installation and sampling of 5 monitoring wells, and the sampling of the fresh water well.
October 12, 1992	Brown and Caldwell submits Soil and Groundwater Investigation Report to the OCD.
December 2, 1992	The OCD requests the installation and sampling of 4 additional monitoring wells, including a monitoring well on an adjacent property.
April 13, 1993	Brown and Caldwell conducts a vapor extraction pilot test on existing groundwater monitoring wells.
April 15, 1993	Brown and Caldwell installs off-site monitoring well.
April 22, 1993	Brown and Caldwell samples off-site monitoring well.
May 27, 1993	Brown and Caldwell submits a letter report documenting the installation and sampling of the off-site monitoring well to the OCD.

Table 2-1 (Cont'd) Chronology of Events
The Western Company of North America, Hobbs, New Mexico Facility

Date	Activity
June 2, 1993	Brown and Caldwell conducts a short-term aquifer test using the fresh water well at the facility.
June 8, 1993	USTank Management, Inc. conducts a non-volumetric tank system tightness test on the diesel and unleaded gasoline aboveground storage tanks at the facility.
June 21, 1993	ENSR Consulting and Engineering (ENSR) requests to sample the off-site monitoring well. ENSR is the environmental consultant of the adjacent property owner on which the off-site well is located.
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. submits the tank tightness test report to Brown and Caldwell. The report indicated that both tanks and their associated piping passed.
August 16 - 19, 1993	Because downgradient extent of hydrocarbon-affected groundwater was not defined by previous investigations, Brown and Caldwell installed 2 additional downgradient monitoring wells. Brown and Caldwell sampled each of the existing monitoring and the newly installed monitoring wells.
August 25, 1993	Brown and Caldwell submits a letter report to the OCD documenting the split-sampling of the off-site monitoring well and analytical results for the portion analyzed by Brown and Caldwell.
January 28, 1994	Brown and Caldwell performed groundwater monitoring event; all existing monitoring wells and the fresh water well were purged and sampled. Groundwater samples were analyzed for BTEX.
March 17, 1994	Brown and Caldwell submitted a letter report to the OCD documenting the January, 1994 groundwater monitoring event.

Results of Field Investigations

Brown and Caldwell drilled 5 shallow soil borings and 15 deep soil borings and analyzed soil samples to determine the extent and the nature of soil impacted by hydrocarbon at the Hobbs facility. The shallow borings were 4 feet deep and the deep soil borings were 51 feet deep. The shallow borings were located within the containment wall enclosing the two ASTs. The locations of all borings and the results from the soil analysis are presented in Appendix A. The soil surrounding the two ASTs to a depth of four feet had maximum concentrations of to 2398 mg/Kg of benzene, toluene, ethylbenzene and xylene (BTEX), and 35,100 mg/Kg of total petroleum hydrocarbons - diesel fraction (TPH-D). The soil layers at depths between 4 feet and 48 feet were impacted with hydrocarbons at lower concentrations (TPH-D concentration on the order of 500 ppm). Between depths of 48 and 53 feet, the maximum measured hydrocarbon concentration was 355 mg/Kg of total BTEX and 7,610 mg/Kg TPH-D. Since the groundwater is approximately 51 feet deep, this appears to correspond to the capillary fringe zone above the ground water table. The approximate affected area is shown in Figure 2-3.

Eleven monitoring wells have been installed at the Hobbs Facility. The locations of these wells are shown in Figure 2-3. One monitoring well (MW-9) is located in the adjacent HOMCO property. A summary of groundwater samples analyzed for BTEX is presented in Appendix A. The maximum BTEX concentration measured was 38.1 mg/L in MW-6.

Site Geology and Hydrology

The 15 deep soil borings indicate a rather uniform subsurface geology beneath the Hobbs facility. The site is flat and covered with approximately one foot of dense gravel, sand and clay. Below the surface layer is a mixture of clay and silty sand which extends to a depth of approximately 35 feet. The mixture also contains lenses of rock and gravel. At an approximate depth of 35 feet, a 3 to 5 feet thick sandstone layer was encountered in all borings. Below the sandstone layer, is predominantly fine sand was encountered.

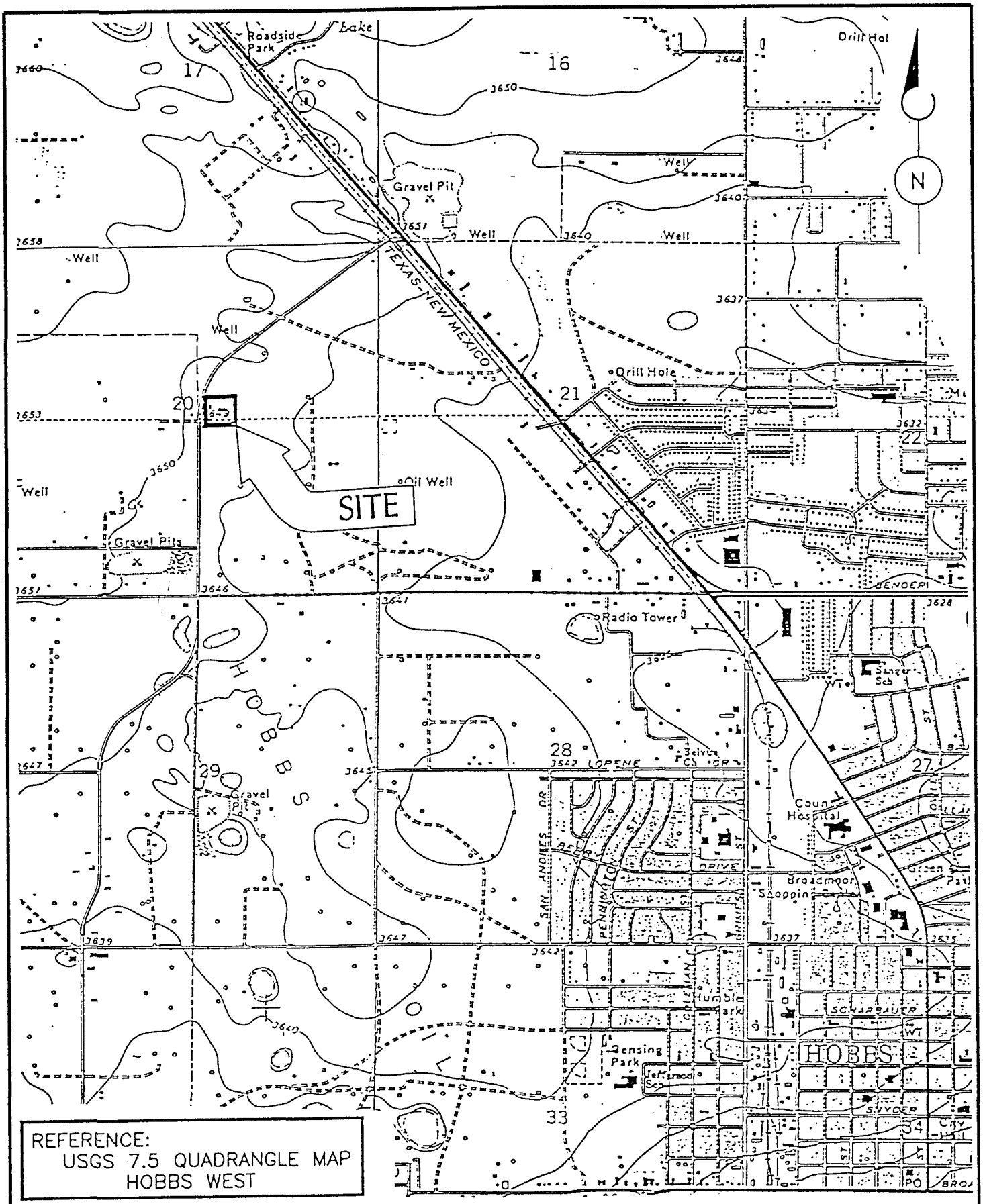
The groundwater was encountered at a typical depth between 51 and 52 feet. A groundwater gradient map is shown in Figure 2-3. The general groundwater flow direction is east-northeast and the gradient is less than 0.01 feet per foot. Because the wells recovered rapidly during two preliminary slug tests, the hydraulic conductivity and groundwater velocity were calculated from available literature data. The hydraulic conductivity at the site is estimated to be 34 to 67 feet per day, based on correlation with grain-size data. Therefore, using a gradient of 0.01 feet per foot and a value of 40 percent for effective porosity, the groundwater velocity is estimated to be between 310 and 611 feet per year.

The groundwater levels in the monitoring wells have been measured on: August 10, 1992, February 9, 1993, August 18, 1993 and January 26, 1994. This data is presented in Appendix B. The data indicates less than one half foot of groundwater level fluctuation.

Soil Vapor Extraction Pilot Study

On April 13, 1993, BC performed an on-site soil vapor extraction (SVE) pilot test. Vapors were extracted from seven monitoring wells: MW-1, MW-2, MW-3, MW-4, MW-5, MW-6 and MW-8. During each test, the extracted vapor volumetric flow rate and vacuum at the extraction well were measured. For the tests at well MW-1, MW-3, MW-4 and MW-6, vacuum measurements were recorded at adjacent wells to determine the zone of influence of these wells. Furthermore, vapors from each well were analyzed for BTEX constituents and TPH (gasoline fraction).

The results from the pilot test are presented in Appendix C. A maximum flow rate of 30 - 35 cubic feet per minute (cfm) was observed at 110 -114 inches of water. The radius of influence of the wells at the site was determined to be less than 40 feet. The TPH concentration (gasoline fraction) varied from less than 10 parts per million by volume (ppmv) in MW-6 to 270,000 ppmv in MW-2.



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USGS 7.5 QUADRANGLE MAP
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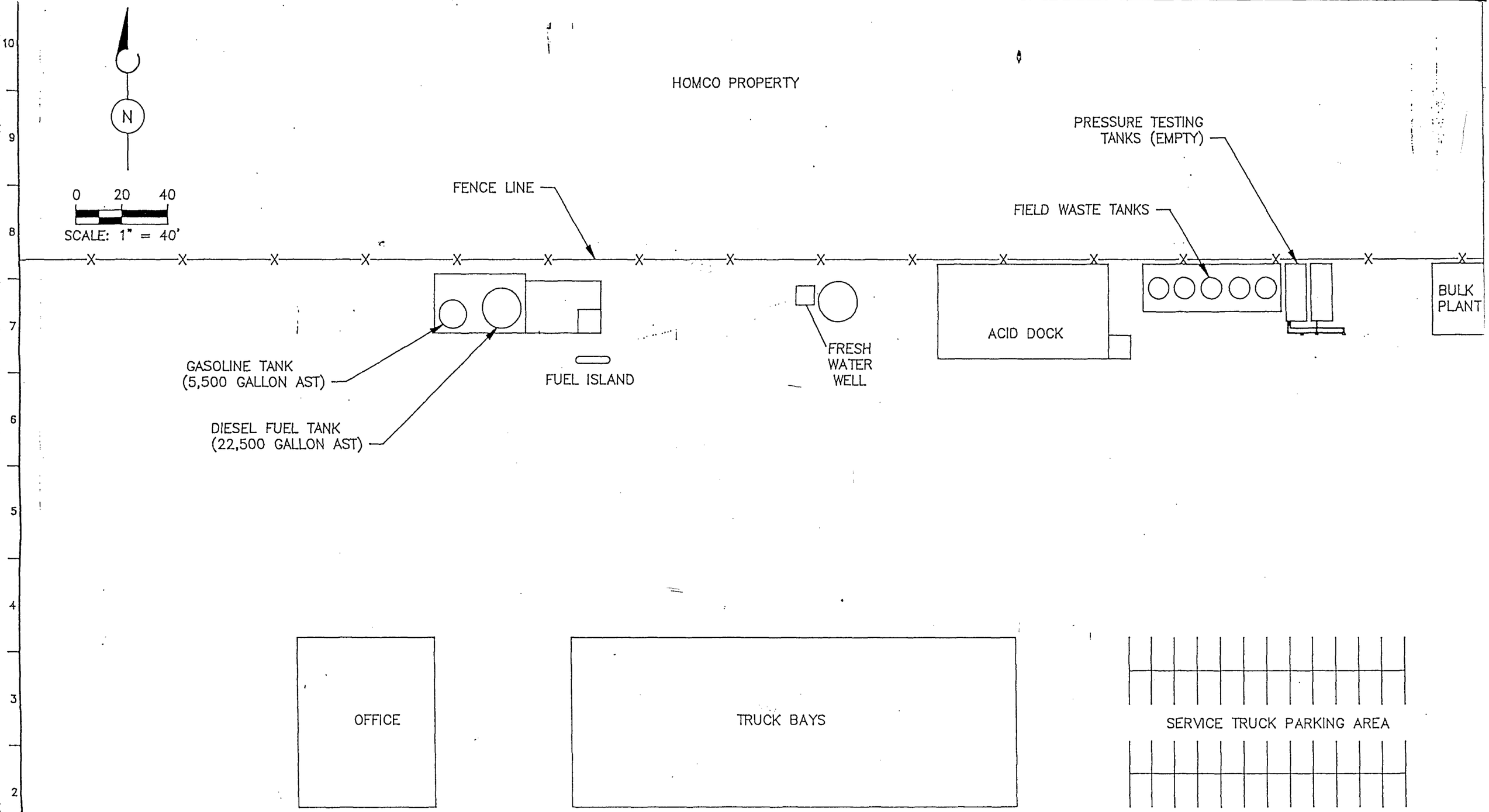

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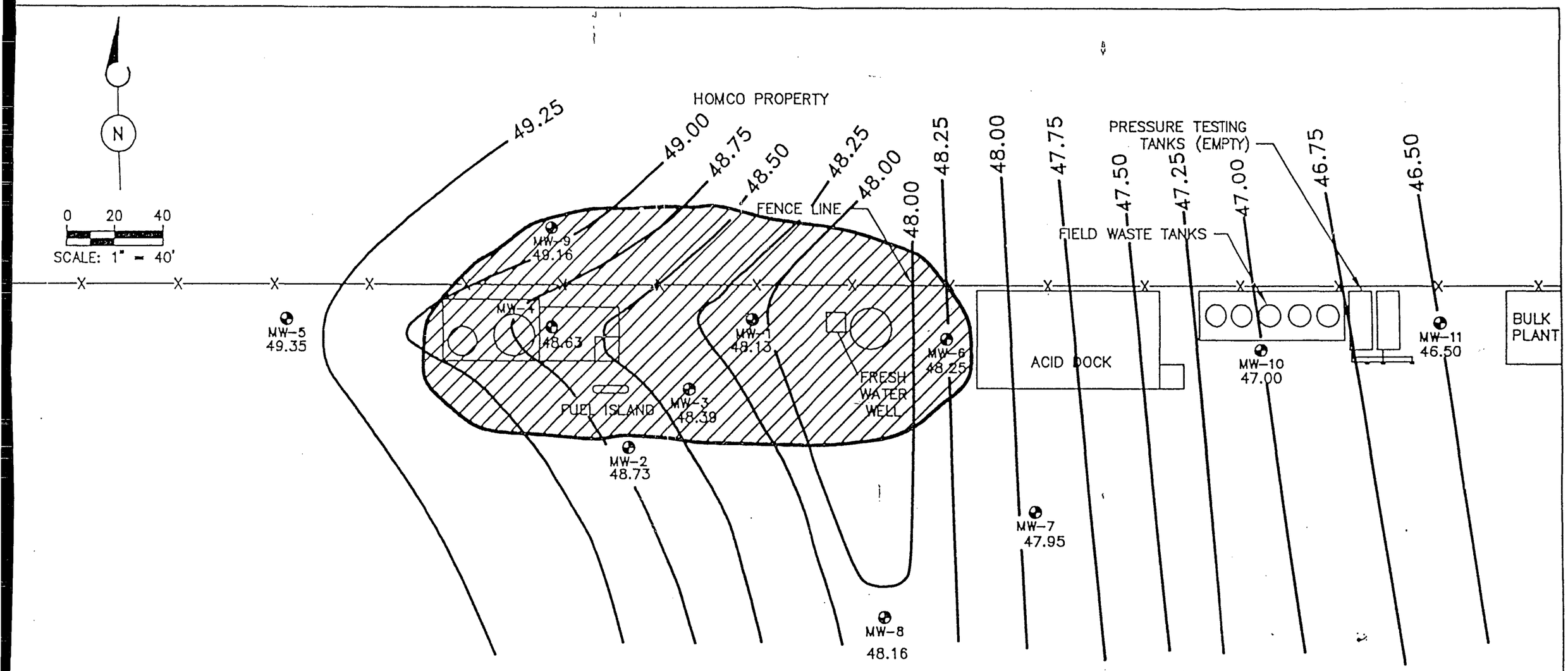

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Dallas – Houston, Texas

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REVISIONS

THE WESTERN COMPANY OF NORTH AMERICA

NOTE: THE GROUNDWATER CONTOUR LINES ARE APPROXIMATE; BASED ON CURRENT APPROXIMATE GROUNDWATER ELEVATION DATA.

ESTIMATED EXTENT OF HYDROCARBON IMPACTED ZONES AND GROUNDWATER GRADIENT MAP JANUARY 26, 1994

HOBBS, NEW MEXICO

DATE: 3/16/94
PROJECT NUMBER: 1151.30
FIGURE NUMBER: 2-3

CHAPTER 3

REMEDIATION GOALS

Western will follow the OCD Guidelines for the remediation of soil and groundwater at Hobbs facility. In the guidelines, OCD sets the remediation goals based on the degree of contamination.

OCD has classified soil contamination into two levels: highly-contaminated/saturated soils and unsaturated-contaminated soils. The highly contaminated /saturated soils are defined as those soils which contain a free phase or exhibit gross staining. Unsaturated-contaminated soils are those that are not highly contaminated/saturated, but contain benzene, toluene, ethylbenzene, total xylene (BTEX) and total petroleum hydrocarbons (TPH) or other potential fresh water contaminants unique to the leak, spill or release.

During the investigations, Brown and Caldwell did not encounter any free phase or observe gross staining in the soil samples. Since the soil samples contained BTEX and TPH, it can be classified as unsaturated-contaminated soil. For unsaturated-contaminated soils, OCD sets the remediation goals based on a risk-based approach. In this approach, the site is ranked according to its general characteristics. Because the groundwater table depth is 51 feet, the site is more than 1,000 feet from any potable water source or private domestic water source and the horizontal distance to the nearest surface water is greater than 200 feet, the ranking score for Hobbs facility is 10. Therefore, the remediation level for soil is 10 ppm for benzene, 50 ppm for BTEX (total) and 1,000 ppm for TPH (also listed in Table 3-1).

In the OCD guidelines, impacted groundwater is defined as the groundwater of a present or a foreseeable beneficial use which contains free phase products, dissolved phase volatile organic constituents or other dissolved constituents in excess of the natural background and New Mexico State Water Quality Control Criteria (WQCC) standards. OCD also states that the impacted groundwater must be remediated to the WQCC or natural background levels. The WQCC lists criteria for metals and several organics. In a previous investigation (April, 1993 Report), it has been shown that the groundwater is impacted by benzene, toluene, ethylbenzene and total xylene (BTEX), and the remaining compounds listed in WQCC are below their respective criteria. Therefore, we will target the BTEX constituents in the remediation of groundwater. The WQCC BTEX concentration limits are listed in Table 3-2.

The remediation system will be designed and operated to meet the target levels set by OCD for soil and groundwater, as shown in Tables 3-1 and 3-2, respectively.

Table 3-1. New Mexico State Oil Conservation Division Target Levels for Hydrocarbons in Soil - Hobbs Facility

Compound	Target Level (mg/Kg)
Benzene	10
Total BTEX	50
TPH	1,000

Table 3-2. New Mexico State Water Quality Control Criteria for BTEX in Groundwater - Hobbs Facility

Compound	Criteria (mg/L)
Benzene	0.01
Toluene	0.75
Ethylbenzene	0.75
Total Xylene	0.62

CHAPTER 4

REMEDIATION APPROACH

This chapter describes the remedial design, permitting requirements, system installation, system start-up, system operation and performance monitoring, confirmation sampling, post remediation monitoring and system decommissioning.

Remediation System Principle

Biosparging will be used for remediation of the impacted soil and groundwater at the Hobbs facility. The biosparging system simultaneously treats contaminants in the soil residual, (adsorbed phase), and contaminants in the soil moisture (dissolved phase), and removes the volatilized contaminants. The biosparging system works by injecting air into the saturated zone and removing air from the vadose zone through a network of wells and piping. The continuous flushing of air through the saturated zone increases the dissolved oxygen concentration in the groundwater, and in the soil moisture in the capillary fringe and vadose zones. The higher dissolved oxygen content facilitates indigenous microorganisms to accelerate biodegradation of the contaminants. The flushing of air also strips the volatile and semivolatile contaminants.

Design Approach

The analytical results from the preliminary field investigations and the quarterly groundwater monitoring events showed that the contaminants at the Hobbs Facility were present primarily in two zones below the aboveground storage tanks (ASTs). The first zone covered an area of 3,310 ft^2 directly below the ASTs extending to a depth of 4 feet. The second zone was located in the capillary fringe at a depth of 50' below ground level extending over an area of 18,820 ft^2. Figure 4-1 illustrates these areas. The analytical results from samples taken at various depths in the two zones were used to estimate the volume of hydrocarbons in the groundwater and the soil. The estimate indicated that a total of 13,360 pounds of hydrocarbons as gasoline fraction and 17,700 pounds of hydrocarbons as diesel fraction were present in the two zones. Using the remediation target concentrations in the soil and the groundwater, the volume of hydrocarbons to be removed from each of the two zones was calculated.

Assuming that all removal is by bioremediation, the design volume of air required to remediate the hydrocarbons was calculated to be 170 standard cubic feet per minute (scfm) in the shallow zone, and 180 scfm in the deeper zone. The system will be designed to use the same air flow to remediate both the upper and lower zones. Based on previous experience in designing such remediation systems for sites with similar characteristics, a design flow rate of 140 scfm was chosen for vacuum extraction for initial system installation. One 60 scfm air injection blower and two 70 scfm vacuum extraction blowers will be initially installed. The performance of this initial biosparging system will be evaluated during the first twelve months of system operation. The system can be upgraded with additional air injection and vacuum extraction blowers, if

expected remediation performance is not attained. Further details of the biosparging system operation and performance are presented later in this chapter. This installation approach will enable the biosparging system to meet the New Mexico Environmental Improvement Board Air Quality Control emission requirements (discussed in the section on permitting).

Remediation System Design Details, Layout and Specifications

The results from the preliminary soil vapor extraction pilot test were used to design the wells for the biosparging system. The planned configuration of the biosparging system to be installed is depicted in Figure 4 -2. The system design includes 16 combined injection/extraction wells, 8 vacuum extraction wells, and 3 injection wells. Figure 4-3 illustrates air injection and vacuum extraction well design. The air injection wells consist of 1-inch diameter PVC piping extending to 60 feet depth with 2½-foot screens located at 5 feet below the groundwater elevation (groundwater elevation is 51 feet below ground elevation). The vacuum extraction wells consist of 2-inch diameter PVC piping extending to 40 feet in depth, with 5-foot screens located just below the sandstone layer at 35 feet. The air flow through the air injection wells and the vacuum extraction wells will be regulated by 1-inch and 2-inch globe valves, respectively.

Eight vacuum extraction wells will be installed in 6-inch diameter, 30-feet deep wells around the containment wall enclosing the two ASTs to remove the volatile fractions. Two inch PVC vacuum extraction wells will be installed in these wells with 20 feet screens extending from 10 feet below ground level. The design of the vacuum extraction wells is shown in Figure 4-4. In order to accelerate bioremediation in the deep soil zone directly below the ASTs, 3 air injection wells will be installed in 6-inch diameter, 60-feet deep wells. The 1-inch diameter PVC air injection wells will be installed with 5-foot screens extending from 5 feet below the groundwater elevation. Figure 4-5 illustrates the design of these air injection wells.

Connections to the air injection vacuum extraction wells will be enclosed in 3' x 3' x 2' steel vaults. These vaults will have removable covers to allow access to operation of the control valves. The vault details are illustrated in Figure 4-6.

One 60 scfm explosion proof blower capable of developing 11 feet of water head was selected for delivering air to the system. Additional blowers can be installed as required. The air injection wells will be grouped and connected to a series of 1-inch diameter Schedule 40 PVC below-ground laterals. The laterals will be connected to 4-inch diameter Schedule 40 PVC below-ground headers. Flow through each lateral will be monitored and regulated by a combination of an air flowmeter and a globe valve. Figure 4-7 depicts these details.

Two 70 scfm capacity explosion proof blowers capable of developing a vacuum of 5.7 feet of water head were selected for removing the vapors from the system. The system can be expanded to accommodate additional blowers as required. The vacuum extraction wells will be grouped and connected to a series of 2-inch diameter Schedule 40 PVC below-ground laterals.

The laterals will be connected to 4-inch diameter Schedule 40 PVC below-ground headers. The flow through each lateral will be monitored and regulated by a combination of an air flow meter and a globe valve. A 4-inch globe suction vent valve will be installed to control the vapor emissions from the system, to maintain emissions below the regulatory limits. These details are illustrated in Figure 4-7.

The progress of bioremediation will be monitored at the monitoring wells MW-3 and MW-1. If the progress of remediation is slow, additional injection wells can be placed in the area surrounding the monitoring wells and additional air injection and vacuum extraction blowers may be installed to accelerate bioremediation. The piping in the system has been designed to accommodate additional wells and increased air flow rates.

Permitting

The New Mexico Environmental Improvement Board Air Quality Control regulation requires permits for emission rates greater than 10 pounds per hour or 25 tons per year of any regulated air contaminant. Using Venting© (1993) software, the emission rates were simulated for model hydrocarbon spills at 100% capacity of the system. The simulation results indicated high emission rates during the initial start-up period with rapid decrease during the first week of system operation. The simulation results showed that the annual regulatory limit of 25 tons per year will not be exceeded during the four year operation of the system. However, the hourly limit of 10 pounds per hour may be approached during the initial three weeks of system operation due to the removal of volatilized hydrocarbons already present in the soil particle interstices.

These emission rate simulations were conducted assuming the hydrocarbons were removed entirely by stripping with no bioremediation. Therefore, the results are expected to be conservative estimates of actual emission rates.

In order to maintain emission rates below 10 pounds per hour during the start-up period, initially two 70 scfm blowers will be installed and the system would be operated at 50% capacity. During the start-up period, the emissions will be monitored hourly using a field Flame Ionization Detector (FID) meter, using the sampling valves installed on the discharge end of each of the blowers to estimate the emission rates. The system will be increased to full capacity when it can be done without exceeding emission criteria.

To further ensure that the emissions will not exceed the regulatory limits, a vent valve will be installed near the suction end of the blowers. This valve has been designed such that it can be opened to reduce volume of subsurface air withdrawn, thereby reducing the emission rate for contaminants. Therefore, there will be no air permitting requirements for the system operation.

Biosparging System Installation

Upon OCD approval of the RAP, Brown and Caldwell will mobilize to the site and install the system. Initially two vacuum extraction blowers (70 scfm) and one air injection blower (60 scfm) will be installed and activated. If the rate of remediation is slow, a second stage of system installation can be implemented. The system piping is designed to accommodate two additional 70 scfm vacuum extraction blowers and two additional 60 scfm air injection blowers, as well as additional air injection and vacuum extraction wells. There will be no high profile surface features in area with the exception of a small shed housing the blowers.

Biosparging System Start-up

A biosparging system start-up will be conducted by Brown and Caldwell after completing the installation. The start-up period will include checking all lines and valves for leaks. The system will be operated at 50% capacity and the emissions will be monitored hourly (during working hours) during the start-up period, to ensure that the emission rates are maintained below the regulatory limits. After a period three weeks, the emission rates are expected to decrease appreciably due to the removal of volatilized hydrocarbons in the soil interstices and the stimulation of bioremediation. The start-up period will be considered complete after one week of continuous operation at initial system capacity.

Biosparging System Operation and Performance Monitoring

During the system operation, bioremediation of the soil and groundwater will be monitored by analysis of the recovered vapors from the system, and the dissolved oxygen concentration in the monitor wells. Additional borings may be drilled to directly measure soil remediation progress. Site monitor wells will be sampled quarterly, and analyzed for BTEX.

Based on the New Mexico Environment Department Air Quality Bureau dispersion modeling guidelines (Part V) for monitoring hydrocarbon emissions, Brown and Caldwell plans to monitor the system emissions using a field FID meter.

Confirmation Sampling

When the site and system monitoring results indicate that the remediation goals have been reached for the Western - Hobbs Facility, Brown and Caldwell will conduct confirmation sampling. Four soil borings will be taken at locations approved by the OCD, and analyzed for TPH as both diesel and gasoline, and BTEX. The monitor wells sampled quarterly for regulatory purposes will be also sampled for confirmation sampling purposes. In the event that confirmation sampling indicates that site remediation goals have not been achieved, system operation will be continued until subsequent confirmation sampling indicate that the remediation goals have been achieved.

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Post Closure Monitoring

Once confirmation sampling indicates that site remediation goals have been met, the site will be monitored quarterly for one year.

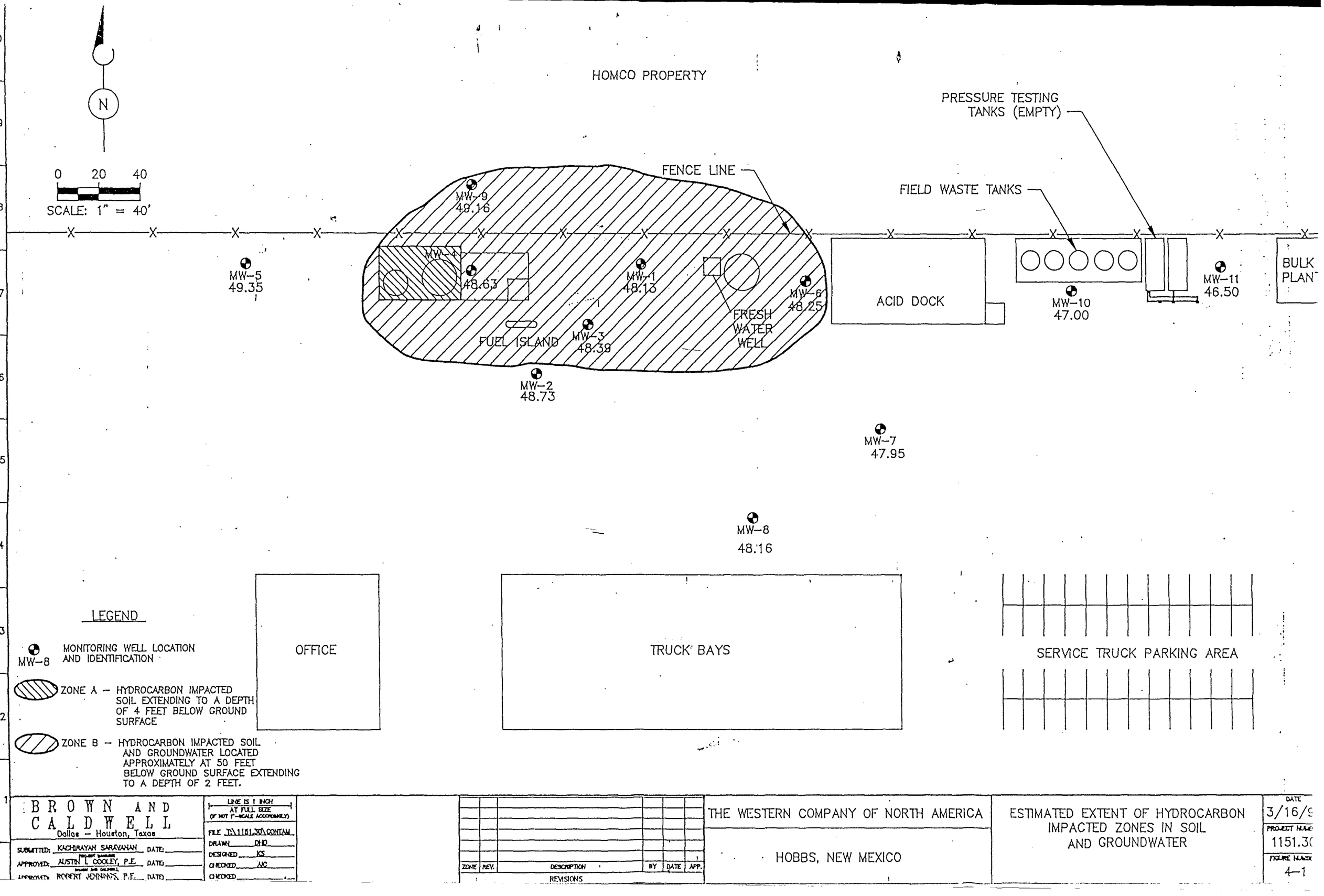
In the event that post closure monitoring shows that the site is not within the remediation goals listed in Table 3-1 and 3-2 in Chapter 3, the system operation will resume and continue until subsequent monitoring indicates that the remediation goals have been achieved.

Biosparging System Closure Report

After completion of the post closure monitoring period, Brown and Caldwell will prepare a biosparging system closure report for the site. A final closure report will be submitted to the OCD by Brown and Caldwell.

Biosparging System Decommissioning

After the completion of the closure report, the biosparging system will be decommissioned. The remediation and monitor wells will be grouted in place. The vacuum lines, air injection lines and the utility lines will be removed.



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BROWN AND CALDWELL
Dallas – Houston, Texas

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APPROVED: AUSTIN L COOLEY, P.E. DATE:
APPROVED: ROBERT JENNINGS, P.E. DATE:

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ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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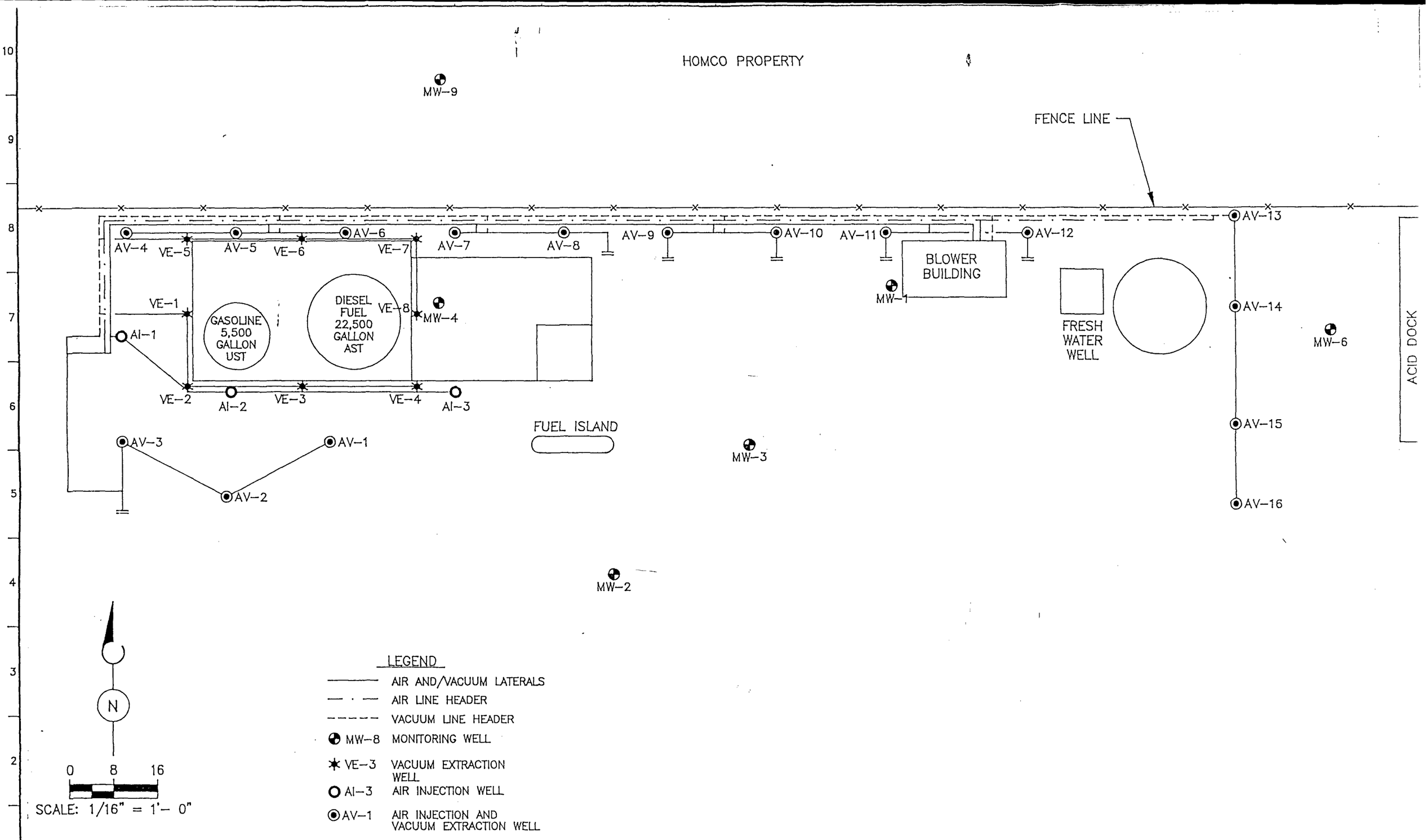
THE WESTERN COMPANY OF NORTH AMERICA

HOBBS, NEW MEXICO

ESTIMATED EXTENT OF HYDROCARBON IMPACTED ZONES IN SOIL AND GROUNDWATER

DATE 3/16/9
PROJECT NUMBER 1151.30
FIGURE NUMBER 4-1



BROWN AND CALDWELL
Dallas – Houston, Texas

SUBMITTED: KACHIRAYAN SARAVANAN (PROJECT ENGINEER) DATE:
APPROVED: AUSTIN I. COOLEY, P.E. (BROWN AND CALDWELL) DATE:
APPROVED: ROBERT JENNINGS, P.E. DATE:

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ZONE	REV.	DESCRIPTION	BY	DATE	APP.

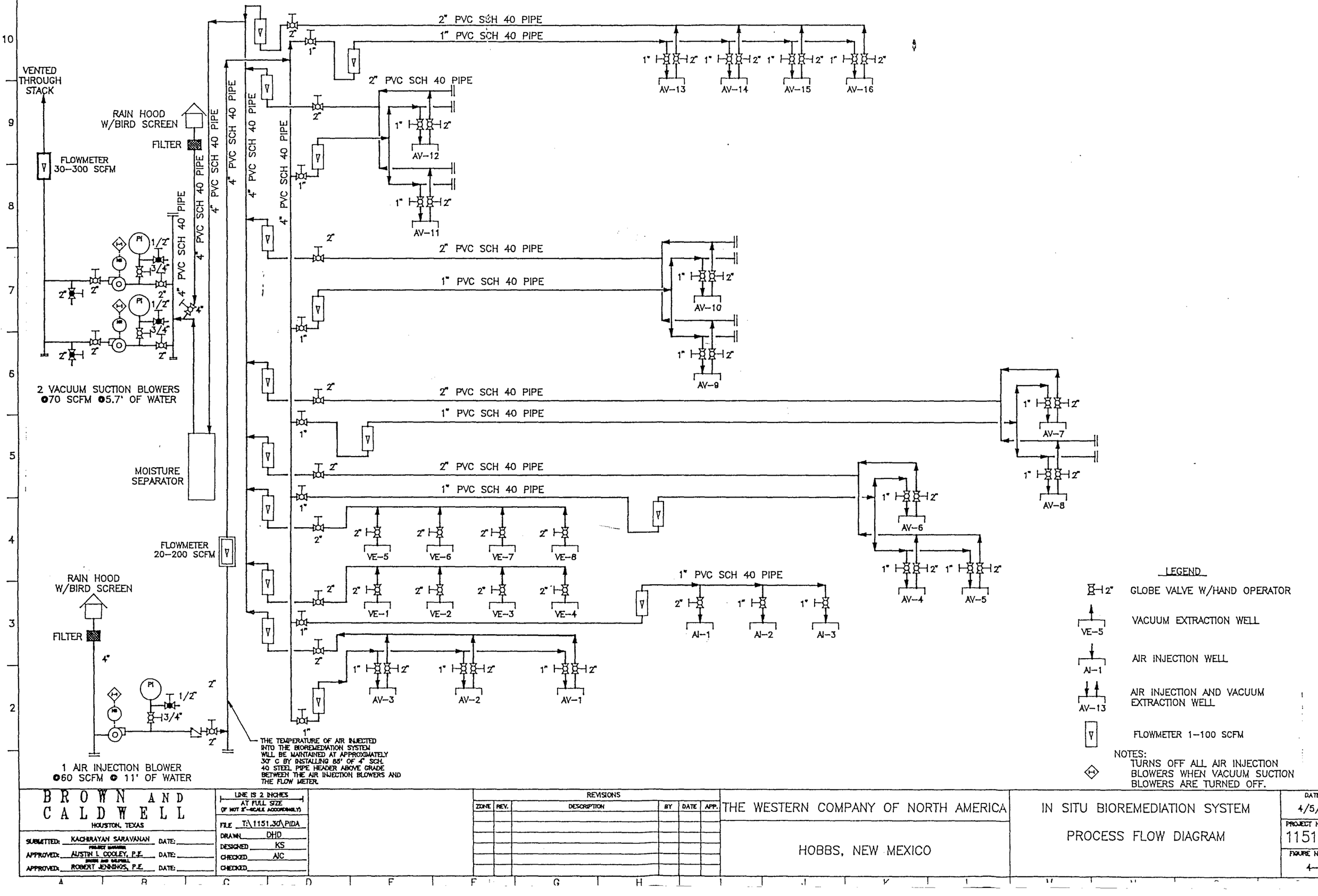
REVISIONS

THE WESTERN COMPANY OF NORTH AMERICA

IN SITU BIOREMEDIATION SYSTEM LAYOUT

HOBBS, NEW MEXICO

DATE 4/5/94
PROJECT NUMBER 1151.30
FIGURE NUMBER 4-2



BROWN AND CALDWELL
HOUSTON, TEXAS

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APPROVED: ROBERT JENNINGS, P.E. DATE:

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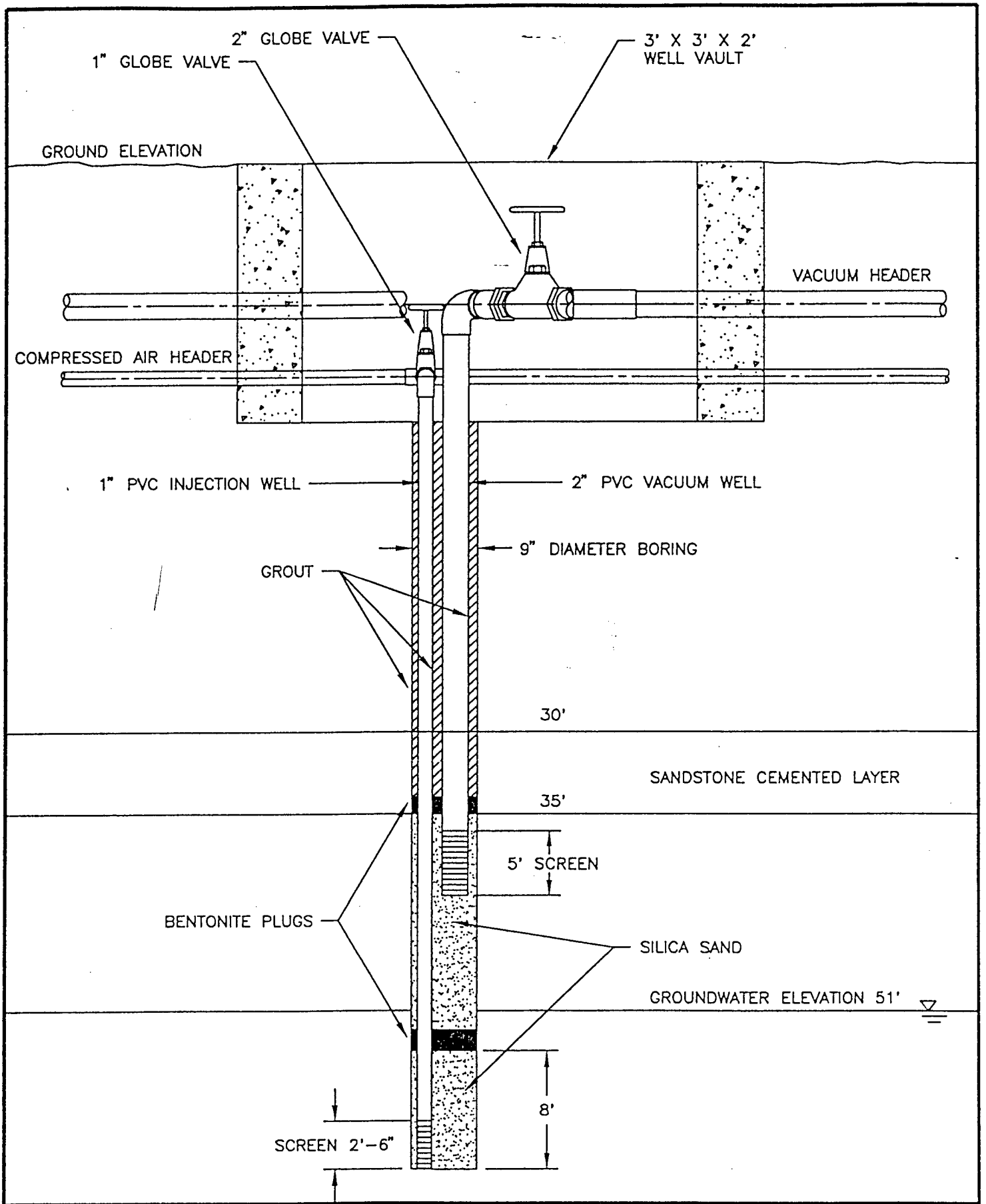
THE WESTERN COMPANY OF NORTH AMERICA

HOBBS, NEW MEXICO

IN SITU BIOREMEDIATION SYSTEM

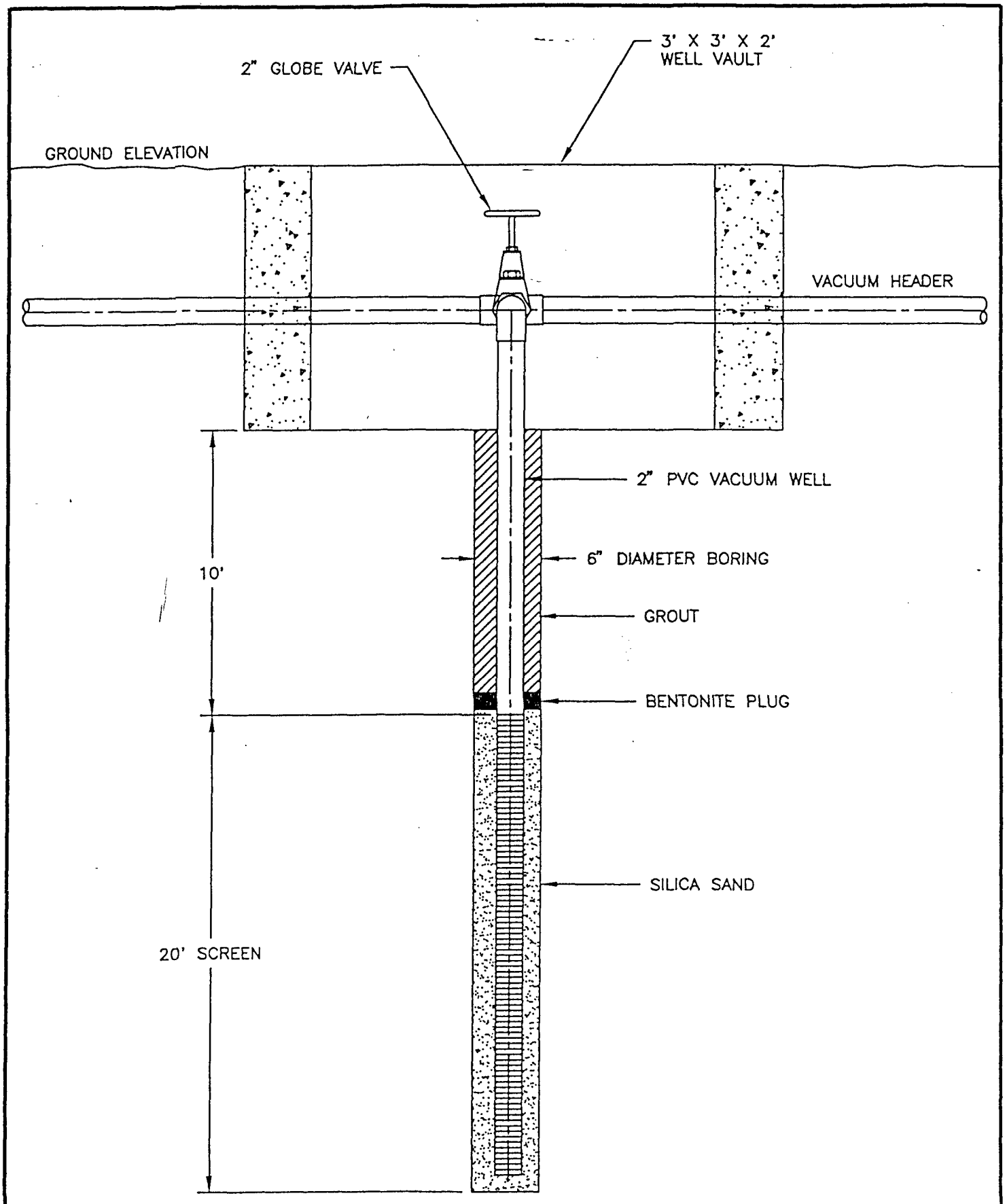
PROCESS FLOW DIAGRAM

DATE 4/5/94
PROJECT NUMBER 1151.30
FIGURE NUMBER 4-7



BROWN AND CALDWELL HOUSTON, TEXAS SUBMITTED: K. SARAVANAN PROJECT MANAGER DATE: APPROVED: AUSTIN I. COOLEY, P.E. BROWN AND CALDWELL DATE:	0 0 0 NOT TO SCALE DRAWN BY: DHD DATE 2/23 CHK'D BY: KS DATE 3/16 APPROVED: AJC DATE	TITLE: AIR INJECTION AND VACUUM EXTRACTION WELL CLIENT: THE WESTERN COMPANY OF NORTH AMERICA SITE LOCATION: HOBBS, NEW MEXICO	DATE: 3/16/94 PROJECT NUMBER: 1151.30 FIGURE NUMBER: 4-3

I:\1151.30\FIG4-2A



BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: K. SARAVANAN PROJECT MANAGER DATE:

APPROVED: AUSTIN I. COOLEY, P.E. BROWN AND CALDWELL DATE:

0 0 0
NOT TO SCALE

DRAWN BY: DHD DATE 2/25
CHK'D BY: KS DATE 3/16
APPROVED: AIC DATE

TITLE: VACUUM EXTRACTION WELL

CLIENT: THE WESTERN COMPANY OF NORTH AMERICA

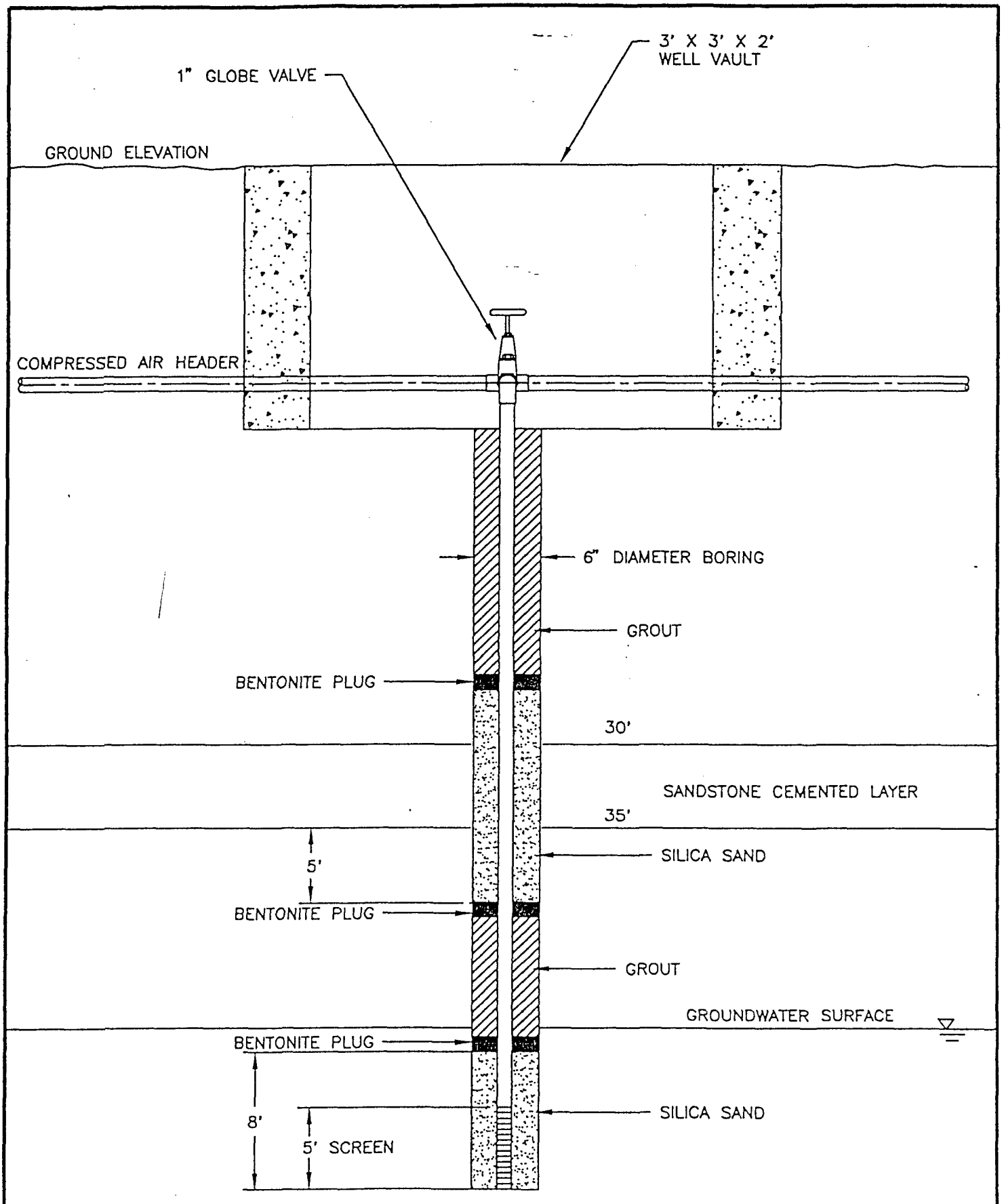
SITE LOCATION: HOBBS, NEW MEXICO

DATE: 3/16/94

PROJECT NUMBER: 1151.30

FIGURE NUMBER: 4-4

T:\1151.30\FIG4-3



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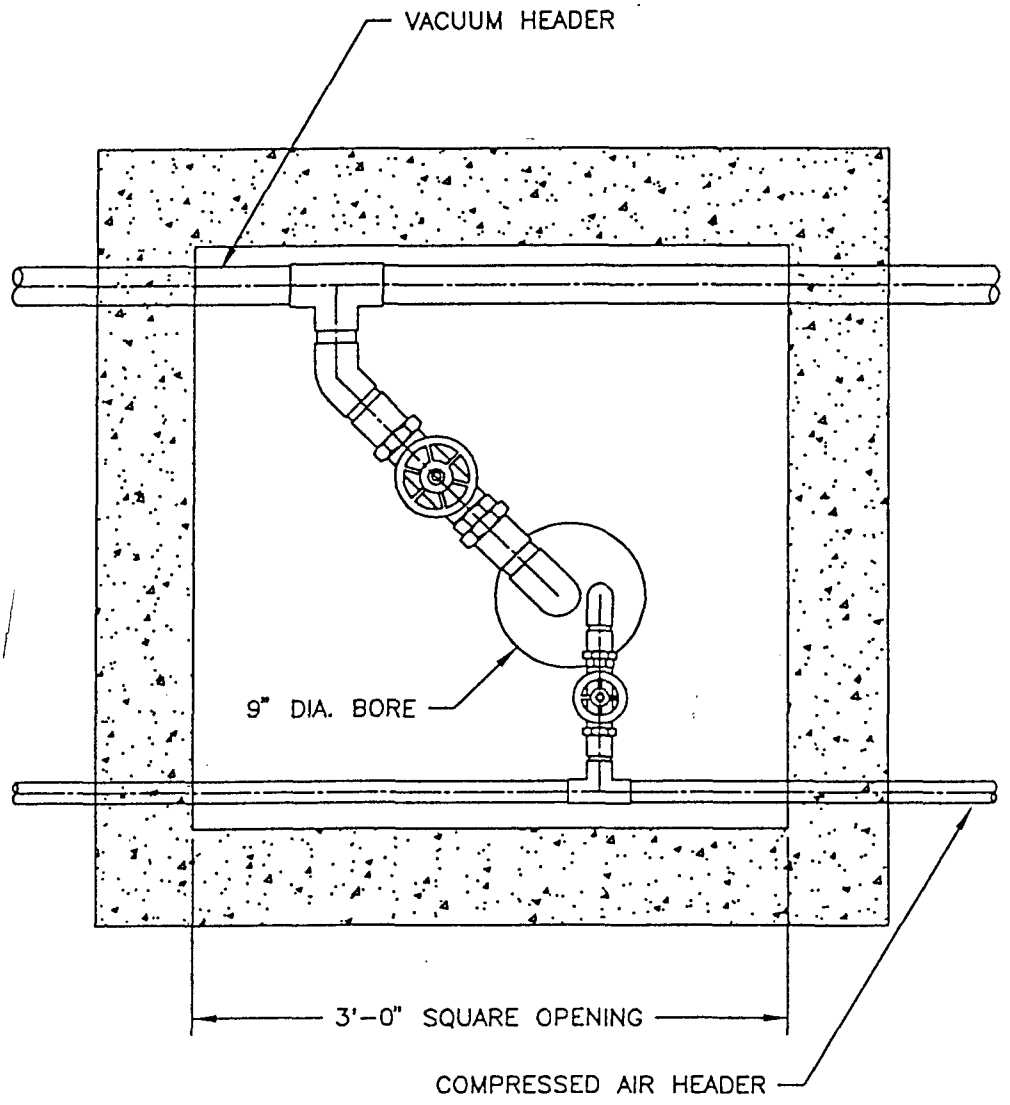
I:\1151.30\FIG4-4



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:\1151.30\FIG4-5

CHAPTER 5

PROJECT SCHEDULE

A project schedule has been developed for the Western - Hobbs Facility hydrocarbon remediation. The schedule is listed in Table 5-1. Note that schedule changes may occur due to delays in approval by the New Mexico OCD or in receipt of comments by Western.

Table 5-1 Hobbs Facility Remediation System - Project Schedule

Milestone	Date
Submit RAP to Western for Final Review	April 15, 1994
Receive Western Comments on RAP	April 22, 1994
Submit Final RAP to Western and OCD	May 6, 1994
New Mexico OCD Approval of RAP	June 20, 1994
Mobilize to Site	July 6, 1994
Complete System Installation	August 8, 1994
Complete System Start-up	August 15, 1994
Complete Site Remediation/Initiate Confirmation Sampling	August, 1998
Complete Post Remediation Monitoring	August, 1999
Decommission the System	September, 1999
Issue Closure Report	September, 1999

CHAPTER 6

PROJECT COST ESTIMATE

Brown and Caldwell has estimated the cost for remediation of the Western - Hobbs Facility using the biosparging system for the purposes of this Remedial Action Plan. The cost estimate is listed in Table 6-1. The degree of accuracy of this estimate is approximately ±15 percent of the actual remediation project cost.

Table 6-1 Hobbs Facility Remediation System - Project Cost Estimate

Task	Description	Cost
	Remediation Phase	
01	Final Design	$8,620
02	System Installation and Start-up[a,b]	$125,100
03	System Operation Monitoring and Evaluation[b] - 8 events over the entire period of system operation	$36,800
04	Regulatory Monitoring and Reporting[b] - 16 Quarters ($5,700/Quarter)	$91,200
05	Confirmation Sampling[b]	$9,000
	Subtotal - Remediation Phase	$270,720
	Closure Phase	
07	Monitoring and Reporting[b] - 4 Quarters (5,700/Quarter)	$22,800
08	System Decommissioning[d]	$21,600
09	Closure Report	$11,000
	Subtotal - Closure Phase	$55,400
	Total Remediation Project Cost	**$326,120**

[a] Includes drilling, equipment, piping, site work (grouting by Western), installation, and start-up costs.
[b] Includes analytical costs.
[c] Operating and maintenance costs are not included.
[d] Disposal and decontamination costs not included.

A

APPENDIX A

APPENDIX A

Table A-1 Summary of Laboratory Analyses for Selected Deep Boring Soil Samples WCNA-Hobbs, New Mexico Facility

Sample Number (Sample Depth in Feet)	Laboratory Analysis				EPA Method 8015 (Diesel Fraction mg/Kg)
	EPA 8020 - mg/Kg				
	Benzene	Toluene	Ethylbenzene	Xylene	
SB-1-20 (49-51)	6.88	44.27	36.20	124.82	5510
SB-1-21 (51-53)	17.95	103.32	56.49	177.17	2360
SB-2-16 (45-47)	<0.80	2.17	4.90	19.34	347
SB-2-18 (49-51)	<0.80	3.60	5.54	21.75	526
SB-3-11 (42-44)	<0.020	<0.020	<0.020	<0.020	3.8
SB-3-14 (49-57)	0.035	<0.020	<0.020	<0.020	1.7
SB-4-23 (48-50)	0.063	0.186	0.029	0.079	9.8
SB-4-24 (50-52)	1.02	21.82	16.55	55.73	697
SB-5-8 (15-17)	1.34	8.68	9.84	34.17	1160
SB-5-22 (49-51)	<0.40	8.01	6.81	23.99	733
SB0-6-22 (49-51)	5.61	32.53	20.91	68.26	2510
SB-6-23 (51-53)	9.85	65.10	54.80	155.68	7610
SB-7-18 (40-42	<0.020	<0.020	<0.020	<0.020	<1.0
SB-7-21 (46-48)	<0.020	<0.020	<.020	<0.020	1.0
SB-8-22 (48-50)	0.63	11.46	7.63	25.24	28.3
SB-8-23 (50-52)	9.53	45.31	27.97	90.52	6680
SB-9-22 (44-46)	<0.020	<0.020	<0.020	<0.020	<1.0
SB-9-24 (48-50)	<0.020	<0.020	<0.020	<0.020	<1.0

Note: Concentrationsof constituents give or detection limit shown.

mg/Kg: milligrams per kilogram = parts per million

HOMCO PROPERTY

WEST COUNTY ROAD

DEPTH	45–47	49–51
B	<0.80	<0.80
T	2.17	3.60
E	4.90	5.54
X	19.34	21.75
D	347	526

DEPTH	48–50	50–52
B	0.63	9.53
T	11.46	45.31
E	7.63	25.97
X	25.24	90.52
D	28.3	6680

DEPTH	15–17	49–51
B	1.34	<0.40
T	8.68	8.01
E	9.84	6.81
X	34.17	23.99
D	1160	733

DEPTH	49–51	51–53
B	6.38	17.95
T	44.27	103.32
E	36.20	56.49
X	124.82	177.17
D	5510	2360

SB-2

SB-8

SB-1

SB-7

DEPTH	40–42	46–48
B	<0.02	<0.02
T	<0.02	<0.02
E	<0.02	<0.02
X	<0.02	<0.02
D	<1.0	1.0

SB-5

SB-6

DEPTH	49–51	51–53
B	5.61	9.85
T	32.53	65.10
E	20.91	54.80
X	68.26	155.68
D	2510	7610

SB-4

DEPTH	48–50	50–52
B	0.063	1.02
T	0.186	21.82
E	0.029	16.55
X	0.079	55.73
D	9.8	697

SB-3

DEPTH	42–44	49–51
B	<0.02	0.035
T	<0.02	<0.02
E	<0.02	<0.02
X	<0.02	<0.02
D	3.8	1.7

FRESH WATER WELL

ACID DOCK

SB-9

DEPTH	44–46	48–50
B	<0.02	<0.02
T	<0.02	<0.02
E	<0.02	<0.02
X	<0.02	<0.02
D	<1.0	<1.0

BULK PLANT

OFFICE

TRUCK BAYS

N

LEGEND

DEPTH = DEPTH OF SAMPLE – FEET
B = BENZENE – mg/Kg
T = TOLUENE – mg/Kg
E = ETHYL BENZENE – mg/Kg
X = XYLENE – mg/Kg
D = DIESEL FRACTION OF TPH BY EPA MODIFIED 8015 – mg/Kg

Brown and Caldwell Consultants
DALLAS–HOUSTON, TEXAS

APPROVED: _____ PROJECT MANAGER DATE _____
APPROVED: _____ DATE _____

REV.	DESCRIPTION	BY	DATE

0 20 40
SCALE: 1" = 40'
DRAWN BY: JON DATE 9/30
CHK'D BY: JJC DATE 9/30
APPROVED: SAM DATE _____

TITLE: AFFECTED SOIL MAP
DATE: 10/06/92
CLIENT: WESTERN COMPANY OF NORTH AMERICA
PROJECT NUMBER: 7032–13
SITE LOCATION: HOBBS, NEW MEXICO
FIGURE NUMBER: A.–1

Table A-2 Cumulative Results of BTEX Analysis for Groundwater Samples
The Western Company of North America
Hobbs, New Mexico Facility

MONITORING WELL	SAMPLING DATE	PARAMETER (µg/L)			
		Benzene	Ethylbenzene	Toluene	Xylenes
MW-1	8/10/92	5,550	2,160	12,090	7,370
	2/9/93	2,100	1,300	6,500	7,400
	8/19/93	3,200	1,200	7,300	3,700
	1/27/94	1,930	672	4,580	2,390
MW-2	8/10/92	14.9	<4.0	<4.0	<4.0
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/19/93	100	3.0	12.0	13.0
	1/27/94	<1.0	2.0	1.2	2.5
MW-3	8/10/92	304.9	6,760	2,099	1,586
	2/9/93	130	<10.0	<10.0	190
	8/19/93	560	630	3,100	1,900
	1/27/94	1,070	510	5,380	3,120
MW-4	8/10/92	2,594	2,160	10,360	6,740
	2/9/93	5,200	2,200	15,000	10,000
	8/19/93	3,000	<2,000	12,000	7,000
	1/27/94	NS[a]	NS[a]	NS[a]	NS[a]
MW-5	8/10/92	<4.0	<4.0	<4.0	<4.0
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/10/93	<2.0	<2.0	<2.0	<2.0
	1/27/94	8.7	4.0	29.9	11.3
MW-6	8/10/92	NS	NS	NS	NS
	2/9/93	7,000	3,100	19,000	7,200
	8/19/93	8,100	3,500	19,000	6,400
	1/27/94	7,960	3,830	20,200	6,150
MW-7	8/10/92	NS	NS	NS	NS
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/19/93	<2.0	<2.0	3.0	<2.0
	1/27/94	1.1	<1.0	<1.0	<1.0

NS = Not sampled on this date.

[a] MW-4 was not sampled due to the presence of PSHs in the well.

[b] MW-9 was sampled upon installation in April 1993 and during split-sampling in July 1993, as well as during other regular sampling events.

Table A-2 (Cont'd) Cumulative Results of BTEX Analysis for Groundwater Samples
The Western Company of North America
Hobbs, New Mexico

MONITORING WELL	SAMPLING DATE	PARAMETER (µg/L)			
		Benzene	Ethylbenzene	Toluene	Xylenes
MW-8	8/10/92	NS	NS	NS	NS
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/19/93	<2.0	<2.0	<2.0	<2.0
	1/27/94	<1.0	<1.0	<1.0	<1.0
MW-9[b]	8/10/92	NS	NS	NS	NS
	2/9/93	NS	NS	NS	NS
	4/22/93	570	<50.0	380	870
	7/15/93	121	3.0	7.3	458
	8/19/93	390	40.0	290	250
	1/27/94	327	51.1	357	293
MW-10	8/10/92	NS	NS	NS	NS
	2/9/93	NS	NS	NS	NS
	8/19/93	190	<200	460	240
	1/27/94	13.4	5.5	4.0	33.6
MW-11	8/10/92	NS	NS	NS	NS
	2/9/93	NS	NS	NS	NS
	8/19/93	<2.0	<2.0	<2.0	<2.0
	1/27/94	<1.0	<1.0	<1.0	<1.0
Fresh Water Well	8/10/92	<4.0	<4.0	<4.0	<4.0
	2/9/93	77.0	<2.0	10.0	73.0
	8/119/93	NS	NS	NS	NS
	1/27/94	<1.0	<1.0	<1.0	<1.0

NS = Not sampled on this date.

[a] MW-4 was not sampled due to the presence of PSHs in the well.

[b] MW-9 was sampled upon installation in April 1993 and during split-sampling in July 1993, as well as during other regular sampling events.

B

APPENDIX B

APPENDIX B

Table B-1 Cumulative Groundwater Elevation Data
The Western Company of North America
Hobbs, New Mexico Facility

Well Number and Measurement Date	Top of Casing Elevation (relative)	Depth of Water from Top of Casing (feet)	Groundwater Elevation (relative)
MW-1			
August 10, 1992	101.44	53.22	48.22
February 9, 1993	101.44	53.03	48.41
August 18, 1993	101.44	53.10	48.34
January 26, 1994	101.44	53.31	48.13
MW-2[a]			
August 10, 1992	101.50	52.82	48.68
February 9, 1993	98.75	49.60	49.15
August 18, 1993	98.75	49.71	49.04
January 26, 1994	98.75	49.97	48.78
MW-3			
August 10, 1992	101.44	52.99	48.45
February 9, 1993	101.44	52.72	48.72
August 18,1993	101.44	52.82	48.62
January 26, 1994	101.44	53.05	48.39
MW-4			
August 10, 1992	99.33	50.55	48.78
February 9, 1993	99.33	50.26	49.07
August 18, 1993	99.33	50.38	48.95
January 26,1994	99.33	50.90[b]	48.67[b]
MW-5			
August 10, 1992	101.85	52.38	49.47
February 9, 1993	101.85	52.06	49.79
August 18, 1993	101.85	52.16	49.69
January 26, 1994	101.85	52.50	49.35

[a] Because the above grade completion on MW-2 was damaged,by on-site truck traffic, it was recompleted as a flush-mount grade box. Brown and Caldwell resurveyed the top of casing elevation at 98.75

[b] A layer of PSHs approximately 0.3 feet in thickness was measured in MW-4. The depth to groundwater measurement shown in this table is actual measurement taken. However, the groundwater elevation has been adjusted by multiplying the PSH thickness by 0.8 and subtracting from the depth to water. This adjustment gives an approximation of the groundwater elevation if a PSH was not present.

[c] MW-9 was water levels were taken at installation in April 1993 and during split-sampling in July 1993, in addition to regularly scheduled measurement and sampling dates.

Table B-1 (Cont'd) Cumulative Groundwater Elevation Data
The Western Company of North America
Hobbs, New Mexico

Well Number and Measurement Date	Top of Casing Elevation (relative)	Depth of Water from Top of Casing (feet)	Groundwater Elevation (relative)
MW-6			
August 10, 1992	NM	NM	NM
February 9, 1993	99.25	50.58	48.67
August 18, 1993	99.25	50.78	48.47
January 26, 1994	99.25	51.00	48.25
MW-7			
August 10, 1992	NM	NM	NM
February 9, 1993	98.96	50.53	48.43
August 18, 1993	98.96	50.74	48.22
January 26, 1994	98.96	51.01	47.95
MW-8			
August 10, 1992	NM	NM	NM
February 9, 1993	99.12	50.48	48.64
August 18, 1993	99.12	50.67	48.45
January 26, 1994	99.12	50.96	48.16
MW-9[b]			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
April 22, 1993	99.18	49.73	49.45
July 15, 1993	99.18	49.65	49.53
August 18, 1993	99.18	49.85	49.33
January 26, 1994	99.18	50.02	49.16
MW-10			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
August 18, 1993	98.90	51.54	47.36
January 26, 1994	98.90	51.90	47.00
MW-11			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
August 18, 1993	98.82	51.92	46.90
January 26, 1994	98.92	52.32	46.60

[a] Because the above grade completion on MW-2 was damaged,by on-site truck traffic, it was recompleted as a flush-mount grade box. Brown and Caldwell resurveyed the top of casing elevation at 98.75

[b] A layer of PSHs approximately 0.3 feet in thickness was measured in MW-4. The depth to groundwater measurement shown in this table is actual measurement taken. However, the groundwater elevation has been adjusted by multiplying the PSH thickness by 0.8 and subtracting from the depth to water. This adjustment gives an approximation of the groundwater elevation if a PSH was not present.

[c] MW-9 was water levels were taken at installation in April 1993 and during split-sampling in July 1993, in addition to regularly scheduled measurement and sampling dates.

C

APPENDIX C

APPENDIX C

Table C-1 Soil Vapor Pilot Study - Vacuum Pressure and Air Flow Rates

Well	Test #1		Test #2		Test #3	
	Vacuum Pressure (inches of H_20)	Air flow rate (cubic feet per minute)	Vacuum Pressure (inches of H_20)	Air flow rate (cubic feet per minute)	Vacuum Pressure (inches of H_20)	Air flow rate (cubic feet per minute)
MW-1	54	10	96	20	110	30
MW-2	58	10	92	20	114	35
MW-3	54	10	88	20	110	35
MW-4	62	10	82	20	110	35
MW-5	54	10	80	20	112	35
MW-6	52	10	88	20	110	30
MW-8	57	10	94	20	114	30

Table C-2 Soil Vapor Pilot Study - Radius of Influence Study

Extraction Well	Pressure at Extraction Well[a]	Influence at Adjacent Monitoring Wells					
		Distance (feet)	Pressure[a]	Distance (feet)	Pressure[a]	Distance (feet)	Pressure[a]
MW-1	54	40	0	78	0	82	0
MW-1	96	40	0	78	0	82	0
MW-1	110	40	0	78	0	82	0
MW-3	54	40	0	40	0	62	0.15
MW-3	88	40	0.03	40	0	62	0.16
MW-3	110	40	0.04	40	0	62	0.2
MW-4	62	62	0.01	63	0.05	82	0.06
MW-4	82	62	0.02	63	0.03	82	0.04
MW-4	110	62	0.05	63	0.06	82	0.09
MW-3	52	78	0	107	0.05	N.A[b]	N.A
MW-3	88	78	0.04	107	0.07	N.A	N.A
MW-3	110	78	0.03	107	0.08	N.A	N.A

Notes [a] All vacuum pressures are in inches of water.
[b]NA is not determined

Table C-3 Soil Vapor Pilot Study - Results of Analytical Testing

Analysis	Extraction Well Concentration (parts per million as volume)						
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-8
Benzene	99	NA[a]	230	731	NA	0.73	NA
Ethylbenzene	8.7	NA	25	31	NA	0.035	NA
Toluene	130	NA	220	660	NA	0.92	NA
Total xylene	30	NA	42	67	NA	0.06	NA
TPH-Gasoline	13,000	270,000	28,000	64,000	4,000	7.7	640

Notes: [a]NA is not analyzed

D

APPENDIX D

APPENDIX D

REFERENCES

1. "Additional Soil and Groundwater Investigation at The Western Company of North America Hobbs, New Mexico Facility" by Brown and Caldwell, April 27, 1993.

2. Venting© - A program for estimating hydrocarbon recovery from soil vacuum extraction systems- Version 3.0, Environmental Systems & Technologies Inc., Blacksburg, VA, 1993.

received
4-11-94

BROWN AND CALDWELL

ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION

THE WESTERN COMPANY OF NORTH AMERICA

HOBBS, NEW MEXICO

BROWN AND CALDWELL

April 6, 1994

Ms. Kathy Brown
State of New Mexico
Energy Minerals and Natural Resources Dept.
Oil Conservation Division
Post Office Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

19-1151-10

Subject: The Western Company of North America
Hobbs, New Mexico Facility
Additional Soil and Groundwater Investigation

Dear Ms. Brown:

On behalf of The Western Company of North America (Western), Brown and Caldwell is submitting this Additional Soil and Groundwater Investigation report for the subject facility.

If you have any questions or require additional information, please contact me or Jack Cooper at (713) 759-0999.

Very truly yours,

BROWN AND CALDWELL

Robert N. Jennings P.E.
Project Manager

Jackie (Jack) Cooper, Jr.
Project Geologist

1415 Louisiana, Suite 2500, Houston, TX 77002 (713) 759-0999 Fax (713) 759-0952

ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION

THE WESTERN COMPANY OF NORTH AMERICA

HOBBS, NEW MEXICO FACILITY

CONTENTS

LIST OF TABLES

LIST OF FIGURES

* Figure follows page number listed.

1

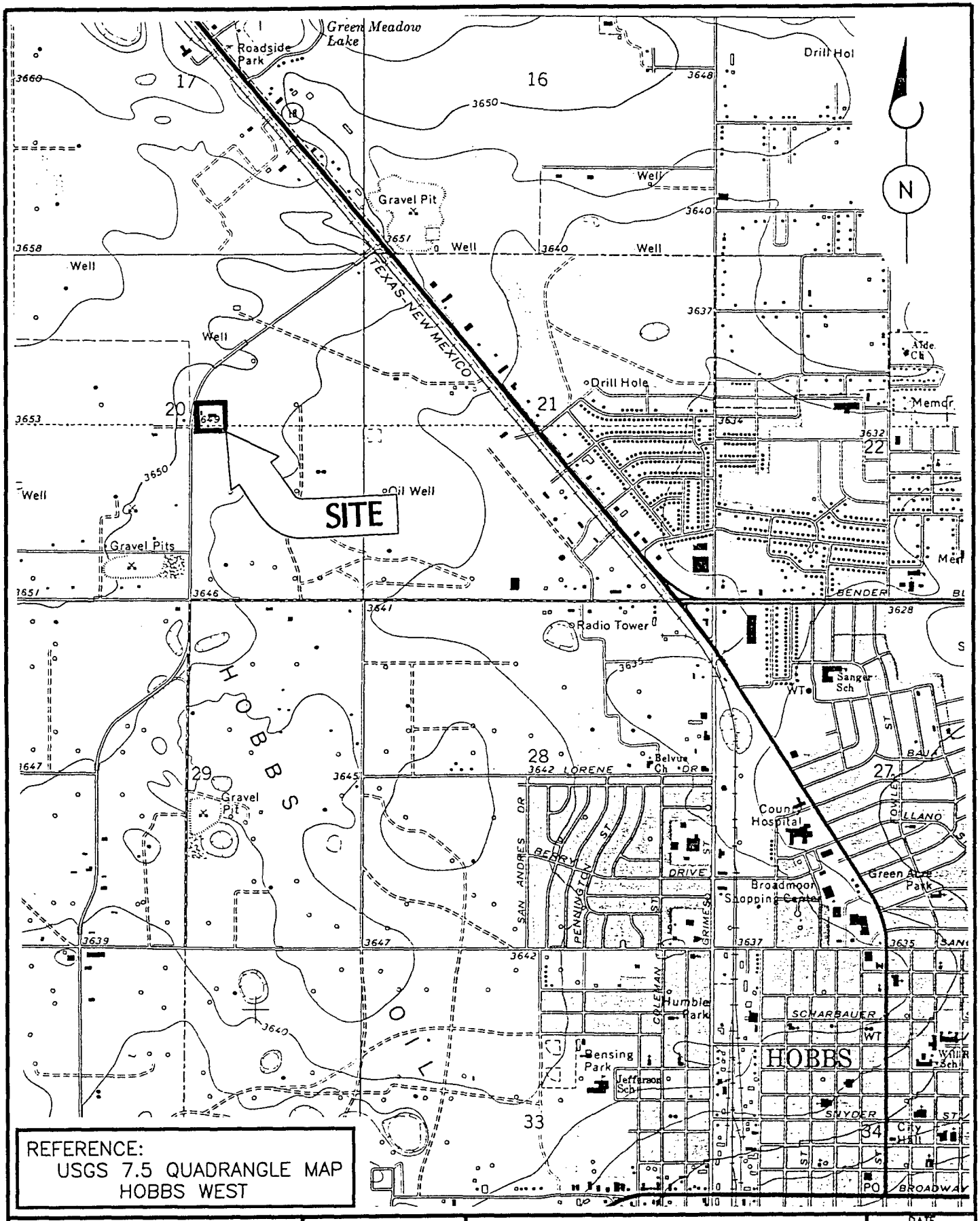
CHAPTER 1

INTRODUCTION

Brown and Caldwell conducted additional soil and groundwater investigations at The Western Company of North America (Western) facility in Hobbs, New Mexico. The investigations were conducted to determine the vertical and horizontal extent of hydrocarbon-affected soil and groundwater at the facility.

The facility is a truck operation and maintenance center for Western's oil field service business. The facility is located north of downtown Hobbs at 2708 West County Road. A site location map is presented as Figure 1-1. Pertinent regulatory information is as follows:

EPA ID Number:	NMD 052377637
Owner's Address:	The Western Company of North America P.O. Box 56006 Houston, Texas 77256
Owner's Representative:	Mr. Phillip Box, Manager Real Estate and Environmental Compliance
Owner's Telephone Number:	(713) 629-2861
Facility Address:	The Western Company of North America 2708 West County Road Hobbs, New Mexico 88240
Facility Representative:	Mr. Teddy Gandy, District Manager
Facility Telephone Number:	(505) 392-5556
Regulatory Agency:	State of New Mexico Energy, Minerals, and Natural Resources Department Oil Conservation Division Santa Fe, New Mexico (505) 827-5800



BROWN AND CALDWELL HOUSTON, TEXAS SUBMITTED: LYNN M. WRIGHT / PROJECT MANAGER DATE: APPROVED: ROBERT JENNINGS, P.E. / BROWN AND CALDWELL DATE:	0 1000 2000 SCALE: 1" = 2000' DRAWN BY: DHD DATE 2/8 CHK'D BY: JLC DATE 2/9 APPROVED: DATE	TITLE: SITE LOCATION MAP CLIENT: THE WESTERN COMPANY OF NORTH AMERICA SITE LOCATION: HOBBS, NEW MEXICO	DATE: 2/8/94 PROJECT NUMBER: 1151.10 FIGURE NUMBER: 1-1

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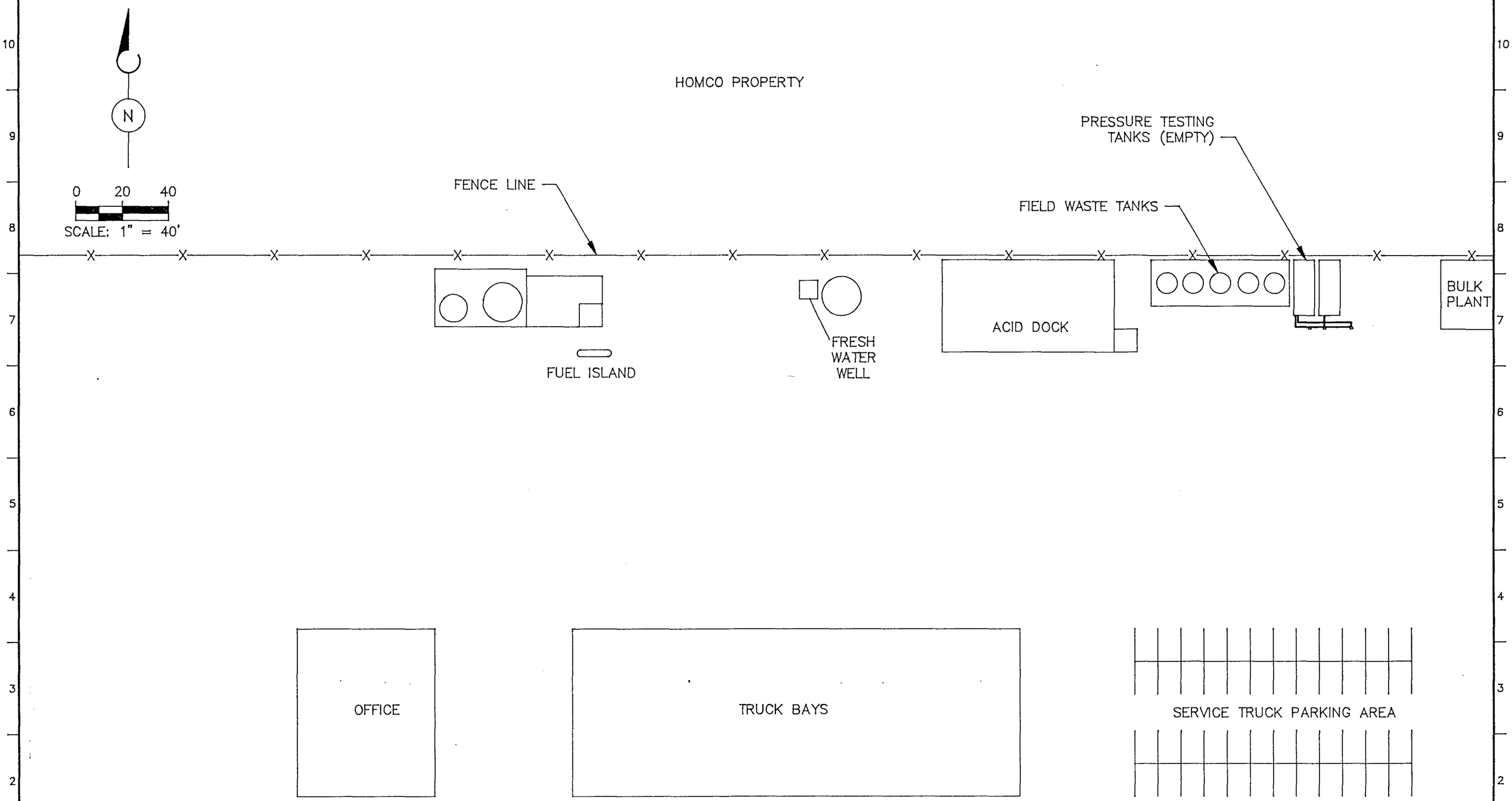
The facility maintains a fueling operation on the north side of the service yard. The fuel island dispenses diesel fuel and unleaded gasoline to service vehicles. The diesel fuel is stored in a 22,500 gallon aboveground storage tank (AST) and the unleaded gasoline is stored in a 5,500 gallon AST. Fuel is transferred from the ASTs to the dispenser pumps through underground fuel lines. The underground fuel lines are buried approximately two to three feet below ground surface. A facility site map is presented as Figure 1-2.



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SUBMITTED: LYNN M. WRIGHT (PROJECT MANAGER) DATE:
APPROVED: ROBERT JENNINGS, P.E. (BROWN AND CALDWELL) DATE:
APPROVED: DATE:

LINE IS 1 INCH AT FULL SIZE (IF NOT 1"–SCALE ACCORDINGLY)

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ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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THE WESTERN COMPANY OF NORTH AMERICA

SITE MAP

HOBBS, NEW MEXICO

DATE 2/8/94
DRAWING NUMBER 1151.10
SHEET NUMBER 1–2

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2

CHAPTER 2

CHRONOLOGY OF EVENTS

On August 13 through August 19, 1993, Brown and Caldwell conducted an additional soil and groundwater investigation at The Western Company of North America (Western) facility in Hobbs, New Mexico. Table 2-1 presents a chronology of events associated with the facility.

Table 2-1 Chronology of Events
The Western Company of North America
Hobbs, New Mexico Facility

Date	Event
February 7, 1991	The State of New Mexico Oil Conservation Division (OCD) conducts an on-site inspection, including sampling of the on-site fresh water well.
August 6, 1991	OCD requests submittal of an investigation work plan.
September 5, 1991	Roberts/Schornick and Associates, Inc. (RSA) submits Technical Work Plan for soil and groundwater investigation to the OCD.
November 15, 1991	The OCD approves Technical Work Plan submitted by RSA.
December 16, 1991	RSA samples the fresh water well. Analytical results are submitted to the OCD.
February 21, 1992	Western samples the fresh water well. Analytical results are submitted to the OCD.
July 29 - August 10, 1992	Brown and Caldwell conducts a soil and groundwater investigation according to the approved Technical Work Plan. Investigation included drilling and sampling 9 soil borings, sampling 6 hand-augered soil borings, the installation and sampling of 5 monitoring wells, and the sampling of the fresh water well.
October 12, 1992	Brown and Caldwell submits Soil and Groundwater Investigation Report to the OCD.
December 2, 1992	The OCD requests the installation and sampling of 4 additional monitoring wells, including a monitoring well on an adjacent property.
April 13, 1993	Brown and Caldwell conducts a vapor extraction pilot test on existing groundwater monitoring wells.

Table 2-1 Chronology of Events (Cont'd)
The Western Company of North America
Hobbs, New Mexico Facility

Date	Event
April 15, 1993	Brown and Caldwell installs off-site monitoring well.
April 22, 1993	Brown and Caldwell samples off-site monitoring well.
May 27, 1993	Brown and Caldwell submits a letter report documenting the installation and sampling of the off-site monitoring well to the OCD.
June 2, 1993	Brown and Caldwell conducted a short-term aquifer test using the fresh water well at the facility.
June 8, 1993	USTank Management, Inc. conducted a non-volumetric tank system tightness test on the diesel and unleaded gasoline aboveground storage tanks at the facility.
June 21, 1993	ENSR Consulting and Engineering (ENSR) requested to sample the off-site monitoring well. ENSR is the environmental consultant of the adjacent property owner on which the off-site well is located.
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	Because downgradient extent of hydrocarbon-affected groundwater was not defined by previous investigations, Brown and Caldwell installed 2 additional downgradient monitoring wells. Brown and Caldwell sampled each of the existing monitoring and the newly installed monitoring wells.
August 25, 1993	Brown and Caldwell submitted a letter report to the OCD documenting the split-sampling of the off-site monitoring well and analytical results for the portion analyzed by Brown and Caldwell.

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CHAPTER 3

SOIL AND GROUNDWATER INVESTIGATION

This chapter describes previous activities as well as the additional soil and groundwater sampling activities performed for this additional investigation at the Western Hobbs, New Mexico facility.

Previous Activities

On October 12, 1992, Brown and Caldwell submitted a Soil and Groundwater Investigation Report to the OCD. The report described that the soil and groundwater at the Hobbs facility had been affected by hydrocarbons.

On December 2, 1992, the OCD requested that additional soil and groundwater investigations, including the installation of a groundwater monitoring well on an adjacent property, be conducted to determine the vertical and horizontal extent of affected soil and groundwater at the Hobbs facility. These additional investigations were conducted on February 3 through 6, 1993. However, because of delays in obtaining access to the adjacent property, the off-site monitoring well could not be installed during the investigation activities conducted in February 1993. On April 27, 1993, Brown and Caldwell submitted an Additional Soil and Groundwater Investigation Report to the OCD.

On April 13, 1993, Brown and Caldwell conducted a vapor extraction pilot test on several of the existing groundwater monitoring wells at the facility. The pilot test was conducted to assist in determining properties of air flow through the subsurface soils at the site. The information obtained from this pilot test will be used in the preparation of a Remedial Action Plan (RAP) for the facility.

During April 15 and 16, Brown and Caldwell personnel drilled and installed the off-site groundwater monitoring well requested by the OCD in the December 2, 1992 letter. This monitoring well was installed on the property, located adjacent to the north of the Hobbs facility, owned by HOMCO International (HOMCO). A letter report documenting the drilling, installation, and soil and groundwater sampling activities was submitted to the OCD on May 27,1993.

On June 2, 1993, Brown and Caldwell conducted a short duration pump test on the fresh water monitoring well located on the property of the Hobbs facility. This test was conducted

to assist in determining aquifer characteristics at the site. The information obtained will be used in the preparation of a RAP for the facility.

On June 8 through July 7, 1993, non-volumetric tightness testing of the aboveground storage tanks (ASTs), used to store gasoline and diesel at the Hobbs facility, was conducted. The result of the testing indicated no leaks in either of the two tanks or their associated piping. The report documenting the tank testing procedure and results is presented in Appendix A.

In a letter dated June 21, 1993, ENSR Consulting and Engineering (ENSR), on behalf of HOMCO, requested access to sample the monitoring well installed on the HOMCO property. On July 15, 1993, the off-site monitoring well was purged and sampled by ENSR personnel, and a groundwater sample was split with Brown and Caldwell personnel. Brown and Caldwell documented the purging and sampling activities and submitted the laboratory analytical reports for the Brown and Caldwell portion of the groundwater sample in a letter to the OCD dated August 26, 1993.

Because the previous investigations did not delineate the downgradient extent of hydrocarbons in the groundwater, as required by the OCD, Brown and Caldwell drilled and installed two additional downgradient monitoring wells. In addition, Brown and Caldwell personnel purged and sampled each groundwater monitoring well at the Hobbs facility.

Soil Investigation

On August 16 through August 18, 1993, Brown and Caldwell completed two additional soil borings at the Hobbs facility. The following is a description of the completion, sampling, and laboratory results of these soil borings.

Soil Boring, Drilling, and Sampling

During August 16 through August 18, 1993, Brown and Caldwell completed two soil borings. The locations of the borings were determined based on the results of field screening and laboratory analysis of soil samples collected from soil boring SB-9, completed in a previous investigation conducted by Brown and Caldwell. In addition, the boring locations were affected by permanent structures located at the Hobbs facility. Each soil boring was drilled and continuously sampled to a depth of approximately 55 feet. The soil borings were drilled using hollow stem auger drilling methods. Soil samples were collected using a 1.5 inch diameter split spoon sampler. Full recovery was not obtained where sampler refusal was

encountered, including a surface caliche layer, a deep heavy gravel layer, and a sandstone layers. Brown and Caldwell collected an additional sample of drill cuttings from these intervals for screening. Borehole logs prepared for each location are presented in Appendix B.

Each soil sample collected was visually inspected and logged. After logging, each sample was split, with half of the sample being placed in a labeled, laboratory cleaned jar and immediately placed on ice to prevent loss of any volatile constituents. The other half of the sample was placed in a laboratory cleaned, wide-mouth 16 ounce jar, the top covered with aluminum foil, the lid secured over the foil, and volatile organic compounds (VOCs) were allowed to develop for several minutes. During this period, the sample was shaken vigorously for approximately one minute. The aluminum foil was then pierced with a photoionization detector (PID) probe and a VOC reading was taken. PID measurements of each soil sample are presented on the boring logs in Appendix B.

Two soil samples from boring SB-14 and one soil sample from boring SB-15 were selected for laboratory analysis. Because VOC impacted intervals were indicated by field screening and visual inspection in soil boring SB-14, the sample with the highest PID reading and the sample from the capillary fringe were selected for laboratory analysis. Because no VOC impacted interval was indicated by field screening or visual inspection in boring SB-15, only the sample from the capillary fringe was submitted for laboratory analysis. Sample SB-14-7 was collected from the interval 22.5 to 25.0 feet below grade and SB-14-19 was collected from the interval 52.5 to 55.0 feet below grade. Sample SB-15-20 was collected from the interval 52.5 to 55.0 feet below grade. At the conclusion of the sampling, the cooled samples were shipped via over night delivery to Inchcape Testing\NDRC Laboratories in Richardson, Texas using chain-of-custody procedures.

Prior to drilling at the site and between each boring, the pilot bit and all other downhole equipment was steam-cleaned to prevent cross-contamination between borings. The equipment used by Brown and Caldwell personnel for soil sampling was cleaned prior to each use by washing with a laboratory grade detergent solution, rinsing with tap water, and a final rinse with distilled water.

Drill cuttings and excess soil generated by drilling activities were stored on heavy gauge plastic and covered by heavy gauge plastic along the east property fence area on-site to await proper disposal by Western. Steam cleaning of the drilling equipment was conducted in the on-site truck wash bay which empties into the field waste system at the Hobbs facility to await treatment or disposal by Western.

Soil Boring Sample Analysis

Each soil sample selected for laboratory analysis was analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) by EPA Method 8020, and Total Petroleum Hydrocarbons (TPH)--Diesel Fraction by EPA Modified 8015. The soil sample from boring SB-14 that had the highest PID measurement (SB-14-7) was also submitted for Toxicity Characteristic Leaching Procedure (TCLP) analysis for volatile organics (EPA Method 8240), extractable organics (EPA Method 8270). In addition, sample SB-14-7 was analyzed for TCLP priority pollutant metals. A soil sample from SB-15 was not submitted for TCLP analyses because no significant PID measurements were reported. A summary of selected analytical results for the selected soil samples is presented in Table 3-1. The laboratory analytical reports are presented in Appendix C.

Total benzene was reported to be <2.0 micrograms per kilogram (µg/kg) in each soil sample. Total toluene ranged from <2.0 µg/kg in samples SB-14-19 and SB-15-20 to 1,500 µg/kg in sample SB-14-7. Total ethyl benzene concentrations ranged from <2.0 µg/kg in SB-15-20 to 3,500 in SB-14-7. Total xylene concentrations ranged from 9.6 µg/kg in SB-15-20 to 32,000 µg/kg in SB-14-19. Total BTEX concentrations ranged from 9.6 µg/kg in SB-15-20 to 37,000 µg/kg in SB-14-20. TPH concentrations ranged from 210 µg/kg in SB-14-19 to 380,000 µg/kg in SB-14-7.

TCLP analyses indicated that concentrations of all volatile and extractable organics were below detection limits in soil sample SB-14-7. TCLP analyses for priority pollutant metals indicated that each metal was below the laboratory detection limit, except for zinc which was reported at a concentration of 0.2 milligrams per liter (mg/L).

Groundwater Investigation

On August 16 through August 18, 1993, Brown and Caldwell installed groundwater monitoring wells in the newly drilled soil borings. On August 18 and 19, Brown and Caldwell personnel developed, purged, and sampled the two newly installed groundwater monitoring wells. The nine existing groundwater monitoring wells were also purged and sampled. The following is a description of the installation, development, purging, and sampling of the newly installed groundwater monitoring wells, as well as the purging and sampling of the nine existing groundwater monitoring wells.

Table 3-1 Summary of Selected Laboratory Analyses for Soil Samples

The Western Company of North America
Hobbs, New Mexico Facility

Laboratory Analyses	Soil Boring Sample		
	SB-14-7 (22.5 to 25.0 feet)	SB-14-19 (52.5 to 55.0 feet)	SB-15-20 (52.5 to 55.0 feet)
EPA 8020 (μg/kg) Benzene	<200	<2.0	<2.0
EPA 8020 (μg/kg) Toluene	1,500	<2.0	<2.0
EPA 8020 (μg/kg) Ethyl benzene	3,500	2.7	<2.0
EPA 8020 (μg/kg) Xylenes	32,000	19.0	9.6
Total BTEX (μg/kg)	37,000	21.7	9.6
EPA Modified 8015 (μg/kg) TPH (Diesel fraction)	380,000	210	220
EPA 8240 (μg/kg) TCLP Volatile Organics	BDL	NA	NA
EPA 8270 (μg/kg) TCLP Extractable Organics	BDL	NA	NA
EPA 6010 or EPA 7470 (mg/Kg) Priority Pollutant Metals			
Silver	<0.01	NA	NA
Arsenic	<1.0	NA	NA
Beryllium	<0.005	NA	NA
Cadmium	<0.005	NA	NA
Chromium	<0.07	NA	NA
Copper	<0.05	NA	NA
Mercury	0.001	NA	NA
Nickel	<0.05	NA	NA
Lead	<0.05	NA	NA
Antimony	<0.1	NA	NA
Selenium	<1.0	NA	NA
Thallium	<0.1	NA	NA
Zinc	0.2	NA	NA

mg/kg = milligrams per kilogram
μg/kg = micrograms per kilogram
BDL = below detection limits for all constituents
NA = not analyzed for the indicated parameter(s)

Monitoring Well Installation

Each well installation consisted of approximately 2.5 feet of 2-inch diameter schedule 40 PVC blank casing, to act as a sump for the collection of fine sediments, followed by 15 feet of 2-inch diameter Schedule 40 PVC slotted casing (0.01-inch slots). The slotted PVC was followed by 47.5 feet of 2-inch diameter Schedule 40 PVC solid casing. Each section of casing was joined using threaded, flush-mounted connections. Three centralizers were used in each well at approximately 45 feet, 30 feet, and 15 feet below ground surface.

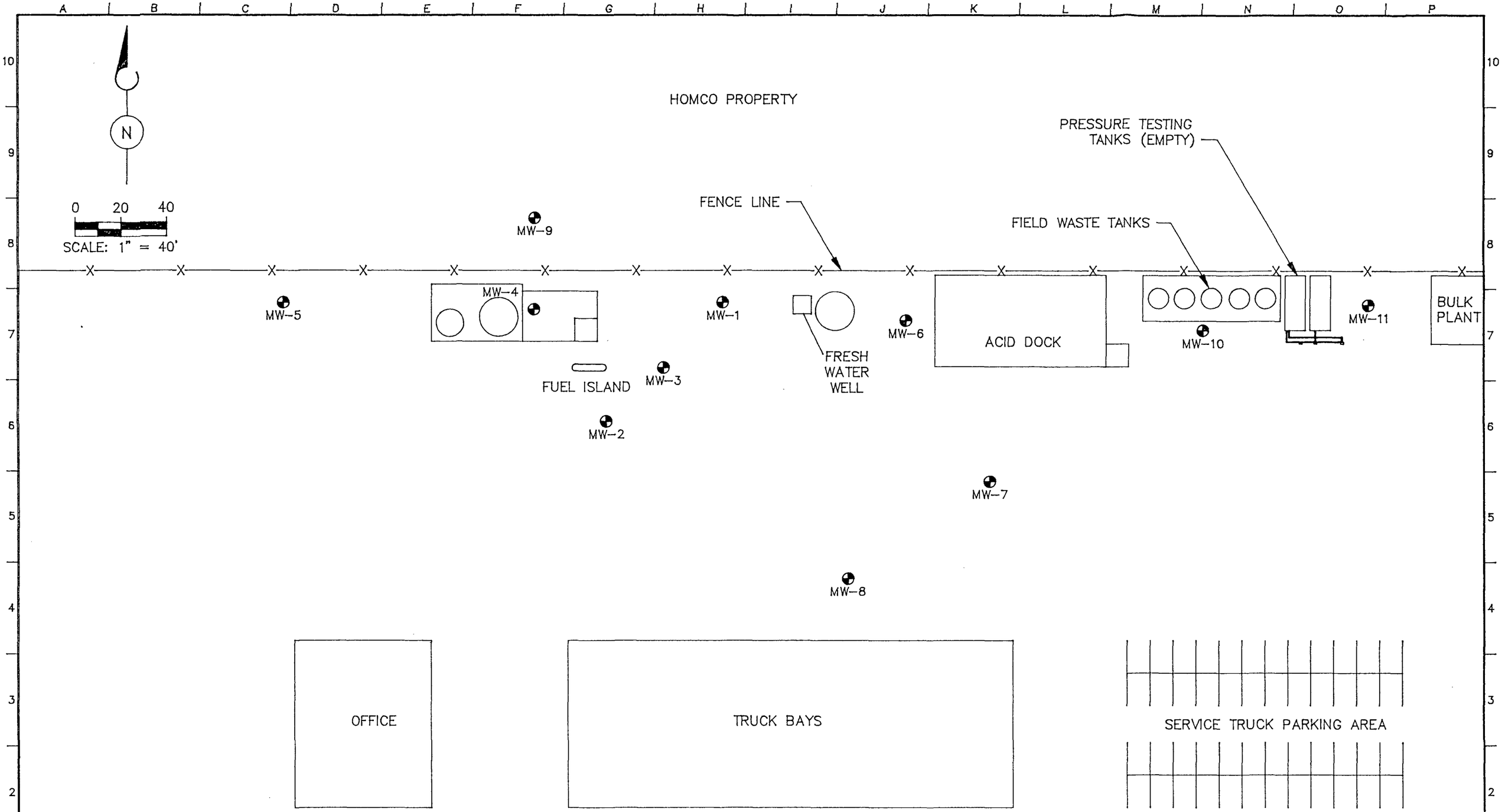
Silica sand (20-40 grain size) was placed in the annulus around the well screen to provide a filter pack. The filter pack extended approximately two feet above the top of the screened interval; this depth was verified by sounding. Approximately two feet of bentonite pellets were placed immediately above the filter pack and hydrated. The remaining annular space was filled with a cement/bentonite grout mix. Well construction information is presented on the borehole logs in Appendix B.

Monitoring wells MW-10 and MW-11 were completed as at-grade completions. The groundwater monitoring wells were completed with a flush-mount grade box surrounded by a small (3 feet by 3 feet square) concrete pad. The locations of the two newly installed groundwater monitoring wells are shown on Figure 3-1.

The two newly installed groundwater monitoring wells were developed to remove fine sediments from the bottom of the well. Development was accomplished by using a 2-inch-diameter submersible pump. Approximately three to four well volumes were evacuated from each well or until the evacuated water appeared free of sediments. The evacuated water was placed in the on-site field waste tanks.

Monitoring Well Purging and Sampling

Groundwater samples were collected for laboratory analysis from newly installed and existing groundwater monitoring wells on August 19, 1993. Prior to sample collection, the 2-inch-diameter submersible pump was used to purge each well. Water was removed until at least one and one-half well volumes had been removed. After one and one-half well volumes had been removed, the evacuated water was tested for stability using a specific conductance/pH and temperature meter. Subsequent testing of the evacuated water was conducted at one-half well volume intervals. When two consecutive measurements showed results within five percent of each other (for specific conductance, pH, and temperature), and at least three well volumes had been removed, the groundwater was considered stable and



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MW-8 MONITORING WELL LOCATION AND IDENTIFICATION

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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THE WESTERN COMPANY OF NORTH AMERICA

MONITORING WELL LOCATION MAP

HOBBS, NEW MEXICO

DATE 2/8/94
DRAWING NUMBER 1151.10
SHEET NUMBER 3-1

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purging was terminated. After purging the groundwater monitoring wells, they were allowed time to recharge to static water level and then sampled.

The groundwater monitoring wells were sampled at static water level by lowering a stainless steel bailer into the well. The groundwater samples were placed in labeled, laboratory sample containers. The containers were immediately placed on ice to prevent the loss of any VOCs. An equipment rinsate blank was taken after six monitoring wells had been sampled. A trip blank was also included in the ice chest. At the conclusion of sampling, the cooled samples were shipped via overnight express to Inchcape Testing/NDRC Laboratories in Richardson, Texas using chain-of-custody procedures.

All equipment used for purging and sampling was cleaned prior to each use by washing with a laboratory-grade detergent solution, rinsing with tap water, and a final rinse with distilled water.

Groundwater Sample Analysis

The eleven groundwater samples, equipment rinsate blank, and trip blank were analyzed for semi-volatile organics by EPA Method 601 and volatile organics EPA Method 602. The groundwater samples from monitoring wells MW-10 and MW-11 were also analyzed for polynuclear aromatic hydrocarbons (PAHs) by EPA Method 610 and total metals (priority pollutant metals list). The laboratory analytical reports are presented in Appendix D.

The results of the groundwater samples analyzed by EPA Method 602 for volatile organics indicated total benzene concentrations were below the laboratory detection limit of 2.0 micrograms per liter (μg/L) in monitoring wells MW-5, MW-7, MW-8 and MW-11. However, total benzene concentrations above the laboratory detection limit were reported in all other monitoring wells ranging from 100 μg/L in MW-2 to 8,100 μg/L in MW-6. Total BTEX concentrations ranged from below laboratory detection limits in monitoring wells MW-5, MW-8, and 37,000 μg/L in MW-6. Due to the concentration of benzene in these groundwater samples, the samples had to be diluted, which raised the detection limits of many of the volatile and semi-volatile constituents. Therefore, a discussion of the results of the analyses for individual volatile constituents, other than benzene, and semi-volatile constituents will not be presented. A summary of the cumulative analytical results for BTEX is presented in Table 3-2. Cumulative results of laboratory analyses for organic constituents in groundwater samples obtained at the site are presented in Appendix D.

Table 3-2
Cumulative Results of BTEX Analysis
The Western Company of North America
Hobbs, New Mexico Facility

MONITORING WELL	SAMPLING DATE	PARAMETER (µg/L)			
		Benzene	Ethylbenzene	Toluene	Xylenes
MW-1	8/10/92	5,550	2,160	12,090	7,370
	2/9/93	2,100	1,300	6,500	7,400
	8/19/93	3,200	1,200	7,300	3,700
MW-2	8/10/93	14.9	<4	<4	<4
	2/9/93	<2	<2	<2	<6
	8/19/93	100	3	12	13
MW-3	8/10/93	304.9	6,760	2,099	1,586
	2/9/93	130	<10	<10	190
	8/19/93	560	630	3,100	1,900
MW-4	8/10/93	2,594	2,160	10,360	6,740
	2/9/93	5,200	2,200	15,000	10,000
	8/19/93	3,000	<2,000	12,000	7,000
MW-5	8/10/93	<4	<4	<4	<4
	2/9/93	<2	<2	<2	<6
	8/10/93	<2	<2	<2	<2
MW-6	NS	NS	NS	NS	NS
	2/9/93	7,000	3,100	19,000	7,200
	8/19/93	8,100	3,500	19,000	6,400
MW-7	NS	NS	NS	NS	NS
	2/9/93	<2	<2	<2	<6
	8/19/93	<2	<2	3	<2
MW-8	NS	NS	NS	NS	NS
	2/9/93	<2	<2	<2	<6
	8/19/93	<2	<2	<2	<2
MW-9*	4/22/93	570	<50	380	870
	7/15/93	121	3	7.3	458
	8/19/93	390	40	290	250
MW-10	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS
	8/19/93	190	<200	460	240
MW-11	NS	NS	NS	NS	NS
	NS	NS	NS	NS	NS
	8/19/93	<2	<2	<2	<2
Fresh Water Well	8/10/92	<4	<4	<4	<4
	2/9/93	77	<2	10	73
	8/19/93	NS	NS	NS	NS

µg/l = micrograms per liter
NS = Not Sampled
*MW-9 was sampled upon installation and in July '93 a sample was split with ENSR

The results of laboratory analyses for priority pollutant metals in groundwater samples from monitoring wells MW-10 and MW-11 indicated the presence of arsenic and copper. Arsenic was detected in MW-11 at a concentration of 0.01 milligrams per liter (mg/L). Copper was detected at concentrations of 0.02 mg/L in both MW-10 and MW-11. These concentrations are below the State of New Mexico Water Quality Control Commission (WQCC) standards for groundwater. These standards were established in "New Mexico Water Quality Control Commission Regulations" as amended through August 18, 1992. All other priority pollutant metals were below the laboratory detection limits. Cumulative results of laboratory analyses for inorganic constituents are presented in Appendix E.

Determination of Groundwater Flow Direction and Gradient

On August 18, 1993, BC personnel recorded groundwater level measurements in each of the eleven groundwater monitoring wells. To identify potential floating non-aqueous phase liquids, a dual interface probe (Marine Moisture Control Company Model D-2401-2UI) was used for the groundwater level measurements. All readings were measured relative to the surveyed elevation mark at the top of each well casing which were established by a survey conducted by Brown and Caldwell personnel. The benchmark (relative elevation of 100.00 feet) was defined as the northeast corner of the office building slab and all top of casing elevations were surveyed relative to that point. All data was recorded to the nearest 0.01 foot. Cumulative groundwater elevation data for each monitoring well is presented in Table 3-3. The groundwater flow direction at the site is to the east-northeast with a gradient of <0.01 feet per foot. Figure 3-2 presents the Groundwater Gradient Map for the Western Facility in Hobbs, New Mexico.

Table 3-3
Cumulative Groundwater Levels and Elevation
The Western Company of North America
Hobbs, New Mexico Facility

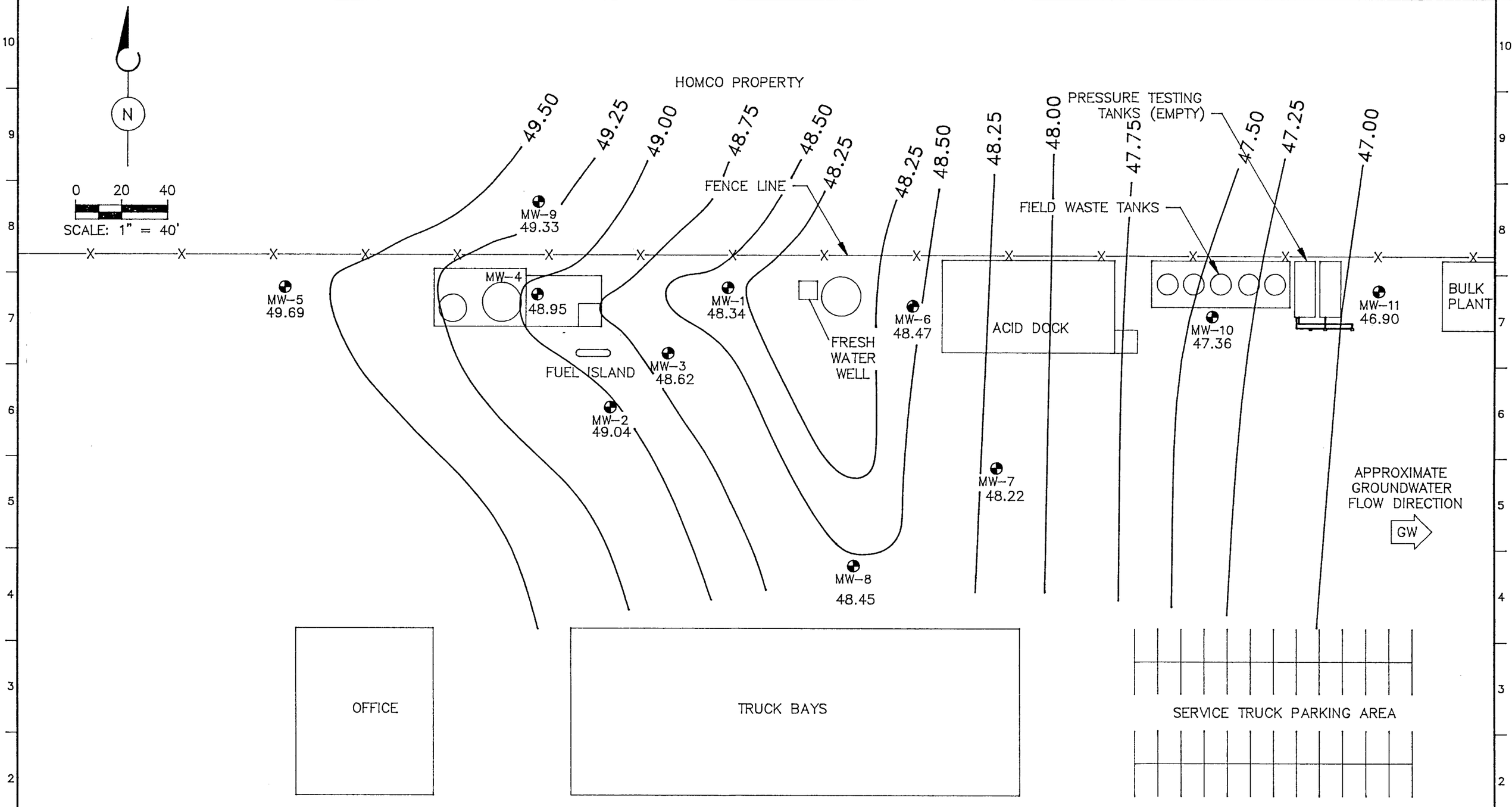
Well Number and Measurement Date	Top of Casing Elevation (relative)	Depth of Water from Top of Casing (feet)	Groundwater Elevation (relative)
MW-1			
August 10, 1992	101.44	53.22	48.22
February 9, 1993	101.44	53.03	48.41
August 18, 1993	101.44	53.10	48.34
MW-2*			
August 10, 1992	101.50	52.82	48.68
February 9, 1993	98.75	49.60	49.15
August 18, 1993	98.75	49.71	49.04
MW-3			
August 10, 1992	101.44	52.99	48.45
February 9, 1993	101.44	52.72	48.72
August 18,1993	101.44	52.82	48.62
MW-4			
August 10, 1992	99.33	50.55	48.78
February 9, 1993	99.33	50.26	49.07
August 18, 1993	99.33	50.38	48.95
MW-5			
August 10, 1992	101.85	52.38	49.47
February 9, 1993	101.85	52.06	49.79
August 18, 1993	101.85	52.16	49.69
MW-6			
August 10, 1992	NM	NM	NM
February 9, 1993	99.25	50.58	48.67
August 18, 1993	99.25	50.78	48.47
MW-7			
August 10, 1992	NM	NM	NM
February 9, 1993	98.96	50.53	48.43
August 18, 1993	98.96	50.74	48.22
MW-8			
August 10, 1992	NM	NM	NM
February 9, 1993	99.12	50.48	48.64
August 18, 1993	99.12	50.67	48.45

NM = No measurement taken on this date.
*MW-2 was originally completed above grade (when this survey was conducted); however, because of truck traffic on-site, it was redone as a flush-mount grade box. The top of casing elevation is now 98.75 feet.

Table 3-3
Cumulative Groundwater Levels and Elevations (Cont'd)
The Western Company of North America
Hobbs, New Mexico Facility

Well Number and Measurement Date	Top of Casing Elevation (relative)	Depth of Water from Top of Casing (feet)	Groundwater Elevation (relative)
MW-9			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
April 22, 1993	99.18	49.73	49.45
July 15, 1993	99.18	49.65	49.53
August 18, 1993	99.18	49.85	49.33
MW-10			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
August 18, 1993	98.90	51.54	47.36
MW-11			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
August 18, 1993	98.82	51.92	46.90

NM = No measurement taken on this date.
Note: Water level in MW-9 was taken upon installation in April 1993 and again during split-sampling with ENSR in July 1993.



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Dallas – Houston, Texas

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LEGEND
MW-8 MONITORING WELL LOCATION AND IDENTIFICATION
APPROXIMATE GROUNDWATER ELEVATION CONTOUR LINE

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

REVISIONS

THE WESTERN COMPANY OF NORTH AMERICA

NOTE: THE GROUNDWATER CONTOUR LINES ARE APPROXIMATE; BASED ON CURRENT APPROXIMATE GROUNDWATER ELEVATION DATA.

GROUNDWATER FLOW DIRECTION AND GRADIENT MAP
AUGUST 18, 1993

HOBBS, NEW MEXICO

DATE 2/8/94
DRAWING NUMBER 1151.10
SHEET NUMBER 3-2

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Based on these additional investigations Brown and Caldwell presents the following conclusions and recommendations.

Conclusions

Based on field investigations and laboratory analytical results:

- Total BTEX concentrations were found to be 37,000 micrograms per kilogram (µg/kg) in boring SB-14 at a depth of 22.5 to 25.0 feet, and 21.7 ug/kg at a depth of 52.5 to 55.0 feet. Xylenes were the major constituents present in each sample.

- Total BTEX concentrations in boring SB-15 were reported to be 9.6 ug/kg. Xylenes were the only constituents found to be above the laboratory detection limits.

- TPH was reported to be 380,000 mg/kg in boring SB-14 at a depth of 22.5 to 25.0 feet, and 210 mg/kg at a depth of 52.5 to 55.0 feet. TPH was reported to be 220 mg/kg in boring SB-15 at a depth of 52.5 to 55.0 feet.

- The concentrations of total BTEX and TPH detected in SB-14 were from a shallower depth (22.5 to 25.0 feet) than previous soil samples (48.0 to 52.0) with hydrocarbon constituents above laboratory detection limits. Therefore, hydrocarbons detected in boring SB-14 appear to be unrelated to the hydrocarbons detected in previous soil borings.

- Total BTEX were detected in the groundwater at concentrations of up to 37,000 micrograms per liter (µg/L). This concentration was reported in monitoring well MW-6.

- Total metals above the laboratory detection limits in monitoring wells MW-10 and MW-11 were below the WQCC Groundwater standards.

- Based on approximate groundwater elevation measurements taken during this investigation, the fresh water well continues to affect local groundwater gradient. A limited cone of depression appears to remain around the fresh water well.

- Based on approximate groundwater elevation measurements taken during this investigation, overall groundwater gradient is estimated to be <0.01 feet per foot with a flow direction generally toward the east-northeast, with the exception of the localized cone of depression previously described.

Recommendations

Based on information obtained to date, Brown and Caldwell recommends the following:

- Prepare a Remedial Action Plan (RAP) to address hydrocarbon-affected soil and groundwater at the Hobbs facility. The RAP will include a preliminary design of the remediation system, a cost estimate for the final design and installation of the remediation system (including required pilot testing), a plan to monitor the effectiveness and progress of the remediation system, and a schedule for the remedial activities to be conducted at the facility.

- Continue groundwater monitoring activities on a semi-annual (six month) basis, for BTEX by EPA Method 8020 only, until remedial activities begin.

A

APPENDIX A

Tank Tightness Testing Report

USTank Management
703 South Main Street, Suite 15 • Cottonwood Arizona 86326
(602) 639-0044 • Fax (602) 639-0146 • Toll Free 1 (800) 786-USTM

REGULATORY COMPLIANCE PROGRAM

NONVOLUMETRIC PRECISION TANK SYSTEM TEST

FOR

WESTERN COMPANY OF NORTH AMERICA

2708 WEST COUNTY ROAD, HOBBS, NEW MEXICO

Presented by USTank Management Inc., Cottonwood, Arizona

July 30, 1993

Charles W. Hobbs
Manager, Technical Services

Reviewed By Richard T. McGeney USTM

TABLE OF CONTENTS

CONCEPT OF OPERATION AND IMPLEMENTATION

The tracer leak detection method relies upon the addition of a highly volatile liquid chemical to the product in the tank. If a leak occurs in the underground storage system, product is released into the surrounding soil. The tracer escapes from the product by vaporization and disperses into the soil by molecular diffusion. Various means are used to sample the soil vapors in the immediate vicinity of the underground storage tanks and associated piping. Each probe has an effective detection radius of approximately 10 feet. This means that a given probe should detect a leak anywhere within the area described by the 10 foot radius around the probe. The tracer must be placed in the tank at least two weeks prior to the probe sampling for this method to be effective. This process of leak detection by placing a liquid or gas tracer in a liquid product followed by detection of the tracer underground in the vapor phase is protected under *TRACER* patents.

Pipelines are located using radio frequency induction and/or connection equipment.

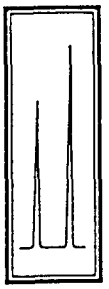
The throughput factor is used to determine the amount of tracer chemical used to inoculate a given tank. The throughput factor is a multiplier and is based on the number of tank refills expected within the first three days after inoculation. Tracer is added to the tank in an amount that will insure adequate tracer concentration after receiving all product deliveries scheduled for the first three days after inoculation.

LEAK DETECTION CRITERIA

The classification of leakage is based on the presence or absence of tracer.

PASS	FAIL
Criteria:	Criteria:
NO tracer detected	tracer detected

If requested, total volatile hydrocarbon (TVHC) concentrations are measured to give additional information about site conditions. The TVHC data provide information about the severity of the leakage, and the degree of any possible environmental damage that may have occurred. The TVHC data is not used as a criterion factor to determine the status of a particular tank(s) or piping and is provided as supplemental information only.



APPENDIX A - Results of U.S. EPA Test Evaluation

Results of U.S. EPA Standard Evaluation
Nonvolumetric Tank Tightness Testing Method

This form tells whether the tank tightness testing method described below complies with the performance requirements of the federal underground storage tank regulation. The evaluation was conducted by the equipment manufacturer or a consultant to the manufacturer according to the U.S. EPA's "Standard Test Procedure for Evaluating Leak Detection Methods: Nonvolumetric Tank Tightness Testing Methods." The full evaluation report also includes a form describing the method and a form summarizing the test data.

Tank owners using this leak detection system should keep this form on file to prove compliance with the federal regulations. Tank owners should check with State and local agencies to make sure this form satisfies their requirements.

Method Description

Name: Tracer Research Corporation
Vendor: Tracer Research Corporation
3855 North Business Center Drive
(street address)
Tucson (city) Arizona (state) 85705 (zip) (602) 888-9400 (phone)

Evaluation Results

This method, which declares a tank to be leaking when a threshold amount of Tracer chemical is detected as a vapor in the soil outside the tank has an estimated probability of false alarms [P(FA)] of 2.9 % based on the test results of 1 false alarms out of 34 tests. A 95% confidence interval for P(FA) is from 0 to 8.5 %.

The corresponding probability of detection [P(D)] of a 0.005 gallon per hour leak is 97.1 % based on the test results of 33 detections out of 34 simulated leak tests. A 95% confidence interval for P(D) is from 91.5 to 100 %.

Does this method use additional modes of leak detection? [ ] Yes [X] No
If Yes, complete additional evaluation results on page 3 of this form.

Based on the results above, and on page 3 if applicable, this method [X] does [ ] does not meet the federal performance standards established by the U.S. Environmental Protection Agency (0.10 gallon per hour at P(D) of 95% and P(FA) of 5%).

Test Conditions During Evaluation

The evaluation testing was conducted in a varying size gallon [X] steel [X] fiberglass tank that was _____ inches in diameter and ___ inches long, installed in _____ backfill.

The ground-water level was varying inches above the bottom of the tank.

Nonvolumetric TTT Method Tracer Tight (TM)
Version _____

Test Conditions During Evaluation (continued)

The tests were conducted with the tank varying percent full.

The temperature difference between product added to fill the tank and product already in the tank ranged from N/A °F to N/A °F, with a standard deviation of N/A °F.

The product used in the evaluation was varying gasoline, diesel, jet fuel and heating oil.

This method may be affected by other sources of interference. List these interferences below and give the ranges of conditions under which the evaluation was done. (Check None if not applicable.)
[ ] None

Interferences	Range of Test Conditions
_____	_____
_____	_____
_____	_____

Limitations on the Results

* The performance has not been substantially changed.
* The vendor's instructions for using the method are followed.
* The tank contains a product identified on the method description form.
* The tank capacity is ____ gallons or smaller.
* The difference between added and in-tank product temperatures is no greater than + or - _____degrees Fahrenheit.

[ ] Check if applicable:
Temperature is not a factor because Tracer detection outside of tank does not depend on fuel temperature inside tank. Temperature does not affect the amount of Tracer released.

* The waiting time between the end of filling the test tank and the start of the test data collection is at least ____ hours.
* The waiting time between the end of "topping off" to final testing level and the start of the test data collection is at least <x hours.
* The total data collection time for the test is at least ____ hours.
* The product volume in the tank during testing is 0-100 % full.
* This method [ ] can [ ] cannot be used if the ground-water level is above the bottom of the tank.

Other limitations specified by the vendor or determined during testing:

1. After Tracer chemical is added, you must wait at least 14 days to collect samples from vapor probes. 2. Alternative approaches must be used if top of tank is under water. These approaches are available through Tracer Research Corp.

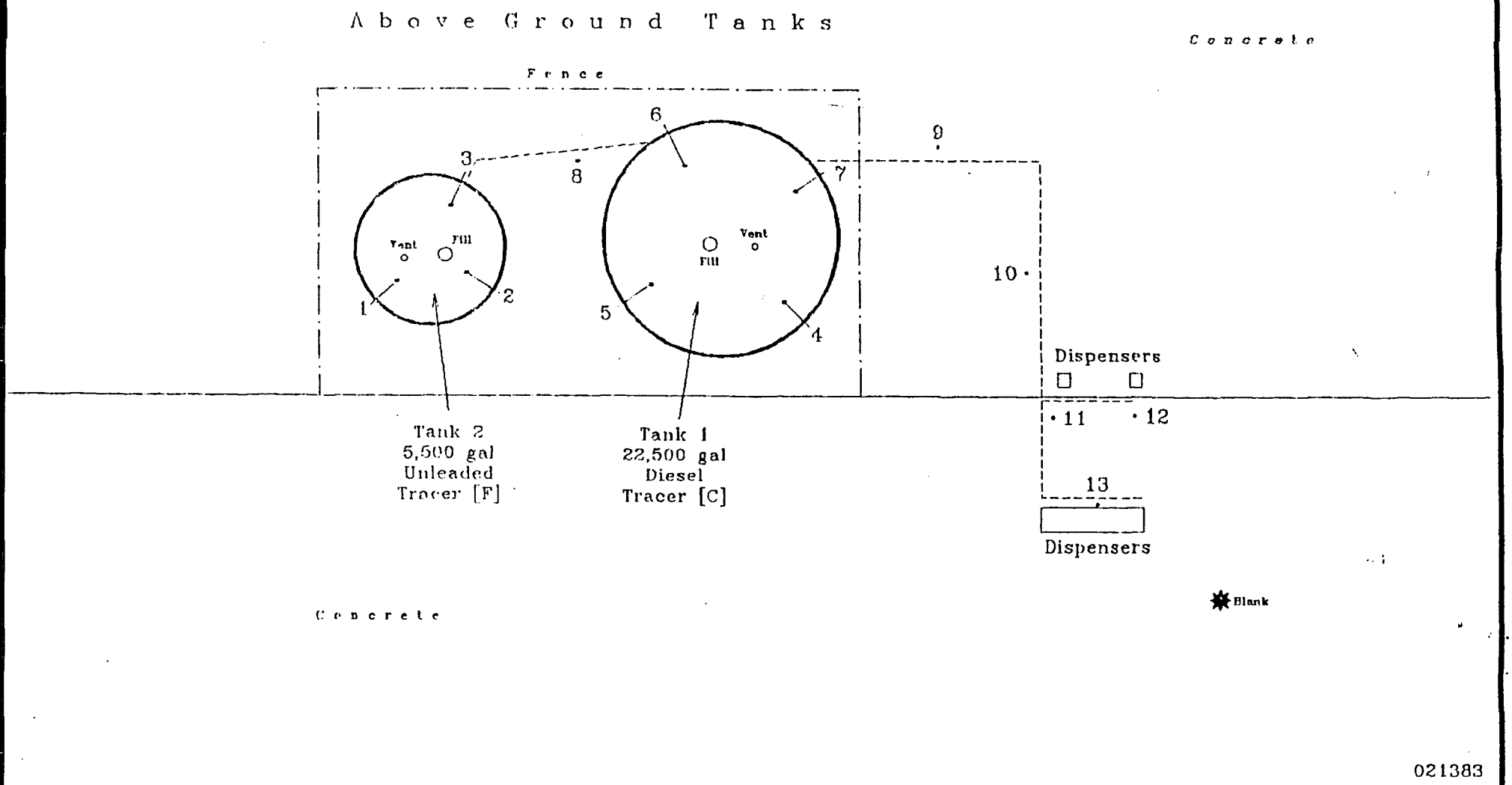
USTM/Western Company of North America
2708 West County Road, Hobbs, NM

021383

7/09/93 CONDENSED DATA

Location	Compound	Concentration
001-2.5	C	0.0000
001-2.5	F	0.0000
001-2.5	TVHC	1.1900
002-2.5	C	0.0000
002-2.5	F	0.0000
002-2.5	TVHC	.1480
003-2.5	C	0.0000
003-2.5	F	0.0000
003-2.5	TVHC	44.0620
004-2.5	C	0.0000
004-2.5	F	0.0000
004-2.5	TVHC	.6220
005-2.5	C	0.0000
005-2.5	F	0.0000
005-2.5	TVHC	.2340
006-2.5	C	0.0000
006-2.5	F	0.0000
006-2.5	TVHC	.1300
007-2.5	C	0.0000
007-2.5	F	0.0000
007-2.5	TVHC	.1720
008,009,010	C	0.0000
008,009,010	F	0.0000
008,009,010	TVHC	.3590
011,012,013	C	0.0000
011,012,013	F	0.0000

TVHC in mg/L, Tracers in mg/L
0.0000 = Not detected Detection Limits: Tracer (0.0001)
-99999999999 = No sample TVHC (0.05)



021383

EXPLANATION

- •1 Sampling Probe Location
- Probes 1 through 7 were installed in ground at 45° angles
- ------- Approximate Pipeline Location

N

0 10

feet

WESTERN COMPANY
OF NORTH AMERICA

2708 N. COUNTY ROAD
HOBBS, NEW MEXICO

SAMPLING LOCATIONS

Figure 1

B

APPENDIX B

Borehole Logs

BROWN AND CALDWELL
HOUSTON, TEXAS

BORING LOG

PROJECT NAME: WESTERN – HOBBS, N.M. FACIITY PROJECT NUMBER: 1151 SHEET 1 OF 3

SOIL BORING IDENTIFICATION: SB–14 MONITORING WELL IDENTIFICATION: MW–10

Boring Location: HOBBS FACIITY	Elevation and Datum:
Drilling Contractor: HARRISON DRILLING	Date Started: 8–16–93 / Date Finished: 8–16–93
Drilling Equipment: MOBILE DRILL B–57	Completed Depth (feet): 64.0 / Water Depth: (feet) ~51.5
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒	WELL CONSTRUCTION
Drilling Fluid: N/A	Type and Diameter of Well Casing: 2" DIAMETER, SCHEDULE 40 PVC
Backfill Material: N/A	Slot Size: 0.010 FEET / Filter Material: 20–40 SAND
Logged By: / Checked By:	Development Method: SUBMERSIBLE PUMP

Depth (feet)	USC Soil Type	Description	Blow Count / Penetration	Sample No.	Graphic Log: Lithology / Annulus / Casing	PID/FID Readings	Remarks
5		SILTY SAND – Red					No sample
				1		4.8	Very moist, black staining, fuel odor
				2		3.2	Very moist, No staining slight odor
10		CALICHE – extrememly weathered; pink to white; gravel					No sample
		– white to tan		3		2.0	Dry; No odor
15		CLAYEY SAND – tan; some gravel		4		2.0	Slightly moist, No odor
		SILTY SAND – tan; some gravel		5		2.1	Moist to dry; No odor
20		– no gravel		6		108	Moist; black staining; fuel odor
		– 0.5' thick clayey sand		7		164	Black staining; strong fuel odor
25				8		160	
30				9		154	Slightly moist; gray; fuel odor

PVC Casing

FOR CONTINUATION SEE SHEET 2 OF 3

D:\DOMBROSK\BORLOG

BROWN AND CALDWELL
HOUSTON, TEXAS

BORING LOG

PROJECT NAME: WESTERN – HOBBS, N.M. FACIITY
PROJECT NUMBER: 1151
SHEET 2 OF 3
SOIL BORING IDENTIFICATION: SB–14
MONITORING WELL IDENTIFICATION: MW–10

Boring Location: HOBBS FACIITY	Elevation and Datum:
Drilling Contractor: HARRISON DRILLING	Date Started: 8–16–93 / Date Finished: 8–16–93
Drilling Equipment: MOBILE DRILL B–57	Completed Depth (feet): 64.0 / Water Depth: (feet) ~51.5
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒	WELL CONSTRUCTION
Drilling Fluid: N/A	Type and Diameter of Well Casing: 2" DIAMETER, SCHEDULE 40 PVC
Backfill Material: N/A	Slot Size: 0.010 FEET / Filter Material: 20–40 SAND
Logged By: Checked By:	Development Method: SUBMERSIBLE PUMP

Depth (feet)	USC Soil Type	Description	Blow Count/ Penetration	Sample No.	Graphic Log: Lithology / Annulus / Casing	PID/FID Readings	Remarks
35		SAND – fine grained ; black to gray		10		140	Dry; black staining; fuel odor
				11		145	
				12		150	Moist; black staining; odor
				13		118	
40		– gypsum stringers		14		95.8	
				15	PVC Casing	65.4	
45				16		39.0	
				17		20.2	
50				18		13.2	Very moist; black staining; odor
				19		12.0	Wet
55							No sample
60							

FOR CONTINUATION SEE SHEET 3 OF 3

D:\DOMBROSK\BORLOG

BROWN AND CALDWELL
HOUSTON, TEXAS

BORING LOG

PROJECT NAME: WESTERN – HOBBS, N.M. FACIITY
PROJECT NUMBER: 1151
SHEET 3 OF 3

SOIL BORING IDENTIFICATION: SB–14
MONITORING WELL IDENTIFICATION: MW–10

Boring Location: HOBBS FACIITY	Elevation and Datum:
Drilling Contractor: HARRISON DRILLING	Date Started: 8–16–93 / Date Finished: 8–16–93
Drilling Equipment: MOBILE DRILL B–57	Completed Depth (feet): 64.0 / Water Depth: (feet) ~51.5
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒	WELL CONSTRUCTION
Drilling Fluid: N/A	Type and Diameter of Well Casing: 2" DIAMETER, SCHEDULE 40 PVC
Backfill Material: N/A	Slot Size: 0.010 FEET / Filter Material: 20–40 SAND
Logged By: Checked By:	Development Method: SUBMERSIBLE PUMP

Depth (feet)	USC Soil Type	Description	Blow Count/ Penetration	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		SAND – fine grained; black to gray					PVC Blank		No sample
65		T.D. at 64.0 feet							
70									
75									
80									
85									
90									

D:\DOMBROSK\BORLOG

BROWN AND CALDWELL
HOUSTON, TEXAS

BORING LOG

PROJECT NAME: WESTERN – HOBBS, N.M. FACIITY PROJECT NUMBER: 1151 SHEET 1 OF 3

SOIL BORING IDENTIFICATION: SB–15 MONITORING WELL IDENTIFICATION: MW–11

Boring Location: HOBBS FACIITY	Elevation and Datum:		
Drilling Contractor: HARRISON DRILLING	Date Started: 8–17–93	Date Finished: 8–17–93	
Drilling Equipment: MOBILE DRILL B–57	Completed Depth (feet): 64.5	Water Depth: (feet): 51.92	
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒	WELL CONSTRUCTION		
Drilling Fluid: N/A	Type and Diameter of Well Casing: 2" DIAMETER, SCHEDULE 40 PVC		
Backfill Material: N/A	Slot Size: 0.010 FEET	Filter Material: 20–40 SAND	
Logged By: J. COOPER Checked By:	Development Method: SUBMERSIBLE PUMP		

Depth (feet)	USC Soil Type	Description	Blow Count/ Penetration	Sample No.	Graphic Log: Lithology / Annulus / Casing	PID/FID Readings	Remarks
		SANDY CLAY – brown; some gravel					No sample
5		CALICHE – extremely weathered; white; gravel		1		0	Dry; no odor
		– tan; sandy		2		0	Moist; no odor
10		– pink		3		0	
				4		0	
15				5		0	
		SILTY SAND – tan; minor clay and gravel		6		0	
20		– clayey		7		0	
				8		0	
25		SAND – fine grained; tan; some silt and gravel		9		0	
		– sandstone and gypsum stringers		10		0	
30							

PVC Casing

FOR CONTINUATION SEE SHEET 2 OF 3

T:\1151.10\BORLOGS

BROWN AND CALDWELL
HOUSTON, TEXAS

BORING LOG

PROJECT NAME: WESTERN – HOBBS, N.M. FACIITY PROJECT NUMBER: 1151 SHEET 2 OF 3

SOIL BORING IDENTIFICATION: SB–15 MONITORING WELL IDENTIFICATION: MW–11

Boring Location: HOBBS FACIITY	Elevation and Datum:		
Drilling Contractor: HARRISON DRILLING	Date Started: 8–17–93	Date Finished: 8–17–93	
Drilling Equipment: MOBILE DRILL B–57	Completed Depth (feet): 64.5	Water Depth: (feet): 51.92	
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒	WELL CONSTRUCTION		
Drilling Fluid: N/A	Type and Diameter of Well Casing: 2" DIAMETER, SCHEDULE 40 PVC		
Backfill Material: N/A	Slot Size: 0.010 FEET	Filter Material: 20–40 SAND	
Logged By: J. COOPER Checked By:	Development Method: SUBMERSIBLE PUMP		

Depth (feet)	USC Soil Type	Description	Blow Count/ Penetration	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
35		SAND – fine grained; tan; some silt and gravel		11			PVC Casing	0	Moist; no odor
				12				0	Slightly moist to moist; no odor
				13				0	
				14				0	
40				15				0	
				16				0	
45		– gypsum stringer		17				0	
				18				0	
50				19					Very moist; no odor
				20					Wet
55									No sample
60									

FOR CONTINUATION SEE SHEET 3 OF 3

T:\1151.10\BORLOGS

BROWN AND CALDWELL
HOUSTON, TEXAS

BORING LOG

PROJECT NAME: WESTERN – HOBBS, N.M. FACIITY PROJECT NUMBER: 1151 SHEET 3 OF 3

SOIL BORING IDENTIFICATION: SB–15 MONITORING WELL IDENTIFICATION: MW–11

Boring Location: HOBBS FACIITY	Elevation and Datum:
Drilling Contractor: HARRISON DRILLING	Date Started: 8–17–93 / Date Finished: 8–17–93
Drilling Equipment: MOBILE DRILL B–57	Completed Depth (feet): 64.5 / Water Depth: (feet) 51.92
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒	WELL CONSTRUCTION
Drilling Fluid: N/A	Type and Diameter of Well Casing: 2" DIAMETER, SCHEDULE 40 PVC
Backfill Material: N/A	Slot Size: 0.010 FEET / Filter Material: 20–40 SAND
Logged By: J. COOPER Checked By:	Development Method: SUBMERSIBLE PUMP

Depth (feet)	USC Soil Type	Description	Blow Count/ Penetration	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		SAND – fine grained; tan, some silt and gravel					PVC Blank		No sample
65		T.D. at 64.5 feet							
70									
75									
80									
85									
90									

T:\1151.10\BORLOGS

C

APPENDIX C

Laboratory Analytical Reports and Chain of Custody Records for Soil Samples

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-1
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-7
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : VLH
ANALYZED ON : 21-AUG-1993
DILUTION FACTOR : 100
METHOD FACTOR : 1
QC BATCH NO : 27-082193

BTEX ANALYSIS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Benzene	200	µg/Kg	< 200	µg/Kg	
Toluene	200	µg/Kg	1500	µg/Kg	
Ethyl benzene	200	µg/Kg	3500	µg/Kg	
Xylenes	200	µg/Kg	32000	µg/Kg	
BTEX (total)			37000	µg/Kg	#

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene(SS)	50.0	µg/Kg	122	%

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

NDRC Laboratories, Inc. Martin Jeffys

Martin Jeffys
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-1
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-7
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993
ANALYSIS METHOD : EPA 5030/8015 /1
ANALYZED BY : VLH
ANALYZED ON : 23-AUG-1993
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-082393

TRPH BY EPA METHOD MODIFIED 8015		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbon	50 µg/Kg	380000 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Fluorobenzene	50.0 µg/Kg	89.0 %

NDRC Laboratories, Inc. Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-1
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-7
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993
PREPARATION METHOD : EPA 1311
PREPARED BY : MPE
PREPARED ON : 25-AUG-1993
ANALYSIS METHOD : EPA 1311/8240 /1
ANALYZED BY : NTT
ANALYZED ON : 26-AUG-1993
DILUTION FACTOR : 1
QC BATCH NO : VOA4-032

TCLP VOLATILE ORGANICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	0.01 mg/L	< 0.01 mg/L
Carbon tetrachloride	0.01 mg/L	< 0.01 mg/L
Chlorobenzene	0.01 mg/L	< 0.01 mg/L
Chloroform	0.01 mg/L	< 0.01 mg/L
1,4-Dichlorobenzene	0.01 mg/L	< 0.01 mg/L
1,2-Dichloroethane	0.01 mg/L	< 0.01 mg/L
1,1-Dichloroethene	0.01 mg/L	< 0.01 mg/L
Methyl ethyl ketone	1.00 mg/L	< 1.00 mg/L
Tetrachloroethene	0.01 mg/L	< 0.01 mg/L
Trichloroethene	0.01 mg/L	< 0.01 mg/L
Vinyl chloride	0.02 mg/L	< 0.02 mg/L

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

REPORT NUMBER : D93-9538-1
ANALYSIS METHOD : EPA 1311/8240 /1

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
1,2-Dichloroethane-d4(SS)	50.0 µg/L	90.1 %
Toluene-d8(SS)	50.0 µg/L	91.5 %
Bromofluorobenzene(SS)	50.0 µg/L	109 %

NDRC Laboratories, Inc. Martin Jeffus dm

Martin Jeffus
General Manager

Inchcape Testing Services
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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-1
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-7
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993
PREPARATION METHOD : EPA 3520
PREPARED BY : VHT
PREPARED ON : 25-AUG-1993
ANALYSIS METHOD : EPA 1311/8270 /1
ANALYZED BY : VDL
ANALYZED ON : 28-AUG-1993
DILUTION FACTOR : 1
METHOD FACTOR : 10
QC BATCH NO : 1311_3520_021

TCLP EXTRACTABLE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
o-Cresol	0.2	mg/L	<	0.2	mg/L
m-Cresol	0.2	mg/L	<	0.2	mg/L
p-Cresol	0.2	mg/L	<	0.2	mg/L
2,4-Dinitrotoluene	0.1	mg/L	<	0.1	mg/L
Hexachlorobenzene	0.1	mg/L	<	0.1	mg/L
Hexachlorobutadiene	0.1	mg/L	<	0.1	mg/L
Hexachloroethane	0.1	mg/L	<	0.1	mg/L
Nitrobenzene	0.1	mg/L	<	0.1	mg/L
Pentachlorophenol	0.5	mg/L	<	0.5	mg/L
Pyridine	0.1	mg/L	<	0.1	mg/L
2,4,5-Trichlorophenol	0.1	mg/L	<	0.1	mg/L
2,4,6-Trichlorophenol	0.1	mg/L	<	0.1	mg/L

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REPORT NUMBER : D93-9538-1
ANALYSIS METHOD : EPA 1311/8270 /1

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Nitrobenzene-d5 (SS)	50.0 µg/L	85.2 %
2-Fluorobiphenyl (SS)	50.0 µg/L	89.3 %
Terphenyl-d14 (SS)	50.0 µg/L	93.6 %
Phenol-d5 (SS)	100 µg/L	67.0 %
2-Fluorophenol (SS)	100 µg/L	72.8 %
2,4,6-Tribromophenol (SS)	100 µg/L	81.0 %

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General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-1
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-7
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993

TCLP METALS			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Silver	/1	0.01 mg/L	< 0.01 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Arsenic	/1	1.0 mg/L	< 1.0 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Beryllium	/1	0.005 mg/L	< 0.005 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Cadmium	/1	0.005 mg/L	< 0.005 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Chromium	/1	0.07 mg/L	< 0.07 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			

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TCLP METALS			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Copper	/1	0.05 mg/L	< 0.05 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Mercury	/1	0.001 mg/L	< 0.001 mg/L
Dilution Factor : 1 Prepared using EPA 1311/7470 on 26-AUG-1993 by CEL Analyzed using EPA 7470 on 26-AUG-1993 by SKW QC Batch No : 5033			
Nickel	/1	0.05 mg/L	< 0.05 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Lead	/1	0.05 mg/L	< 0.05 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Antimony	/1	0.1 mg/L	< 0.1 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Selenium	/1	1.0 mg/L	< 1.0 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			
Thallium	/1	0.1 mg/L	< 0.1 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3015 on 25-AUG-1993 by JK Analyzed using EPA 6010 on 26-AUG-1993 by KJS QC Batch No : 5032			

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TCLP METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Zinc /1	0.1 mg/L	0.2 mg/L

Dilution Factor : 1
Prepared using EPA 1311/3015 on 25-AUG-1993 by JK
Analyzed using EPA 6010 on 26-AUG-1993 by KJS
QC Batch No : 5032

NDRC Laboratories, Inc. Martin Jeffus dm
Martin Jeffus
General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-1
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-7
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	92.2 %
Analyzed using EPA 160.3 on 24-AUG-1993 by CLM QC Batch No : 70040F			

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-2
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-19
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : VLH
ANALYZED ON : 21-AUG-1993
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 27-082193

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2.0 µg/Kg	< 2.0 µg/Kg
Toluene	2.0 µg/Kg	< 2.0 µg/Kg
Ethyl benzene	2.0 µg/Kg	2.7 µg/Kg
Xylenes	2.0 µg/Kg	19.0 µg/Kg
BTEX (total)		21.7 µg/Kg #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene(SS)	50.0 µg/Kg	123 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

NDRC Laboratories, Inc. Martin Jeffus

Martin Jeffus
General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-2
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-19
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993
ANALYSIS METHOD : EPA 5030/8015 /1
ANALYZED BY : VLH
ANALYZED ON : 21-AUG-1993
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-082193

TRPH BY EPA METHOD MODIFIED 8015		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbon	50 µg/Kg	210 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Fluorobenzene	50.0 µg/Kg	74.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-2
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-14-19
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 16-AUG-1993

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	93.9 %
Analyzed using EPA 160.3 on 24-AUG-1993 by CLM QC Batch No : 70040F			

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-3
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-15-20
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 17-AUG-1993
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : VLH
ANALYZED ON : 21-AUG-1993
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 27-082193

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2.0 µg/Kg	< 2.0 µg/Kg
Toluene	2.0 µg/Kg	< 2.0 µg/Kg
Ethyl benzene	2.0 µg/Kg	< 2.0 µg/Kg
Xylenes	2.0 µg/Kg	9.6 µg/Kg
BTEX (total)		9.6 µg/Kg #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene(SS)	50.0 µg/Kg	115 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

NDRC Laboratories, Inc. Martin Jeffus

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General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-3
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-15-20
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 17-AUG-1993
ANALYSIS METHOD : EPA 5030/8015 /1
ANALYZED BY : VLH
ANALYZED ON : 21-AUG-1993
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-082193

TRPH BY EPA METHOD MODIFIED 8015		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbon	50 µg/Kg	220 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Fluorobenzene	50.0 µg/Kg	96.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9538-3
REPORT DATE : 31-AUG-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-15-20
PROJECT : 7445-02 Western-Hobbs, NM
DATE SAMPLED : 17-AUG-1993

MISCELLANEOUS ANALYSES			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Total Solids	/1	0.01 %	84.2 %
Analyzed using EPA 160.3 on 24-AUG-1993 by CLM QC Batch No : 70040F			

NDRC Laboratories, Inc. Martin Jeffus dm

Martin Jeffus
General Manager

CHAIN OF CUSTODY RECORD

NDRC LABORATORIES, INC. 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Brown & Caldwell	Name: SAMG
Address: 1415 Louisiana, Ste. 2500 Houston, Tx 77002	Address:
Contact: Jack Cooper	Contact:
Phone: (713) 759-0999	Phone:
Fax: (713) 759-	Fax:
	PO/SO #:

Lab use only
Due Date: 8-31-93
WIC
RCRA ☐
NPDES ☐
Section / Date

Proj. No. 7445-02 | Project Name: Western - Hobbs, NM | No. of Containers[2]

[1] Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	BTEX by 8020	TPH by Mod. 8015	TCLP Metals (Pest/PCB)	TCLP Volatile Organics	TCLP Semi-Volatile Organics	Hold remaining sample for future analysis	Lab. Sample ID
S	8-16-93	1400		X	SB-14-7			5		X	X	X	X	X		9538-1
S	8-16-93	1810		X	SB-14-19			2		X	X				X	Do TPH on this sample +BTEX
S	8-17-93	1335		X	SB-15-20			1		X	X					2

GCMS

Turn around time ☐ 100% ☐ 50% ☒ Standard Other: _____ Temperature °C: <4°C

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	8-19-93	1600	FEDERAL EXPRESS		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
			BWilson	8/20/93	9:45

Remarks: ORIGINAL

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

[1] Matrix W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

NDRC cannot accept verbal changes. Please Fax written changes to 214-238-5592

D

APPENDIX D

Laboratory Analytical Reports and Chain of Custody Records for Groundwater Samples

Inchcape Testing Services
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Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-9
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-1
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : CNA
ANALYZED ON : 31-AUG-1993
DILUTION FACTOR : 500
QC BATCH NO : 30-083193

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	100 µg/L	3200 µg/L
Chlorobenzene	200 µg/L	< 200 µg/L
1,2-Dichlorobenzene	400 µg/L	< 400 µg/L
1,3-Dichlorobenzene	400 µg/L	< 400 µg/L
1,4-Dichlorobenzene	300 µg/L	< 300 µg/L
Ethyl benzene	100 µg/L	1200 µg/L
Toluene	100 µg/L	7300 µg/L
Xylenes	100 µg/L	3700 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	95.0 %

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General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-9
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-1
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 28-AUG-1993
DILUTION FACTOR : 1000
QC BATCH NO : 4-082893

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	100	µg/L	<	100	µg/L
Bromoform	200	µg/L	<	200	µg/L
Bromomethane	1200	µg/L	<	1200	µg/L
Carbon tetrachloride	200	µg/L	<	200	µg/L
Chlorobenzene	300	µg/L	<	300	µg/L
Chloroethane	600	µg/L	<	600	µg/L
2-Chloroethylvinyl ether	300	µg/L	<	300	µg/L
Chloroform	100	µg/L	<	100	µg/L
Chloromethane	500	µg/L	<	500	µg/L
Dibromochloromethane	100	µg/L	<	100	µg/L
1,2-Dichlorobenzene	200	µg/L	<	200	µg/L
1,3-Dichlorobenzene	400	µg/L	<	400	µg/L
1,4-Dichlorobenzene	300	µg/L	<	300	µg/L
Dichlorodifluoromethane	2000	µg/L	<	2000	µg/L
1,1-Dichloroethene	200	µg/L	<	200	µg/L
1,2-Dichloroethane	300	µg/L	<	300	µg/L
1,1-Dichloroethane	100	µg/L	<	100	µg/L

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REPORT NUMBER : D93-9534-9
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	100	µg/L	<	100	µg/L
1,2-Dichloropropane	100	µg/L	<	100	µg/L
cis-1,3-Dichloropropene	200	µg/L	<	200	µg/L
trans-1,3-Dichloropropene	200	µg/L	<	200	µg/L
Methylene chloride	500	µg/L	<	500	µg/L
1,1,2,2-Tetrachloroethane	100	µg/L	<	100	µg/L
Tetrachloroethene	100	µg/L	<	100	µg/L
1,1,1-Trichloroethane	100	µg/L	<	100	µg/L
1,1,2-Trichloroethane	100	µg/L	<	100	µg/L
Trichloroethene	100	µg/L	<	100	µg/L
Trichlorofluoromethane	500	µg/L	<	500	µg/L
Vinyl chloride	500	µg/L	<	500	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	94.0	%

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Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-5
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-2
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 3-082793

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2 µg/L	100 µg/L
Chlorobenzene	2 µg/L	< 2 µg/L
1,2-Dichlorobenzene	4 µg/L	< 4 µg/L
1,3-Dichlorobenzene	4 µg/L	< 4 µg/L
1,4-Dichlorobenzene	3 µg/L	< 3 µg/L
Ethyl benzene	2 µg/L	3 µg/L
Toluene	2 µg/L	12 µg/L
Xylenes	2 µg/L	13 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	90.0 %

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Martin Jeffus
General Manager

Inchcape Testing Services
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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-5
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-2
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 4-082793

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1	µg/L	<	1	µg/L
Bromoform	2	µg/L	<	2	µg/L
Bromomethane	12	µg/L	<	12	µg/L
Carbon tetrachloride	2	µg/L	<	2	µg/L
Chlorobenzene	3	µg/L	<	3	µg/L
Chloroethane	6	µg/L	<	6	µg/L
2-Chloroethylvinyl ether	3	µg/L	<	3	µg/L
Chloroform	1	µg/L	<	1	µg/L
Chloromethane	5	µg/L	<	5	µg/L
Dibromochloromethane	1	µg/L	<	1	µg/L
1,2-Dichlorobenzene	2	µg/L	<	2	µg/L
1,3-Dichlorobenzene	4	µg/L	<	4	µg/L
1,4-Dichlorobenzene	3	µg/L	<	3	µg/L
Dichlorodifluoromethane	20	µg/L	<	20	µg/L
1,1-Dichloroethene	2	µg/L	<	2	µg/L
1,2-Dichloroethane	3	µg/L	<	3	µg/L
1,1-Dichloroethane	1	µg/L	<	1	µg/L

Inchcape Testing Services
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Richardson, TX 75081
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Fax. 214-258-5592

REPORT NUMBER : D93-9534-5
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1	µg/L	<	1	µg/L
1,2-Dichloropropane	1	µg/L	<	1	µg/L
cis-1,3-Dichloropropene	2	µg/L	<	2	µg/L
trans-1,3-Dichloropropene	2	µg/L	<	2	µg/L
Methylene chloride	5	µg/L	<	5	µg/L
1,1,2,2-Tetrachloroethane	1	µg/L	<	1	µg/L
Tetrachloroethene	1	µg/L	<	1	µg/L
1,1,1-Trichloroethane	1	µg/L	<	1	µg/L
1,1,2-Trichloroethane	1	µg/L	<	1	µg/L
Trichloroethene	1	µg/L	<	1	µg/L
Trichlorofluoromethane	5	µg/L	<	5	µg/L
Vinyl chloride	5	µg/L	<	5	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	96.0	%

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-8
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-3
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : CNA
ANALYZED ON : 31-AUG-1993
DILUTION FACTOR : 250
QC BATCH NO : 30-083193

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	50 µg/L	560 µg/L
Chlorobenzene	50 µg/L	< 50 µg/L
1,2-Dichlorobenzene	100 µg/L	< 100 µg/L
1,3-Dichlorobenzene	100 µg/L	< 100 µg/L
1,4-Dichlorobenzene	80 µg/L	< 80 µg/L
Ethyl benzene	50 µg/L	630 µg/L
Toluene	50 µg/L	3100 µg/L
Xylenes	50 µg/L	1900 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	94.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-8
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-3
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 4-082793

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1	µg/L	<	1	µg/L
Bromoform	2	µg/L	<	2	µg/L
Bromomethane	12	µg/L	<	12	µg/L
Carbon tetrachloride	2	µg/L	<	2	µg/L
Chlorobenzene	3	µg/L	<	3	µg/L
Chloroethane	6	µg/L	<	6	µg/L
2-Chloroethylvinyl ether	3	µg/L	<	3	µg/L
Chloroform	1	µg/L	<	1	µg/L
Chloromethane	5	µg/L	<	5	µg/L
Dibromochloromethane	1	µg/L	<	1	µg/L
1,2-Dichlorobenzene	2	µg/L	<	2	µg/L
1,3-Dichlorobenzene	4	µg/L	<	4	µg/L
1,4-Dichlorobenzene	3	µg/L	<	3	µg/L
Dichlorodifluoromethane	20	µg/L	<	20	µg/L
1,1-Dichloroethene	2	µg/L	<	2	µg/L
1,2-Dichloroethane	3	µg/L	<	3	µg/L
1,1-Dichloroethane	1	µg/L	<	1	µg/L

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REPORT NUMBER : D93-9534-8
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1	µg/L	<	1	µg/L
1,2-Dichloropropane	1	µg/L	<	1	µg/L
cis-1,3-Dichloropropene	2	µg/L	<	2	µg/L
trans-1,3-Dichloropropene	2	µg/L	<	2	µg/L
Methylene chloride	5	µg/L	<	5	µg/L
1,1,2,2-Tetrachloroethane	1	µg/L	<	1	µg/L
Tetrachloroethene	1	µg/L	<	1	µg/L
1,1,1-Trichloroethane	1	µg/L	<	1	µg/L
1,1,2-Trichloroethane	1	µg/L	<	1	µg/L
Trichloroethene	1	µg/L	<	1	µg/L
Trichlorofluoromethane	5	µg/L	<	5	µg/L
Vinyl chloride	5	µg/L	<	5	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	105	%

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-10
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-4
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : BSR
ANALYZED ON : 28-AUG-1993
DILUTION FACTOR : 10000
QC BATCH NO : 3-082893

VOLATILE AROMATICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	
Benzene	2000	µg/L	3000	µg/L
Chlorobenzene	2000	µg/L	< 2000	µg/L
1,2-Dichlorobenzene	4000	µg/L	< 4000	µg/L
1,3-Dichlorobenzene	4000	µg/L	< 4000	µg/L
1,4-Dichlorobenzene	3000	µg/L	< 3000	µg/L
Ethyl benzene	2000	µg/L	< 2000	µg/L
Toluene	2000	µg/L	12000	µg/L
Xylenes	2000	µg/L	7000	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
4-Bromofluorobenzene	50.0	µg/L	98.0	%

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-10
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-4
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 28-AUG-1993
DILUTION FACTOR : 10000
QC BATCH NO : 4-082893

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1000	µg/L	<	1000	µg/L
Bromoform	2000	µg/L	<	2000	µg/L
Bromomethane	12000	µg/L	<	12000	µg/L
Carbon tetrachloride	2000	µg/L	<	2000	µg/L
Chlorobenzene	3000	µg/L	<	3000	µg/L
Chloroethane	6000	µg/L	<	6000	µg/L
2-Chloroethylvinyl ether	3000	µg/L	<	3000	µg/L
Chloroform	1000	µg/L	<	1000	µg/L
Chloromethane	5000	µg/L	<	5000	µg/L
Dibromochloromethane	1000	µg/L	<	1000	µg/L
1,2-Dichlorobenzene	2000	µg/L	<	2000	µg/L
1,3-Dichlorobenzene	4000	µg/L	<	4000	µg/L
1,4-Dichlorobenzene	3000	µg/L	<	3000	µg/L
Dichlorodifluoromethane	20000	µg/L	<	20000	µg/L
1,1-Dichloroethene	2000	µg/L	<	2000	µg/L
1,2-Dichloroethane	3000	µg/L	<	3000	µg/L
1,1-Dichloroethane	1000	µg/L	<	1000	µg/L

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REPORT NUMBER : D93-9534-10
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1000	µg/L	<	1000	µg/L
1,2-Dichloropropane	1000	µg/L	<	1000	µg/L
cis-1,3-Dichloropropene	2000	µg/L	<	2000	µg/L
trans-1,3-Dichloropropene	2000	µg/L	<	2000	µg/L
Methylene chloride	5000	µg/L	<	5000	µg/L
1,1,2,2-Tetrachloroethane	1000	µg/L	<	1000	µg/L
Tetrachloroethene	1000	µg/L	<	1000	µg/L
1,1,1-Trichloroethane	1000	µg/L	<	1000	µg/L
1,1,2-Trichloroethane	1000	µg/L	<	1000	µg/L
Trichloroethene	1000	µg/L	<	1000	µg/L
Trichlorofluoromethane	5000	µg/L	<	5000	µg/L
Vinyl chloride	5000	µg/L	<	5000	µg/L

QUALITY CONTROL DATA					
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED		
Bromofluorobenzene (SS)	50.0	µg/L	94.0	%	

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-2
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-5
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 3-082793

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2 µg/L	< 2 µg/L
Chlorobenzene	2 µg/L	< 2 µg/L
1,2-Dichlorobenzene	4 µg/L	< 4 µg/L
1,3-Dichlorobenzene	4 µg/L	< 4 µg/L
1,4-Dichlorobenzene	3 µg/L	< 3 µg/L
Ethyl benzene	2 µg/L	< 2 µg/L
Toluene	2 µg/L	< 2 µg/L
Xylenes	2 µg/L	< 2 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	99.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-2
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-5
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 4-082793

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1	µg/L	<	1	µg/L
Bromoform	2	µg/L	<	2	µg/L
Bromomethane	12	µg/L	<	12	µg/L
Carbon tetrachloride	2	µg/L	<	2	µg/L
Chlorobenzene	3	µg/L	<	3	µg/L
Chloroethane	6	µg/L	<	6	µg/L
2-Chloroethylvinyl ether	3	µg/L	<	3	µg/L
Chloroform	1	µg/L	<	1	µg/L
Chloromethane	5	µg/L	<	5	µg/L
Dibromochloromethane	1	µg/L	<	1	µg/L
1,2-Dichlorobenzene	2	µg/L	<	2	µg/L
1,3-Dichlorobenzene	4	µg/L	<	4	µg/L
1,4-Dichlorobenzene	3	µg/L	<	3	µg/L
Dichlorodifluoromethane	20	µg/L	<	20	µg/L
1,1-Dichloroethene	2	µg/L	<	2	µg/L
1,2-Dichloroethane	3	µg/L	<	3	µg/L
1,1-Dichloroethane	1	µg/L	<	1	µg/L

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REPORT NUMBER : D93-9534-2
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1	µg/L	<	1	µg/L
1,2-Dichloropropane	1	µg/L	<	1	µg/L
cis-1,3-Dichloropropene	2	µg/L	<	2	µg/L
trans-1,3-Dichloropropene	2	µg/L	<	2	µg/L
Methylene chloride	5	µg/L	<	5	µg/L
1,1,2,2-Tetrachloroethane	1	µg/L	<	1	µg/L
Tetrachloroethene	1	µg/L	<	1	µg/L
1,1,1-Trichloroethane	1	µg/L	<	1	µg/L
1,1,2-Trichloroethane	1	µg/L	<	1	µg/L
Trichloroethene	1	µg/L	<	1	µg/L
Trichlorofluoromethane	5	µg/L	<	5	µg/L
Vinyl chloride	5	µg/L	<	5	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	96.0	%

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-11
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-6
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : CNA
ANALYZED ON : 31-AUG-1993
DILUTION FACTOR : 1000
QC BATCH NO : 30-083193

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	200 µg/L	8100 µg/L
Chlorobenzene	1000 µg/L	< 1000 µg/L
1,2-Dichlorobenzene	8000 µg/L	< 8000 µg/L
1,3-Dichlorobenzene	8000 µg/L	< 8000 µg/L
1,4-Dichlorobenzene	6000 µg/L	< 6000 µg/L
Ethyl benzene	200 µg/L	3500 µg/L
Toluene	200 µg/L	19000 µg/L
Xylenes	200 µg/L	6400 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	89.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-11
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-6
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 28-AUG-1993
DILUTION FACTOR : 5000
QC BATCH NO : 4-082893

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	500	µg/L	<	500	µg/L
Bromoform	1000	µg/L	<	1000	µg/L
Bromomethane	6000	µg/L	<	6000	µg/L
Carbon tetrachloride	1000	µg/L	<	1000	µg/L
Chlorobenzene	1500	µg/L	<	1500	µg/L
Chloroethane	3000	µg/L	<	3000	µg/L
2-Chloroethylvinyl ether	1500	µg/L	<	1500	µg/L
Chloroform	500	µg/L	<	500	µg/L
Chloromethane	2500	µg/L	<	2500	µg/L
Dibromochloromethane	500	µg/L	<	500	µg/L
1,2-Dichlorobenzene	1000	µg/L	<	1000	µg/L
1,3-Dichlorobenzene	2000	µg/L	<	2000	µg/L
1,4-Dichlorobenzene	1500	µg/L	<	1500	µg/L
Dichlorodifluoromethane	10000	µg/L	<	10000	µg/L
1,1-Dichloroethene	1000	µg/L	<	1000	µg/L
1,2-Dichloroethane	1500	µg/L	<	1500	µg/L
1,1-Dichloroethane	500	µg/L	<	500	µg/L

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REPORT NUMBER : D93-9534-11
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	500	µg/L	<	500	µg/L
1,2-Dichloropropane	500	µg/L	<	500	µg/L
cis-1,3-Dichloropropene	1000	µg/L	<	1000	µg/L
trans-1,3-Dichloropropene	1000	µg/L	<	1000	µg/L
Methylene chloride	2500	µg/L	<	2500	µg/L
1,1,2,2-Tetrachloroethane	500	µg/L	<	500	µg/L
Tetrachloroethene	500	µg/L	<	500	µg/L
1,1,1-Trichloroethane	500	µg/L	<	500	µg/L
1,1,2-Trichloroethane	500	µg/L	<	500	µg/L
Trichloroethene	500	µg/L	<	500	µg/L
Trichlorofluoromethane	2500	µg/L	<	2500	µg/L
Vinyl chloride	2500	µg/L	<	2500	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	99.0	%

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-4
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-7
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 3-082793

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2 µg/L	< 2 µg/L
Chlorobenzene	2 µg/L	< 2 µg/L
1,2-Dichlorobenzene	4 µg/L	< 4 µg/L
1,3-Dichlorobenzene	4 µg/L	< 4 µg/L
1,4-Dichlorobenzene	3 µg/L	< 3 µg/L
Ethyl benzene	2 µg/L	< 2 µg/L
Toluene	2 µg/L	3 µg/L
Xylenes	2 µg/L	< 2 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	100 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-4
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-7
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 4-082793

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1	µg/L	<	1	µg/L
Bromoform	2	µg/L	<	2	µg/L
Bromomethane	12	µg/L	<	12	µg/L
Carbon tetrachloride	2	µg/L	<	2	µg/L
Chlorobenzene	3	µg/L	<	3	µg/L
Chloroethane	6	µg/L	<	6	µg/L
2-Chloroethylvinyl ether	3	µg/L	<	3	µg/L
Chloroform	1	µg/L	<	1	µg/L
Chloromethane	5	µg/L	<	5	µg/L
Dibromochloromethane	1	µg/L	<	1	µg/L
1,2-Dichlorobenzene	2	µg/L	<	2	µg/L
1,3-Dichlorobenzene	4	µg/L	<	4	µg/L
1,4-Dichlorobenzene	3	µg/L	<	3	µg/L
Dichlorodifluoromethane	20	µg/L	<	20	µg/L
1,1-Dichloroethene	2	µg/L	<	2	µg/L
1,2-Dichloroethane	3	µg/L	<	3	µg/L
1,1-Dichloroethane	1	µg/L	<	1	µg/L

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Tel. 214-238-5591
Fax. 214-238-5592

REPORT NUMBER : D93-9534-4
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1	µg/L	<	1	µg/L
1,2-Dichloropropane	1	µg/L	<	1	µg/L
cis-1,3-Dichloropropene	2	µg/L	<	2	µg/L
trans-1,3-Dichloropropene	2	µg/L	<	2	µg/L
Methylene chloride	5	µg/L	<	5	µg/L
1,1,2,2-Tetrachloroethane	1	µg/L	<	1	µg/L
Tetrachloroethene	1	µg/L	<	1	µg/L
1,1,1-Trichloroethane	1	µg/L	<	1	µg/L
1,1,2-Trichloroethane	1	µg/L	<	1	µg/L
Trichloroethene	1	µg/L	<	1	µg/L
Trichlorofluoromethane	5	µg/L	<	5	µg/L
Vinyl chloride	5	µg/L	<	5	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	92.0	%

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Martin Jeffus
General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-3
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-8
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 3-082793

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2 µg/L	< 2 µg/L
Chlorobenzene	2 µg/L	< 2 µg/L
1,2-Dichlorobenzene	4 µg/L	< 4 µg/L
1,3-Dichlorobenzene	4 µg/L	< 4 µg/L
1,4-Dichlorobenzene	3 µg/L	< 3 µg/L
Ethyl benzene	2 µg/L	< 2 µg/L
Toluene	2 µg/L	< 2 µg/L
Xylenes	2 µg/L	< 2 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	97.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-3
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-8
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 4-082793

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1	µg/L	<	1	µg/L
Bromoform	2	µg/L	<	2	µg/L
Bromomethane	12	µg/L	<	12	µg/L
Carbon tetrachloride	2	µg/L	<	2	µg/L
Chlorobenzene	3	µg/L	<	3	µg/L
Chloroethane	6	µg/L	<	6	µg/L
2-Chloroethylvinyl ether	3	µg/L	<	3	µg/L
Chloroform	1	µg/L	<	1	µg/L
Chloromethane	5	µg/L	<	5	µg/L
Dibromochloromethane	1	µg/L	<	1	µg/L
1,2-Dichlorobenzene	2	µg/L	<	2	µg/L
1,3-Dichlorobenzene	4	µg/L	<	4	µg/L
1,4-Dichlorobenzene	3	µg/L	<	3	µg/L
Dichlorodifluoromethane	20	µg/L	<	20	µg/L
1,1-Dichloroethene	2	µg/L	<	2	µg/L
1,2-Dichloroethane	3	µg/L	<	3	µg/L
1,1-Dichloroethane	1	µg/L	<	1	µg/L

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REPORT NUMBER : D93-9534-3
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1	µg/L	<	1	µg/L
1,2-Dichloropropane	1	µg/L	<	1	µg/L
cis-1,3-Dichloropropene	2	µg/L	<	2	µg/L
trans-1,3-Dichloropropene	2	µg/L	<	2	µg/L
Methylene chloride	5	µg/L	<	5	µg/L
1,1,2,2-Tetrachloroethane	1	µg/L	<	1	µg/L
Tetrachloroethene	1	µg/L	<	1	µg/L
1,1,1-Trichloroethane	1	µg/L	<	1	µg/L
1,1,2-Trichloroethane	1	µg/L	<	1	µg/L
Trichloroethene	1	µg/L	<	1	µg/L
Trichlorofluoromethane	5	µg/L	<	5	µg/L
Vinyl chloride	5	µg/L	<	5	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	92.0	%

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-6
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-9
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : RDG
ANALYZED ON : 31-AUG-1993
DILUTION FACTOR : 100
QC BATCH NO : 30-083193

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	20 µg/L	390 µg/L
Chlorobenzene	20 µg/L	< 20 µg/L
1,2-Dichlorobenzene	40 µg/L	< 40 µg/L
1,3-Dichlorobenzene	40 µg/L	< 40 µg/L
1,4-Dichlorobenzene	30 µg/L	< 30 µg/L
Ethyl benzene	20 µg/L	40 µg/L
Toluene	20 µg/L	290 µg/L
Xylenes	20 µg/L	250 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	91.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-6
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-9
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 4-082793

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1	µg/L	<	1	µg/L
Bromoform	2	µg/L	<	2	µg/L
Bromomethane	12	µg/L	<	12	µg/L
Carbon tetrachloride	2	µg/L	<	2	µg/L
Chlorobenzene	3	µg/L	<	3	µg/L
Chloroethane	6	µg/L	<	6	µg/L
2-Chloroethylvinyl ether	3	µg/L	<	3	µg/L
Chloroform	1	µg/L	<	1	µg/L
Chloromethane	5	µg/L	<	5	µg/L
Dibromochloromethane	1	µg/L	<	1	µg/L
1,2-Dichlorobenzene	2	µg/L	<	2	µg/L
1,3-Dichlorobenzene	4	µg/L	<	4	µg/L
1,4-Dichlorobenzene	3	µg/L	<	3	µg/L
Dichlorodifluoromethane	20	µg/L	<	20	µg/L
1,1-Dichloroethene	2	µg/L	<	2	µg/L
1,2-Dichloroethane	3	µg/L		8	µg/L
1,1-Dichloroethane	1	µg/L	<	1	µg/L

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REPORT NUMBER : D93-9534-6
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1	µg/L	<	1	µg/L
1,2-Dichloropropane	1	µg/L	<	1	µg/L
cis-1,3-Dichloropropene	2	µg/L	<	2	µg/L
trans-1,3-Dichloropropene	2	µg/L	<	2	µg/L
Methylene chloride	5	µg/L	<	5	µg/L
1,1,2,2-Tetrachloroethane	1	µg/L	<	1	µg/L
Tetrachloroethene	1	µg/L	<	1	µg/L
1,1,1-Trichloroethane	1	µg/L	<	1	µg/L
1,1,2-Trichloroethane	1	µg/L	<	1	µg/L
Trichloroethene	1	µg/L	<	1	µg/L
Trichlorofluoromethane	5	µg/L	<	5	µg/L
Vinyl chloride	5	µg/L	<	5	µg/L

QUALITY CONTROL DATA					
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED		
Bromofluorobenzene (SS)	50.0	µg/L	98.0	%	

NDRC Laboratories, Inc. Martin Jeffus dm

Martin Jeffus
General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-12
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-10
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : BSR
ANALYZED ON : 28-AUG-1993
DILUTION FACTOR : 500
QC BATCH NO : 3-082893

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	100 µg/L	190 µg/L
Chlorobenzene	200 µg/L	< 200 µg/L
1,2-Dichlorobenzene	400 µg/L	< 400 µg/L
1,3-Dichlorobenzene	400 µg/L	< 400 µg/L
1,4-Dichlorobenzene	300 µg/L	< 300 µg/L
Ethyl benzene	200 µg/L	< 200 µg/L
Toluene	100 µg/L	460 µg/L
Xylenes	100 µg/L	240 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	97.0 %

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-12
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-10
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 28-AUG-1993
DILUTION FACTOR : 1000
QC BATCH NO : 4-082893

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	100	µg/L	<	100	µg/L
Bromoform	200	µg/L	<	200	µg/L
Bromomethane	1200	µg/L	<	1200	µg/L
Carbon tetrachloride	200	µg/L	<	200	µg/L
Chlorobenzene	300	µg/L	<	300	µg/L
Chloroethane	600	µg/L	<	600	µg/L
2-Chloroethylvinyl ether	300	µg/L	<	300	µg/L
Chloroform	100	µg/L	<	100	µg/L
Chloromethane	500	µg/L	<	500	µg/L
Dibromochloromethane	100	µg/L	<	100	µg/L
1,2-Dichlorobenzene	200	µg/L	<	200	µg/L
1,3-Dichlorobenzene	400	µg/L	<	400	µg/L
1,4-Dichlorobenzene	300	µg/L	<	300	µg/L
Dichlorodifluoromethane	2000	µg/L	<	2000	µg/L
1,1-Dichloroethene	200	µg/L	<	200	µg/L
1,2-Dichloroethane	300	µg/L	<	300	µg/L
1,1-Dichloroethane	100	µg/L	<	100	µg/L

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REPORT NUMBER : D93-9534-12
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	100	µg/L	<	100	µg/L
1,2-Dichloropropane	100	µg/L	<	100	µg/L
cis-1,3-Dichloropropene	200	µg/L	<	200	µg/L
trans-1,3-Dichloropropene	200	µg/L	<	200	µg/L
Methylene chloride	500	µg/L	<	500	µg/L
1,1,2,2-Tetrachloroethane	100	µg/L	<	100	µg/L
Tetrachloroethene	100	µg/L	<	100	µg/L
1,1,1-Trichloroethane	100	µg/L	<	100	µg/L
1,1,2-Trichloroethane	100	µg/L	<	100	µg/L
Trichloroethene	100	µg/L	<	100	µg/L
Trichlorofluoromethane	500	µg/L	<	500	µg/L
Vinyl chloride	500	µg/L	<	500	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene (SS)	50.0	µg/L	91.0	%

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-12
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-10
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
PREPARATION METHOD : EPA 3520
PREPARED BY : VHT
PREPARED ON : 23-AUG-1993
ANALYSIS METHOD : EPA 610 /1
ANALYZED BY : MGD
ANALYZED ON : 25-AUG-1993
DILUTION FACTOR : 1
QC BATCH NO : 610_3520_014

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Acenaphthene	3.00 µg/L	18.0 µg/L
Acenaphthylene	6.00 µg/L	< 6.00 µg/L
Anthracene	7.00 µg/L	< 7.00 µg/L
Benzo(a)anthracene	1.10 µg/L	5.00 µg/L
Benzo(b)fluoranthene	17.0 µg/L	< 17.0 µg/L
Benzo(k)fluoranthene	3.00 µg/L	< 3.00 µg/L
Benzo(g,h,i)perylene	5.00 µg/L	< 5.00 µg/L
Benzo(a)pyrene	6.00 µg/L	< 6.00 µg/L
Chrysene	7.00 µg/L	< 7.00 µg/L
Dibenzo(a,h)anthracene	2.00 µg/L	< 2.00 µg/L
Fluoranthene	3.00 µg/L	< 3.00 µg/L
Fluorene	6.00 µg/L	17.9 µg/L
Indeno(1,2,3-cd)pyrene	2.00 ug/L	< 2.00 ug/L
Naphthalene	6.00 µg/L	< 6.00 µg/L
Phenanthrene	3.00 µg/L	< 3.00 µg/L

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REPORT NUMBER : D93-9534-12
ANALYSIS METHOD : EPA 610 /1

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Pyrene	3.00 µg/L	< 3.00 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
2-Fluorobiphenyl	100 µg/L	125 %

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REPORT NUMBER : D93-9534-12
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-10
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993

TOTAL METALS			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Silver	/1	0.01 mg/L	< 0.01 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 26-AUG-1993 by KJS QC Batch No : 4078			
Arsenic	/1	0.005 mg/L	< 0.005 mg/L
Dilution Factor : 1 Prepared using NPDES 206.5 on 24-AUG-1993 by MDB Analyzed using EPA 206.3 on 26-AUG-1993 by SKW QC Batch No : 5015			
Beryllium	/1	0.0050 mg/L	< 0.0050 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Cadmium	/1	0.005 mg/L	< 0.005 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Chromium	/1	0.07 mg/L	< 0.07 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			

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TOTAL METALS			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Copper	/1	0.01 mg/L	0.02 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Mercury	/1	0.001 mg/L	< 0.001 mg/L
Dilution Factor : 1 Prepared using EPA 245.1 on 24-AUG-1993 by MPE Analyzed using EPA 245.1 on 24-AUG-1993 by SKW QC Batch No : 5012			
Nickel	/1	0.05 mg/L	< 0.05 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Lead	/1	0.05 mg/L	< 0.05 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Antimony	/1	0.1 mg/L	< 0.1 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Selenium	/1	0.005 mg/L	< 0.005 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 270.2 on 31-AUG-1993 by AH QC Batch No : 4078			
Thallium	/1	0.1 mg/L	< 0.1 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			

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TOTAL METALS			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Zinc	/1	0.05 mg/L	< 0.05 mg/L

Dilution Factor : 1
Prepared using NPDES MW on 23-AUG-1993 by MDB
Analyzed using EPA 200.7 on 25-AUG-1993 by KJS
QC Batch No : 4078

NDRC Laboratories, Inc. Martin Jeffus dm

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General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-1
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-11
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 602 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 3-082793

VOLATILE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2 µg/L	< 2 µg/L
Chlorobenzene	2 µg/L	< 2 µg/L
1,2-Dichlorobenzene	4 µg/L	< 4 µg/L
1,3-Dichlorobenzene	4 µg/L	< 4 µg/L
1,4-Dichlorobenzene	3 µg/L	< 3 µg/L
Ethyl benzene	2 µg/L	< 2 µg/L
Toluene	2 µg/L	< 2 µg/L
Xylenes	2 µg/L	< 2 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-Bromofluorobenzene	50.0 µg/L	91.0 %

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General Manager

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DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-1
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-11
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
PREPARATION METHOD : EPA 3520
PREPARED BY : VHT
PREPARED ON : 23-AUG-1993
ANALYSIS METHOD : EPA 610 /1
ANALYZED BY : MGD
ANALYZED ON : 25-AUG-1993
DILUTION FACTOR : 1
QC BATCH NO : 610_3520_014

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Acenaphthene	3.00 µg/L	< 3.00 µg/L
Acenaphthylene	6.00 µg/L	< 6.00 µg/L
Anthracene	7.00 µg/L	< 7.00 µg/L
Benzo(a)anthracene	1.10 µg/L	< 1.10 µg/L
Benzo(b)fluoranthene	17.0 µg/L	< 17.0 µg/L
Benzo(k)fluoranthene	3.00 µg/L	< 3.00 µg/L
Benzo(g,h,i)perylene	5.00 µg/L	< 5.00 µg/L
Benzo(a)pyrene	6.00 µg/L	< 6.00 µg/L
Chrysene	7.00 µg/L	< 7.00 µg/L
Dibenzo(a,h)anthracene	2.00 µg/L	< 2.00 µg/L
Fluoranthene	3.00 µg/L	< 3.00 µg/L
Fluorene	6.00 µg/L	< 6.00 µg/L
Indeno(1,2,3-cd)pyrene	2.00 ug/L	< 2.00 ug/L
Naphthalene	6.00 µg/L	< 6.00 µg/L
Phenanthrene	3.00 µg/L	< 3.00 µg/L

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

REPORT NUMBER : D93-9534-1
ANALYSIS METHOD : EPA 610 /1

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Pyrene	3.00 µg/L	< 3.00 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
2-Fluorobiphenyl	100 µg/L	93.4 %

NDRC Laboratories, Inc. Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-1
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-11
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993

TOTAL METALS

TEST REQUESTED		DETECTION LIMIT	RESULTS
Silver	/1	0.01 mg/L	< 0.01 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 26-AUG-1993 by KJS QC Batch No : 4078			
Arsenic	/1	0.005 mg/L	0.010 mg/L
Dilution Factor : 1 Prepared using NPDES 206.5 on 24-AUG-1993 by MDB Analyzed using EPA 206.3 on 26-AUG-1993 by SKW QC Batch No : 5015			
Beryllium	/1	0.0050 mg/L	< 0.0050 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Cadmium	/1	0.005 mg/L	< 0.005 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Chromium	/1	0.07 mg/L	< 0.07 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			

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Tel. 214-258-5591
Fax. 214-258-5592

TOTAL METALS			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Copper	/1	0.01 mg/L	0.02 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Mercury	/1	0.001 mg/L	< 0.001 mg/L
Dilution Factor : 1 Prepared using EPA 245.1 on 24-AUG-1993 by MPE Analyzed using EPA 245.1 on 24-AUG-1993 by SKW QC Batch No : 5012			
Nickel	/1	0.05 mg/L	< 0.05 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Lead	/1	0.05 mg/L	< 0.05 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Antimony	/1	0.1 mg/L	< 0.1 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			
Selenium	/1	0.005 mg/L	< 0.005 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 270.2 on 23-AUG-1993 by AH QC Batch No : 4078			
Thallium	/1	0.1 mg/L	< 0.1 mg/L
Dilution Factor : 1 Prepared using NPDES MW on 23-AUG-1993 by MDB Analyzed using EPA 200.7 on 25-AUG-1993 by KJS QC Batch No : 4078			

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TOTAL METALS			
TEST REQUESTED		DETECTION LIMIT	RESULTS
Zinc	/1	0.05 mg/L	< 0.05 mg/L

Dilution Factor : 1
Prepared using NPDES MW on 23-AUG-1993 by MDB
Analyzed using EPA 200.7 on 25-AUG-1993 by KJS
QC Batch No : 4078

NDRC Laboratories, Inc. Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 20-AUG-1993

REPORT NUMBER : D93-9534-1
REPORT DATE : 2-SEP-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-11
PROJECT : Western-Hobbs, NM/7445-02
DATE SAMPLED : 19-AUG-1993
ANALYSIS METHOD : EPA 601 /1
ANALYZED BY : BSR
ANALYZED ON : 27-AUG-1993
DILUTION FACTOR : 10
QC BATCH NO : 4-082793

VOLATILE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1	µg/L	<	1	µg/L
Bromoform	2	µg/L	<	2	µg/L
Bromomethane	12	µg/L	<	12	µg/L
Carbon tetrachloride	2	µg/L	<	2	µg/L
Chlorobenzene	3	µg/L	<	3	µg/L
Chloroethane	6	µg/L	<	6	µg/L
2-Chloroethylvinyl ether	3	µg/L	<	3	µg/L
Chloroform	1	µg/L	<	1	µg/L
Chloromethane	5	µg/L	<	5	µg/L
Dibromochloromethane	1	µg/L	<	1	µg/L
1,2-Dichlorobenzene	2	µg/L	<	2	µg/L
1,3-Dichlorobenzene	4	µg/L	<	4	µg/L
1,4-Dichlorobenzene	3	µg/L	<	3	µg/L
Dichlorodifluoromethane	20	µg/L	<	20	µg/L
1,1-Dichloroethene	2	µg/L	<	2	µg/L
1,2-Dichloroethane	3	µg/L	<	3	µg/L
1,1-Dichloroethane	1	µg/L	<	1	µg/L

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

REPORT NUMBER : D93-9534-1
ANALYSIS METHOD : EPA 601 /1

VOLATILE HALOCARBONS			
TEST REQUESTED	DETECTION LIMIT		RESULTS
trans-1,2-Dichloroethene	1 µg/L	<	1 µg/L
1,2-Dichloropropane	1 µg/L	<	1 µg/L
cis-1,3-Dichloropropene	2 µg/L	<	2 µg/L
trans-1,3-Dichloropropene	2 µg/L	<	2 µg/L
Methylene chloride	5 µg/L	<	5 µg/L
1,1,2,2-Tetrachloroethane	1 µg/L	<	1 µg/L
Tetrachloroethene	1 µg/L	<	1 µg/L
1,1,1-Trichloroethane	1 µg/L	<	1 µg/L
1,1,2-Trichloroethane	1 µg/L	<	1 µg/L
Trichloroethene	1 µg/L	<	1 µg/L
Trichlorofluoromethane	5 µg/L	<	5 µg/L
Vinyl chloride	5 µg/L	<	5 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene (SS)	50.0 µg/L	105 %

NDRC Laboratories, Inc. Martin Jeffus dm

Martin Jeffus
General Manager

CHAIN OF CUSTODY RECORD

NDRC LABORATORIES, INC. 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5591

Submitted by	Bill to
Name: Brown & Caldwell	Name: SAME
Address: 1415 Louisiana, Ste. 2500 Houston, Tx 77002	Address:
Contact: Jack Cooper	Contact:
Phone: (713) 759-0999	Phone:
Fax: (713) 759-	Fax:
	PO/SO #:

Lab use only
Due Date:

RCRA ☐
NPDES ☐
Section / Date

Proj. No.: 7445-02
Project Name: WESTERN - HOBBS, NM
No. of Containers[2]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	EPA 601	EPA 602	EPA 8100 - Polynuclear Aromatic Hydrocarbons	6010 Metals (Prior. P.I.)	Lab. Sample ID
W	8-17-93	930/1140		X	MW-11 (3voas, 2 liters)	3	2			X	X	X	X	9534-1
		950/1000			MW-5 (3voa's)	3				X	X			-2
		1005/1015			MW-8 "	3				X	X			-3
		1020/1025			MW-7 "	3				X	X			-4
		1035/1040			MW-2 "	3				X	X			-5
		1105/1110			MW-9 "	3				X	X			-6
		1115			ER-1 "	3				X	X			-7
		1125/1130			MW-3 "	3				X	X			-8
		1135/1140			MW-1 "	3				X	X			-9
		1150/1155			MW-4 "	3				X	X			-10
		1205/1210			MW-6 "	3				X	X			-11
		1220/1230			MW-10 (3voas 2amb)	3	2			X	X	X	X	-12
↓	↓	NA		↓	TRIP BLANK (3voa)	3				X	X	[redacted]	dlc 8-19-93	-13

GC

DUE 8/31/93
LIQUID
GC/WIC

ORIGINAL

Turn around time ☐ 100% ☐ 50% ☒ Standard Other: _____ Temperature °C: _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	8-17-93	1600	FEDERAL EXPRESS		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
			Jennifer Dugan	8/20/93	10:00
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Bill per special quote.

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

[1] Matrix: W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube SL - Sludge O - Oil

[2] C[redacted]r [redacted] 40 m[redacted] A/[redacted]ber / C[redacted]s 1 Li[redacted] 250 [redacted]ss wi[redacted]th [redacted] Plasti[redacted]ther [redacted]

NDRC cannot accept verbal changes. Please Fax written changes to 21[redacted]5592

9-1

E

APPENDIX E

Cumulative Summary of Laboratory Analytical Results for Groundwater Samples

Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples

Inorganic Analyses	Well Number											
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	Fresh Water Well
Antimony (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	<0.05
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.1	<0.1	NS
Arsenic (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	0.009	0.004	0.0026	0.01	0.0023	0.018	0.007	0.006	NS	NS	NS	0.003
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.005	0.01	NS
Beryllium (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.0001	<0.0001	0.0008	<0.0001	0.0002	0.0004	0.0006	0.0003	NS	NS	NS	<0.0001
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.005	<0.005	NS
Cadmium (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.0001	<0.0001	<0.0001	0.0007	0.0001	0.0039	0.0011	0.0013	NS	NS	NS	<0.0001
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.005	<0.005	NS
Chromium (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.01	0.012	<0.01	0.02	<0.01	0.039	0.05	0.041	NS	NS	NS	0.014
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.07	<0.07	NS
Copper (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.03	0.017	NS	NS	NS	0.034
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.02	0.02	NS
Lead (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	0.004	0.0094	<0.001	0.0035	0.0018	0.0114	0.0106	0.0075	NS	NS	NS	0.0029
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.05	<0.05	NS

Note: Concentrations of constituents given or detection limit shown.
NS – No sample taken on this date for analysis of the indicated parameter..
BDL– Below Detection Limits for all constituents
µg/L– micrograms per liter
mg/L– milligrams per liter

Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples (Cont'd)

Inorganic Analyses	Well Number											
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	Fresh Water Well
Mercury (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	NS	<0.001
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.001	<0.001	NS
Nickel (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.01	0.012	<0.01	0.015	<0.01	0.036	0.04	0.031	NS	NS	NS	<0.01
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.05	<0.05	NS
Selenium (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	NS	<0.001
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.005	<0.005	NS
Silver (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.001	<0.001	0.002	<0.001	<0.008	<0.001	<0.001	<0.001	NS	NS	NS	<0.001
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.01	<0.01	NS
Thallium (mg/L)												
august 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	0.008	0.012	0.008	0.008	0.001	0.012	0.013	0.014	NS	NS	NS	0.009
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.1	<0.1	NS
Zinc (mg/L)												
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.01	0.028	0.016	0.02	0.014	0.096	0.102	0.06	NS	NS	NS	0.449
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.05	<0.05	NS
EPA 310.1 Hydroxide (mg/L)												
August 10, 1992	0	0	0	0	0	0	NS	NS	NS	NS	NS	NS
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Note: Concentrations of constituents given or detection limit shown.
NS – No sample taken on this date for analysis of the indicated parameter..
BDL– Below Detection Limits for all constituents
µg/L– micrograms per liter
mg/L– milligrams per liter

Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples (Cont'd)

Inorganic Analyses	Well Number											
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	Fresh Water Well
EPA 310.1 Carbonate (mg/L)												
August 10, 1992	0	0	0	0	0	0	NS	NS	NS	NS	NS	NS
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 310.1 Bicarbonate (mg/L)												
August 10, 1992	383	287	315	361	305	NS	NS	NS	NS	NS	NS	216
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 200.7 Calcium (mg/L)												
August 10, 1992	133	171	149	138	91.8	NS	NS	NS	NS	NS	NS	366
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 325.3 Chloride (mg/L)												
August 10, 1992	163	122	19.2	26	91	NS	NS	NS	NS	NS	NS	621
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 340.2 Fluoride (mg/L)												
August 10, 1992	1.18	0.93	1.08	1.06	0.95	NS	NS	NS	NS	NS	NS	0.83
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SM 2340B Hardness (mg/L)												
August 10, 1992	494	629	553	518	330	NS	NS	NS	NS	NS	NS	1147
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 200.7 Magnesium (mg/L)												
August 10, 1992	39.7	49.1	44.2	42.0	24.4	NS	NS	NS	NS	NS	NS	56.4
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Note: Concentrations of constituents given or detection limit shown.
NS – No sample taken on this date for analysis of the indicated parameter..
BDL– Below Detection Limits for all constituents
µg/L– micrograms per liter
mg/L– milligrams per liter

Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples (Cont'd)

Inorganic Analyses	Well Number											
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	Fresh Water Well
EPA 353.2 Nitrate (mg/L)												
August 10, 1992	1.25	3.75	3.03	1.69	3.12	NS	NS	NS	NS	NS	NS	2.32
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 258.1 Potassium (mg/L)												
August 10, 1992	614	7.67	5.83	7.15	7.74	NS	NS	NS	NS	NS	NS	4.70
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 200.7 Sodium (mg/L)												
August 10, 1992	112	90.0	93.5	116	116	NS	NS	NS	NS	NS	NS	101
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 375.2 Sulfate (mg/L)												
August 10, 1992	158	174	2.09	183	180	NS	NS	NS	NS	NS	NS	251
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Note: Concentrations of constituents given or detection limit shown.
NS – No sample taken on this date for analysis of the indicated parameter..
BDL– Below Detection Limits for all constituents
µg/L– micrograms per liter
mg/L– milligrams per liter

Cumulative Summary of Selected Organic Laboratory Analyses for Groundwater Samples

Organic Analyses	Well Number										
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-10	MW-11	Fresh Water Well
EPA Method 8020/602 (mg/L)											
Benzene											
August 10, 1992	5.55	0.0149	0.3049	2.594	<0.004	NS	NS	NS	NS	NS	<0.004
February 9, 1993	2.10	<0.002	0.13	5.20	<0.002	7.00	<0.002	<0.002	NS	NS	0.077
August 19, 1993	3.20	0.001	0.56	3.00	<0.002	8.10	<0.002	<0.002	0.19	<0.002	NS
1,2-Dichlorobenzene											
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	0.42	<0.004	<0.02	<0.40	<0.004	<0.40	<0.004	<0.004	NS	NS	<0.004
August 19, 1993	<0.40	<0.004	<0.10	<4.00	<0.004	<8.00	<0.004	<0.004	<0.40	<0.004	NS
1,4-Dichlorobenzene											
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	0.58	<0.003	<0.015	0.57	<0.003	0.31	<0.003	<0.003	NS	NS	<0.003
August 19, 1993	<0.30	<0.003	<0.08	<3.00	<0.003	<6.00	<0.003	<0.003	<0.30	<0.003	NS
Ethyl benzene											
August 10, 1992	2.16	<0.004	0.676	2.16	<0.004	NS	NS	NS	NS	NS	NS
February 9, 1993	1.30	<0.002	<0.01	2.20	<0.002	3.10	<0.002	<0.002	NS	NS	<0.002
August 19, 1993	1.20	0.003	0.63	<2.00	<0.002	<3.50	<0.002	<0.002	<0.20	<0.002	NS
Toluene											
August 10, 1992	12.09	<0.004	2.099	10.36	<0.004	NS	NS	NS	NS	NS	<0.004
February 9, 1993	6.50	<0.002	<0.01	15.00	<0.002	19.0	<0.002	<0.002	NS	NS	0.01
August 19, 1993	7.30	0.012	3.10	12.00	<0.002	19.00	0.003	<0.002	0.46	<0.002	NS

Note: Concentrations of constituents given or detection limit shown.
NS – No sample taken on this date for analysis of the indicated parameter..
BDL– Below Detection Limits for all constituents
µg/L– micrograms per liter
mg/L– milligrams per liter

Cumulative Summary of Selected Organic Laboratory Analyses for Groundwater Samples (Cont'd)

Organic Analyses	Well Number										
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-10	MW-11	Fresh Water Well
Xylenes											
August 10, 1992	7.37	<0.004	1.586	6.74	<0.004	NS	NS	NS	NS	NS	<0.004
February 9, 1993	7.40	<0.006	0.19	10.00	<0.006	7.20	<0.006	<0.006	NS	NS	0.073
August 19, 1993	3.70	0.013	1.90	7.00	<0.002	6.40	<0.002	<0.002	0.24	<0.002	NS
EPA Method 601 (mg/L)											
1,2-Dichloroethane											
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.003	<0.003	<0.003	0.048	<0.003	0.0113	<0.003	<0.003	NS	NS	<0.003
August 19, 1993											
1,1-Dichloroethane											
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NS	NS	<0.001
August 19, 1993											
EPA Method 8100/610											
Polynuclear Aromatics (µg/L)											
August 10, 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NS	NS	BDL
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
August 19, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

**Laboratory analyses indicated acenaphthene at 0.018 mg/L, benzo(a)anthracene at 0.005 mg/L, and fluorene at 0.018 mg/L.*

Note: Concentrations of constituents given or detection limit shown.
NS – No sample taken on this date for analysis of the indicated parameter..
BDL– Below Detection Limits for all constituents
µg/L– micrograms per liter
mg/L– milligrams per liter

BROWN AND CALDWELL

ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION

THE WESTERN COMPANY OF NORTH AMERICA

HOBBS, NEW MEXICO

BROWN AND CALDWELL

March 17, 1994

Ms. Kathy Brown
State of New Mexico
Energy, Minerals, and Natural Resources Dept.
Oil Conservation Division
Post Office Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

19-1151-10

Subject: The Western Company of North America
Hobbs, New Mexico Facility
January 1994 Monitoring Well Sampling Event

Dear Ms. Brown:

On January 26 and 27, 1994, Brown and Caldwell conducted a groundwater monitoring well sampling event at The Western Company of North America (Western) facility located in Hobbs, New Mexico. The sampling event was conducted to determine concentrations of dissolved-phase hydrocarbons in the groundwater at the facility. The following is a description of the activities conducted during this sampling event.

Prior to purging each monitoring well, the depth to groundwater was measured with an oil/water interface probe to the nearest 0.01 foot, and recorded. A cumulative table of groundwater elevation data is presented in Enclosure 1, Table 1. The groundwater elevation data was used to calculate well purge volumes as well as to estimate groundwater gradient and flow direction. The groundwater flow direction at the facility continues to be generally to the east. Typical groundwater elevation is approximately 0.2 to 0.4 feet lower than measured in August 1993. Based on the current measurements, groundwater gradient is estimated to be <0.01 feet per foot. A groundwater gradient and flow direction map is presented as Figure 1, Enclosure 1.

During the depth to groundwater measurement activities, the oil/water interface probe indicated that a layer of phase-separated hydrocarbons (PSHs), approximately 0.3 feet in thickness, was present in monitoring well MW-4.

After depth to groundwater measurements were taken, each monitoring well except MW-4, and the fresh water well, was purged. Monitoring well purging was accomplished using a 2-inch-diameter submersible pump in all except monitoring well MW-10. MW-10 was purged

1415 Louisiana, Suite 2500, Houston, TX 77002 (713) 759-0999 Fax (713) 759-0952

with a stainless steel bailer. During the purging of each monitoring well, measurements were made of the pH, temperature, and specific conductivity of the purged groundwater. These measurements were taken at approximately one-half well volume intervals. Two consecutive measurements within five percent (for each of the three parameters) was used to indicate that groundwater parameters had stabilized. The parameters in each monitoring well typically stabilized when approximately two well volumes had been removed; however, at least three well volumes were removed from these monitoring wells. The fresh water well was purged by allowing the well pump to remove water and discharge into the associated water storage tank. Approximately 3,100 gallons were removed during purging of the fresh water well.

After purging activities were completed, each monitoring well was allowed to recover to near static water level and a groundwater sample was obtained. Monitoring well MW-4 was not sampled because of PSHs present in the well. The fresh water well was sampled the day following purging activities.

Groundwater samples were obtained by lowering a stainless steel sampling bailer into the well. The fresh water well sample was obtained directly from a tap located at the wellhead. Samples were placed in laboratory-cleaned glass sample containers and sealed with Teflon-lined lids. The groundwater samples were labelled, placed on ice, and taken by Brown and Caldwell personnel to Inchcape Testing\NDRC Laboratories in Richardson, Texas using chain-of-custody procedures.

Purging and sampling equipment used by Brown and Caldwell was cleaned prior to each use by washing with a laboratory grade detergent, rinsing with tap water, and then rinsing with distilled water. Purged water and excess water generated by equipment cleaning operations was placed in the on-site waste collection system for treatment and disposal by Western.

Groundwater samples collected during this sampling event were analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) by EPA Method 8020.

Total concentrations of BTEX constituents above the laboratory detection limit were reported in the groundwater samples obtained from each monitoring well except MW-8, MW-11, and the fresh water well. Total benzene concentrations ranged from 1.1 micrograms per liter (μg/L) in MW-7 to 7,960 μg/L in MW-6. Total BTEX concentrations ranged from 1.1 ug/L in MW-7 to 38,140 μg/L in MW-6. Concentrations of benzene and/or other BTEX constituents were detected in monitoring wells MW-2, MW-5, and MW-7, however the concentrations detected were below the limits for groundwater established by the New Mexico Water Quality Control Commission (WQCC), published in the State of New Mexico-Energy, Minerals, and Natural Resources Department, Oil Conservation Division's "Environmental Regulations". A cumulative summary of BTEX analytical results for groundwater samples is included as Table 2, Enclosure 1. The laboratory analytical reports and chain of custody

record are included as Enclosure 2.

If you have any questions regarding the information contained in this letter report, please call me at (713) 759-0999.

Very truly yours,

BROWN AND CALDWELL

Jackie (Jack) Cooper, Jr.
Project Geologist

Robert Jennings, P.E.
Project Manager

JLC/RNJ:
Enclosures (2)

cc: Mr. Phillip Box, The Western Company of North America

JANUARY 1994 MONITORING WELL SAMPLING EVENT

THE WESTERN COMPANY OF NORTH AMERICA

HOBBS, NEW MEXICO FACILITY

ENCLOSURE 1

Table 1 Cumulative Groundwater Elevation Data
The Western Company of North America
Hobbs, New Mexico Facility

Well Number and Measurement Date	Top of Casing Elevation (relative)	Depth of Water from Top of Casing (feet)	Groundwater Elevation (relative)
MW-1			
August 10, 1992	101.44	53.22	48.22
February 9, 1993	101.44	53.03	48.41
August 18, 1993	101.44	53.10	48.34
January 26, 1994	101.44	53.31	48.13
MW-2[a]			
August 10, 1992	101.50	52.82	48.68
February 9, 1993	98.75	49.60	49.15
August 18, 1993	98.75	49.71	49.04
January 26, 1994	98.75	49.97	48.78
MW-3			
August 10, 1992	101.44	52.99	48.45
February 9, 1993	101.44	52.72	48.72
August 18,1993	101.44	52.82	48.62
January 26, 1994	101.44	53.05	48.39
MW-4			
August 10, 1992	99.33	50.55	48.78
February 9, 1993	99.33	50.26	49.07
August 18, 1993	99.33	50.38	48.95
January 26,1994	99.33	50.90[b]	48.67[b]
MW-5			
August 10, 1992	101.85	52.38	49.47
February 9, 1993	101.85	52.06	49.79
August 18, 1993	101.85	52.16	49.69
January 26, 1994	101.85	52.50	49.35
MW-6			
August 10, 1992	NM	NM	NM
February 9, 1993	99.25	50.58	48.67
August 18, 1993	99.25	50.78	48.47
January 26, 1994	99.25	51.00	48.25
MW-7			
August 10, 1992	NM	NM	NM
February 9, 1993	98.96	50.53	48.43
August 18, 1993	98.96	50.74	48.22
January 26, 1994	98.96	51.01	47.95

[a] Because the above grade completion on MW-2 was damaged,by on-site truck traffic, it was recompleted as a flush-mount grade box. Brown and Caldwell resurveyed the top of casing elevation at 98.75

[b] A layer of PSHs approximately 0.3 feet in thickness was measured in MW-4. The depth to groundwater measuement shown in this table is actual measurement taken. However, the groundwater elevation has been adjusted by multiplying the PSH thickness by 0.8 and subtracting from the depth to water. This adjustment gives an approximation of the groundwater elevation if a PSH was not present.

[c] MW-9 was water levels were taken at installation in April 1993 and during split-sampling in July 1993, in additon to regularly scheduled measurement and sampling dates.

Table 1 (Cont'd) Cumulative Groundwater Elevation Data
The Western Company of North America
Hobbs, New Mexico

Well Number and Measurement Date	Top of Casing Elevation (relative)	Depth of Water from Top of Casing (feet)	Groundwater Elevation (relative)
MW-8			
August 10, 1992	NM	NM	NM
February 9, 1993	99.12	50.48	48.64
August 18, 1993	99.12	50.67	48.45
January 26, 1994	99.12	50.96	48.16
MW-9[b]			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
April 22, 1993	99.18	49.73	49.45
July 15, 1993	99.18	49.65	49.53
August 18, 1993	99.18	49.85	49.33
January 26, 1994	99.18	50.02	49.16
MW-10			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
August 18, 1993	98.90	51.54	47.36
January 26, 1994	98.90	51.90	47.00
MW-11			
August 10, 1992	NM	NM	NM
February 9, 1993	NM	NM	NM
August 18, 1993	98.82	51.92	46.90
January 26, 1994	98.92	52.32	46.60

[a] Because the above grade completion on MW-2 was damaged,by on-site truck traffic, it was recompleted as a flush-mount grade box. Brown and Caldwell resurveyed the top of casing elevation at 98.75

[b] A layer of PSHs approximately 0.3 feet in thickness was measured in MW-4. The depth to groundwater measuement shown in this table is actual measurement taken. However, the groundwater elevation has been adjusted by multiplying the PSH thickness by 0.8 and subtracting from the depth to water. This adjustment gives an approximation of the groundwater elevation if a PSH was not present.

[c] MW-9 was water levels were taken at installation in April 1993 and during split-sampling in July 1993, in additon to regularly scheduled measurement and sampling dates.

N

0 20 40

SCALE: 1" = 40'

HOMCO PROPERTY

49.25
49.00
48.75
48.50
48.25
48.00
48.00
48.25
48.00
47.75
47.50
47.25
47.00
46.75
46.50

FENCE LINE

PRESSURE TESTING TANKS (EMPTY)

FIELD WASTE TANKS

MW-9
49.16

MW-4
48.67

MW-5
49.35

MW-1
48.13

MW-6
48.25

MW-10
47.00

MW-11
46.50

FUEL ISLAND

MW-3
48.39

MW-2
48.78

FRESH WATER WELL

ACID DOCK

BULK PLANT

APPROXIMATE GROUNDWATER FLOW DIRECTION

GW

MW-7
47.95

MW-8
48.16

OFFICE

TRUCK BAYS

SERVICE TRUCK PARKING AREA

BROWN AND CALDWELL
Dallas — Houston, Texas

SUBMITTED: LYNN M. WRIGHT (PROJECT MANAGER) DATE:
APPROVED: ROBERT JENNINGS, P.E. (BROWN AND CALDWELL) DATE:
APPROVED: DATE:

LINE IS 1 INCH AT FULL SIZE (IF NOT 1"-SCALE ACCORDINGLY)

FILE T:\1151.10\SITE
DRAWN DHD
DESIGNED JLC
CHECKED LMW
CHECKED

LEGEND

MW-8 MONITORING WELL LOCATION AND IDENTIFICATION

APPROXIMATE GROUNDWATER ELEVATION CONTOUR LINE

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		REVISIONS			

THE WESTERN COMPANY OF NORTH AMERICA

NOTE: THE GROUNDWATER CONTOUR LINES ARE APPROXIMATE; BASED ON CURRENT APPROXIMATE GROUNDWATER ELEVATION DATA.

GROUNDWATER FLOW DIRECTION AND GRADIENT MAP JANUARY 26, 1993

HOBBS, NEW MEXICO

DATE 2/14/94
DRAWING NUMBER 1151.10
FIGURE NUMBER 1

Table 2 Cumulative Results of BTEX Analysis for Groundwater Samples
The Western Company of North America
Hobbs, New Mexico Facility

MONITORING WELL	SAMPLING DATE	PARAMETER (µg/L)			
		Benzene	Ethylbenzene	Toluene	Xylenes
MW-1	8/10/92	5,550	2,160	12,090	7,370
	2/9/93	2,100	1,300	6,500	7,400
	8/19/93	3,200	1,200	7,300	3,700
	1/27/94	1,930	672	4,580	2,390
MW-2	8/10/93	14.9	<4.0	<4.0	<4.0
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/19/93	100	3.0	12.0	13.0
	1/27/94	<1.0	2.0	1.2	2.5
MW-3	8/10/93	304.9	6,760	2,099	1,586
	2/9/93	130	<10.0	<10.0	190
	8/19/93	560	630	3,100	1,900
	1/27/94	1,070	510	5,380	3,120
MW-4	8/10/93	2,594	2,160	10,360	6,740
	2/9/93	5,200	2,200	15,000	10,000
	8/19/93	3,000	<2,000	12,000	7,000
	1/27/94	NS[a]	NS[a]	NS[a]	NS[a]
MW-5	8/10/93	<4.0	<4.0	<4.0	<4.0
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/10/93	<2.0	<2.0	<2.0	<2.0
	1/27/94	8.7	4.0	29.9	11.3
MW-6	8/10/92	NS	NS	NS	NS
	2/9/93	7,000	3,100	19,000	7,200
	8/19/93	8,100	3,500	19,000	6,400
	1/27/94	7,960	3,830	20,200	6,150
MW-7	8/10/92	NS	NS	NS	NS
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/19/93	<2.0	<2.0	3.0	<2.0
	1/27/94	1.1	<1.0	<1.0	<1.0
MW-8	8/10/92	NS	NS	NS	NS
	2/9/93	<2.0	<2.0	<2.0	<6.0
	8/19/93	<2.0	<2.0	<2.0	<2.0
	1/27/94	<1.0	<1.0	<1.0	<1.0
MW-9[b]	8/10/92	NS	NS	NS	NS
	2/9/93	NS	NS	NS	NS
	4/22/93	570	<50.0	380	870
	7/15/93	121	3.0	7.3	458
	8/19/93	390	40.0	290	250
	1/27/94	327	51.1	357	293

NS = Not sampled on this date.

[a] MW-4 was not sampled due to the presence of PSHs in the well.

[b] MW-9 was sampled upon installation in April 1993 and during split-sampling in July 1993, as well as during other regular sampling events.

Table 2 (Cont'd) Cumulative Results of BTEX Analysis for Groundwater Samples
The Western Company of North America
Hobbs, New Mexico

MONITORING WELL	SAMPLING DATE	PARAMETER (ug/L)			
		Benzene	Ethylbenzene	Toluene	Xylenes
MW-10	8/10/92	NS	NS	NS	NS
	2/9/93	NS	NS	NS	NS
	8/19/93	190	<200	460	240
	1/27/94	13.4	5.5	4.0	33.6
MW-11	8/10/92	NS	NS	NS	NS
	2/9/93	NS	NS	NS	NS
	8/19/93	<2.0	<2.0	<2.0	<2.0
	1/27/94	<1.0	<1.0	<1.0	<1.0
Fresh Water Well	8/10/92	<4.0	<4.0	<4.0	<4.0
	2/9/93	77.0	<2.0	10.0	73.0
	8/19/93	NS	NS	NS	NS
	1/27/94	<1.0	<1.0	<1.0	<1.0

NS = Not sampled on this date.

[a] MW-4 was not sampled due to the presence of PSHs in the well.

[b] MW-9 was sampled upon installation in April 1993 and during split-sampling in July 1993, as well as during other regular sampling events.

ENCLOSURE 2

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-9
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-1
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 25
METHOD FACTOR : 1
QC BATCH NO : 32-020194A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	25 µg/L	1930 µg/L
Toluene	25 µg/L	4580 µg/L
Ethyl benzene	25 µg/L	672 µg/L
Xylenes	25 µg/L	2390 µg/L
BTEX (total)		9570 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	98.8 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffs
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-6
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-2
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	1.2 µg/L
Ethyl benzene	1.0 µg/L	2.0 µg/L
Xylenes	1.0 µg/L	2.5 µg/L
BTEX (total)		5.7 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	115 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus dm

Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-258-5591
Fax. 214-258-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-7
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-3
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 25
METHOD FACTOR : 1
QC BATCH NO : 32-020194A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	25 µg/L	1070 µg/L
Toluene	25 µg/L	5380 µg/L
Ethyl benzene	25 µg/L	510 µg/L
Xylenes	25 µg/L	3120 µg/L
BTEX (total)		10100 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	102 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-2
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-5
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	8.7 µg/L
Toluene	1.0 µg/L	29.9 µg/L
Ethyl benzene	1.0 µg/L	4.0 µg/L
Xylenes	1.0 µg/L	11.3 µg/L
BTEX (total)		53.9 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	107 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus

Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-12
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-6
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 50
METHOD FACTOR : 1
QC BATCH NO : 32-020194A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	50 µg/L	7960 µg/L
Toluene	50 µg/L	20200 µg/L
Ethyl benzene	50 µg/L	3830 µg/L
Xylenes	50 µg/L	6150 µg/L
BTEX (total)		38100 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	88.3 %

 # Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-258-5591
Fax. 214-258-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-5
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-7
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	1.1 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		1.1 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	111 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus dm

Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-258-5591
Fax. 214-258-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-3
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-8
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		< 1.0 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	104 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus dm

Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-11
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-9
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	327 µg/L
Toluene	1.0 µg/L	357 µg/L
Ethyl benzene	1.0 µg/L	51.1 µg/L
Xylenes	1.0 µg/L	293 µg/L
BTEX (total)		1030 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	78.4 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus dm

Martin Jeffus
General Manager

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DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-8
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-10
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	13.4 µg/L
Toluene	1.0 µg/L	4.0 µg/L
Ethyl benzene	1.0 µg/L	5.5 µg/L
Xylenes	1.0 µg/L	33.6 µg/L
BTEX (total)		56.5 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	111 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus dm
Martin Jeffus
General Manager

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DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-4
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : MW-11
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		< 1.0 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	106 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus III
Martin Jeffus
General Manager

Inchcape Testing Services
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DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-13
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : FW-1
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		1.6 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	111 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus

Martin Jeffus
General Manager

Inchcape Testing Services
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DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-10
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : ER-1
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		< 1.0 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	115 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus

Martin Jeffus
General Manager

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DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1063-1
REPORT DATE : 7-FEB-1994

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 1415 Louisiana, Ste. 2500
: Houston, TX 77002
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Liquid
ID MARKS : TB-1
PROJECT : 1151-24 Hobbs
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		< 1.0 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	107 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus dm

Martin Jeffus
General Manager

CHAIN OF CUSTODY RECORD

NDRC LABORATORIES, INC. 1089 East Collins Blvd., Richardson, TX 75081 (214) 238-5592

Submitted by Brown	Bill to
Name: [redacted] CALDWELL	Name: SAMG
Address: 1415 LOUISIANA, STE. 2500 HOUSTON, TX 77002	Address:
Contact: JACK COOPER	Contact:
Phone: (713) 759-0999	Phone:
Fax: (713) 759-0952	Fax: ✓
	PO/SO #:

Lab use only
Due Date: DUE 2/8/94

RCRA ☑
NPDES ☐

Used 66 mg
Section / Date

BTEX by 8020

Lab. Sample ID

Proj. No.	Project Name	No. of Containers
1151-24	HOBBS	

Matrix	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	Lab. Sample ID
W	1-29-94	1120		X	TB-1	2				1063-1
		1125/1130			MW-5					2
		1140/1145			MW-8					3
		1155/1200			MW-11					4
		1240/1245			MW-7					5
		1255/1300			MW-2					6
		1310/1315			MW-3					7
		1325/1330			MW-10					8
		1340/1345			MW-1					9
		1355/1400			ER-1					10
		1416/1420			MW-9					11
		1425/1430			MW-6					12
					FW-1					13

ORIGINAL

Turn around time ☐ 100% ☐ 50% ☒ Standard Other: _____ Temperature °C: 4°C

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	1-29-94	12:45p	[signature]	1/29/94	12:45PM
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks
Price per quote from Western Co. of North America projects

By submitting these samples, you agree to the terms and conditions contained in NDRC's Price Schedule.

[redacted] Matrix [redacted] Water [redacted] - Soil [redacted] O - S[redacted] L - [redacted] A[redacted]ag [redacted] Charc[redacted] [redacted] - Slud[redacted] O - Oi[redacted]
Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or oth[redacted]

NDRC cannot accept v[redacted] changes. Please [redacted] writt[redacted] ange[redacted]
214-238-5592