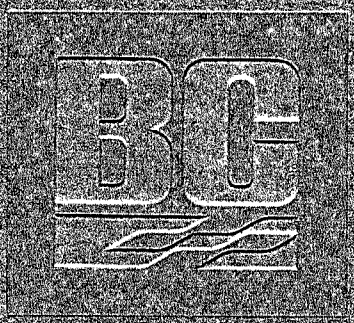
GW - 72

REPORTS

YEAR(S):

1993-1991

Brown and Caldwell
Consultants



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

April 27, 1993

Brown and Caldwell
Consultants

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CHAPTER 1

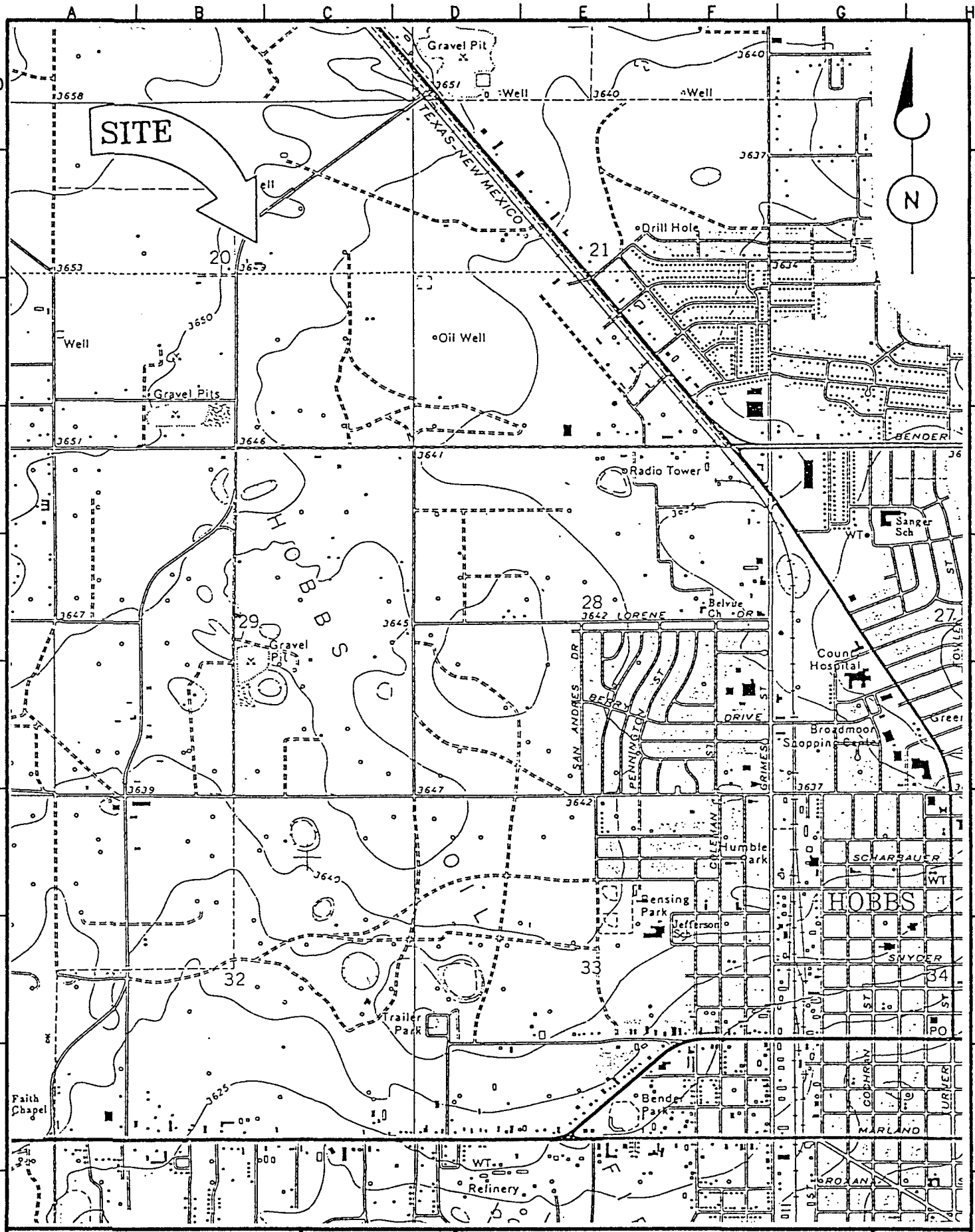
INTRODUCTION

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

The Hobbs facility is a truck operation and maintenance center for Western's oil field service business. The facility is located north of Hobbs at 2708 West County Road (Figure 1-1). 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., Ninth Floor Houston, Texas 77027
Owner's Representative:	Mr. Phillip Box, Manager Real Estate and EPA 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:	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 1-2). 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 dispenser pumps through underground fuel lines. The underground fuel lines are buried two to three feet below ground surface.



Brown and Caldwell Consultants, DALLAS–HOUSTON, TEXAS	0 1000 2000 SCALE: 1" = 2000'	TITLE: VICINITY MAP	DATE: 04/12/93
		CLIENT: WCNA	PROJECT NUMBER: 7445–03
	DRAWN BY: JDN DATE 10/6 CHK'D BY: JLC DATE 10/6 APPROVED: SAM DATE	SITE LOCATION: HOBBS, NEW MEXICO	FIGURE NUMBER: 1–1

REV.	DESCRIPTION	BY	DATE

HOMCO PROPERTY

WEST COUNTY ROAD

N

FUEL ISLAND

FRESH WATER WELL

ACID DOCK

BULK PLANT

OFFICE

TRUCK BAYS

E:\7445\7445-03

Brown and Caldwell Consultants
DALLAS–HOUSTON, TEXAS

APPROVED: _____ DATE _____
PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

REV.	DESCRIPTION	BY	DATE

0 20 40
SCALE: 1" = 40'

DRAWN BY: JDN DATE 3/9
CHK'D BY: JLC DATE 3/9
APPROVED: LMW DATE 3/9

TITLE: SITE MAP

DATE: 04/21/93

CLIENT: WESTERN COMPANY OF NORTH AMERICA

PROJECT NUMBER: 7445–03

SITE LOCATION: HOBBS, NEW MEXICO

FIGURE NUMBER: 1–2

CHAPTER 2

CHRONOLOGY OF EVENTS

On February 3 through February 9, 1993, Brown and Caldwell Consultants (BCC) conducted a soil and groundwater investigation at The Western Company of North America (Western) facility in Hobbs, New Mexico (Hobbs facility). Table 2-1 presents a chronology of events associated with the Hobbs facility.

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

Date	Activity
February 7, 1991	New Mexico Oil Conservation Division (OCD) conducts on-site inspection, including sampling of 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 OCD.
November 15, 1991	OCD approves technical work plan.
December 16, 1991	RSA samples fresh water well. Results submitted to OCD.
February 21, 1992	Western samples fresh water well. Results submitted to OCD.
July 29-August 10, 1992	BCC conducts soil and groundwater investigation according to approved technical work plan.
December 2, 1992	Additional soil and groundwater investigations requested by OCD.
February 3 - 9, 1993	BCC conducts additional soil and groundwater investigations in accordance with the OCD letter dated December 2, 1993.

3

CHAPTER 3

TEXT

Background Information

On October 12, 1992 Brown and Caldwell Consultants submitted a Soil and Groundwater Investigation Report to the New Mexico Oil Conservation Division (OCD). The report described that the soil and groundwater at the Western Company of North America (Western) facility in Hobbs, New Mexico (Hobbs facility) had been affected by hydrocarbons. On December 2, 1992, the OCD requested that additional soil and groundwater investigations be conducted to determine the vertical and horizontal extent of affected soil and groundwater at the Hobbs facility. Relevant regulatory correspondence for the Hobbs facility is presented in Appendix A.

Soil Investigation

On February 3 through February 6, 1993, Brown and Caldwell Consultants (BCC) completed 3 hollow stem auger drilled soil borings. The following is a description of the completion, sampling, and laboratory results of the soil borings at the Hobbs facility.

Soil Boring, Drilling, and Sampling

From February 3 through February 6, 1993, BCC completed three soil borings. The locations of the borings were requested in the OCD letter dated December 2, 1992. Four soil borings were scheduled to be drilled; however, the one requested boring located on an adjacent property could not be drilled because off-site access had not been granted at that time. Each soil boring was drilled and continuously sampled to a depth of approximately 52 feet. The 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 in sample intervals where a surface caliche layer, a deep heavy gravel layer, or sandstone layers were encountered. Instead, BCC collected an additional sample of drill cuttings form these intervals for the purposes of field screening. The locations of the borings are presented on Figure 3-1. Borehole logs prepared for each location are presented in Appendix B.

One sample from each boring was selected for laboratory analysis. In each boring the sample with the highest flame ionization detector (FID) or photoionization detector (PID) reading was selected for analysis. 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 and the lid secured over the foil. Organic vapors were allowed to develop for approximately five minutes. During this period, the sample was shaken vigorously for approximately one minute then the aluminum foil was then pierced with the FID/PID probe and an

HOMCO PROPERTY

WEST COUNTY ROAD

ACID DOCK

BULK PLANT

FUEL ISLAND

FRESH WATER WELL

MW-1

MW-2

MW-3

MW-4

MW-5

SB-10

SB-10	
DEPTH	50-52
B	<2.0 ppb
T	<2.0 ppb
E	<2.0 ppb
X	10.0 ppb
TPH	<10.0 ppm

SB-11

SB-11	
DEPTH	28-30
B	<2.0 ppb
T	<2.0 ppb
E	25.0 ppb
X	260 ppb
TPH	297 ppm

SB-12

SB-12	
DEPTH	49-51
B	<2.0 ppb
T	<2.0 ppb
E	<2.0 ppb
X	<2.0 ppb
TPH	<10.0 ppm

OFFICE

TRUCK BAYS

LEGEND

Depth = Depth of sample in feet below surface
B = Benzene in micrograms per kilogram (parts per billion)
T = Toluene in micrograms per kilogram (parts per billion)
E = Ethyl Benzene in micrograms per kilogram (parts per billion)
X = Xylene in micrograms per kilogram (parts per billion)
TPH = Total Petroleum Hydrocarbons in milligrams per kilogram (parts per million)

MW-1 – Groundwater Monitoring Wells

SB-12 – Soil Borings

Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

APPROVED: _____ DATE _____
PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

REV.	DESCRIPTION	BY	DATE

0 20 40
SCALE: 1" = 40'

DRAWN BY: JDN DATE 3/9
CHK'D BY: JLC DATE 3/9
APPROVED: LMW DATE 3/9

TITLE: AFFECTED SOIL MAP
DATE: 04/21/93
CLIENT: WESTERN COMPANY OF NORTH AMERICA
PROJECT NUMBER: 7445-03
SITE LOCATION: HOBBS, NEW MEXICO
FIGURE NUMBER: 3-1

organic vapor reading was taken. Organic vapor readings are presented on the boring logs in Appendix B. At the conclusion of the sampling, the cooled samples were shipped via over night delivery to NDRC Laboratories in Houston, Texas using proper chain-of-custody procedures. Upon receipt by the laboratory, the samples were logged in and assigned the log numbers shown on the analytical reports presented in Appendix C.

Prior to drilling at the site and between each boring, the pilot bit and all other downhole equipment was cleaned to prevent cross-contamination between borings. The equipment used by BCC personnel for soil sampling at the site 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.

All 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.

Soil Boring Sample Analysis

All soil samples selected for laboratory analysis were analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) EPA Method 8020, and Total Petroleum Hydrocarbons (Diesel Fraction) EPA Modified 8015. The two soil samples that had FID/PID readings were also submitted for Toxicity Characteristic Leaching Procedure (TCLP) analysis for volatile organics (EPA Method 8240), extractable organics (EPA Method 8270) and metals. A soil sample from SB-12 was not submitted for TCLP analyses because no FID/PID readings were detected. 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.

The analytical results of the soil samples selected for laboratory analysis indicate that total benzene and total toluene are below the detection limit of 2.0 parts per billion (ppb). Total ethyl benzene concentrations ranged from <2.0 ppb in SB-10 and SB-12 to 25.0 ppb in SB-11 at a depth of 28 to 30 feet. Total xylene concentrations ranged from <2.0 ppb in SB-12 to 260 ppb in SB-11 at a depth of 28 to 30 feet. Total BTEX concentrations varied from <2.0 ppb in SB-12 to 285 ppb in SB-11. TPH concentrations ranged from <10 ppm in SB-10 and SB-12 to 297 ppm in SB-11 at a depth of 28 to 30 feet.

TCLP analysis indicated that concentrations of all volatile and extractable organics were below detection limits in the soil samples from SB-10 and SB-11. TCLP analysis for metals by ICP metals scan indicated barium concentrations of 1.1 ppm in SB-10 and 1.3 ppm in SB-11. Lead concentrations ranged from 0.03 in SB-10 to 0.05 ppm in SB-11. All other metals were below detection limits.

Table 3-1 Summary of Selected Laboratory Analyses for Soil Samples
The Western Company of North America
Hobbs, New Mexico Facility (February 1993)

Laboratory Analyses	Soil Boring Sample		
	SB-10 (50 to 52 feet)	SB-11 (28 to 30 feet)	SB-12 (49 to 51 feet)
EPA 8020 (ug/Kg) Benzene	<2.0	<2.0	<2.0
EPA 8020 (ug/Kg) Toluene	<2.0	<2.0	<2.0
EPA 8020 (ug/Kg) Ethyl benzene	<2.0	25.0	<2.0
EPA 8020 (ug/Kg) Xylenes	10.0	260	<2.0
Total BTEX	10.0	285	<2.0
EPA Modified 8015 (mg/Kg) TPH (Diesel fraction)	<10.0	297	<10.0
EPA 8240 (ug/Kg) TCLP Volatile Organics	BDL	BDL	NA
EPA 8270 (ug/Kg) TCLP Extractable Organics	BDL	BDL	NA
EPA 6010 or EPA 7470 (mg/Kg) TCLP Metals			
Silver	<0.01	<0.01	NA
Arsenic	<0.2	<0.2	NA
Barium	1.1	1.3	NA
Cadmium	<0.01	<0.01	NA
Chromium	<0.05	<0.05	NA
Mercury	<0.001	<0.001	NA
Lead	0.03	0.05	NA
Selenium	<0.2	<0.2	NA

mg/Kg = milligrams per kilogram = parts per million
ug/Kg = micrograms per kilogram = parts per billion
BDL = below detection limits for all constituents
NA = not analyzed for the indicated parameter(s)

Groundwater Investigation

On February 3 through February 6, 1993, BCC installed groundwater monitoring wells in the newly drilled soil borings. On February 8 and 9, BCC developed, purged, and sampled the three newly installed groundwater monitoring wells and the five existing groundwater monitoring wells. The on-site fresh water well was also evacuated and sampled. The following paragraphs are 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 five existing groundwater monitoring wells and the fresh water well.

Monitoring Well Installation

Each well 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 50 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 slowly poured down the borehole to provide a filter pack. The filter pack extends approximately two feet above the top of the screened interval and this depth was verified by measurement. Approximately two feet of bentonite pellets were poured down the borehole immediately above the filter pack and hydrated to form an annular seal. 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-6, MW-7, and MW-8 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 three newly installed groundwater monitoring wells can be found on Figure 3-2.

The three newly installed groundwater monitoring wells were developed to remove fine sediments from the bottom of the well. Development was accomplished by using a clean stainless steel bailer and approximately three to four well volumes were evacuated from each well. The evacuated water was placed in the on-site field waste tanks.

HOMCO PROPERTY

WEST COUNTY ROAD

MW-5

MW-4

MW-1

MW-6

ACID DOCK

FUEL ISLAND

MW-3

FRESH WATER WELL

BULK PLANT

MW-2

MW-7

MW-8

OFFICE

TRUCK BAYS

N

LEGEND

MW-1 – Groundwater Monitoring Wells

E:\7445\7445-03A

Brown and Caldwell Consultants
DALLAS–HOUSTON, TEXAS

APPROVED: _____ PROJECT MANAGER DATE _____

APPROVED: _____ BROWN AND CALDWELL DATE _____

REV.	DESCRIPTION	BY	DATE

0 20 40

SCALE: 1" = 40'

DRAWN BY: JDN DATE 3/9

CHK'D BY: JLC DATE 3/9

APPROVED: LMW DATE 3/9

TITLE: GROUNDWATER MONITORING WELL LOCATION MAP

CLIENT: WESTERN COMPANY OF NORTH AMERICA

SITE LOCATION: HOBBS, NEW MEXICO

DATE: 04/21/93

PROJECT NUMBER: 7445–03

FIGURE NUMBER: 3–2

Monitoring Well Sampling

Groundwater samples for laboratory analysis were collected from both newly installed and existing groundwater monitoring wells on February 9, 1992. Prior to sample collection, a clean stainless steel bailer was used to purge each well. Water was removed until the Ph, temperature, and specific conductance stabilized (two consecutive readings) and at least three to four well volumes had been removed. 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 clean Teflon bailer into the well. All equipment used for bailing 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. The water samples were placed in labeled, laboratory cleaned bottles. These bottles were immediately placed on ice to prevent the loss of any volatile constituents. At the conclusion of sampling, the cooled samples were shipped via overnight express to NDRC Laboratories in Houston, Texas using proper chain-of-custody procedures.

The fresh water well was evacuated by allowing the pump to run for approximately five minutes. It is estimated that approximately 350 gallons (75 feet of water at 7-inch casing) of water was evacuated from the fresh water well. A groundwater sample was collected immediately after evacuating the fresh water well. This sample was collected via a faucet connected directly to the well housing. The water sample was placed in labelled, laboratory cleaned bottles. The preservation and shipping procedures listed above for the groundwater monitoring well water samples were used for the fresh water well sample.

Groundwater Sample Analysis

The nine groundwater samples were analyzed for semi-volatile organics using EPA Method 601, volatile organics using EPA Method 602 and ICP metals (See Table 3-2 and 3-3). A summary of the selected analytical results for the February 9, 1993 and August 10, 1992 of groundwater samples are presented in Table 3-2 and 3-3 and BTEX analysis may also be found on the Dissolved-Phase Concentration Map (Figure 3-3). The laboratory analytical results are presented in Appendix C.

The results of the groundwater samples analyzed by EPA Method 601 for semi-volatile organics indicated that 1, 2-Dichloroethane was present in MW-4 and MW-6. The concentrations ranged from 0.048 ppm in MW-4 to 0.0113 ppm in MW-6. 1,1-Dichloroethane was detected in MW-1 only, at a concentration of 0.008 ppm.

The results of the groundwater samples analyzed by EPA Method 602 for volatile organics indicted the presence of the following compounds: benzene, 1,2-

HOMCO PROPERTY

FRESH WATER WELL

WEST COUNTY ROAD

N

MW-5

MW-5	
B	<0.002
T	<0.002
E	<0.002
X	<0.006

MW-4

MW-4	
B	5.2
T	15.0
E	2.2
X	10.0

FUEL ISLAND

MW-2

MW-2	
B	<0.002
T	<0.002
E	<0.002
X	<0.006

MW-3

MW-3	
B	0.13
T	<0.01
E	<0.01
X	0.19

MW-1

MW-1	
B	2.1
T	6.5
E	1.3
X	7.4

WELL

WELL	
B	0.077
T	0.01
E	<0.002
X	0.073

MW-6

MW-6	
B	7.0
T	19.0
E	3.1
X	7.2

ACID DOCK

BULK PLANT

MW-7

MW-7	
B	<0.002
T	<0.002
E	<0.002
X	<0.006

MW-8

MW-8	
B	<0.002
T	<0.002
E	<0.002
X	<0.006

OFFICE

TRUCK BAYS

LEGEND

B = Benzene in milligrams per liter (parts per million)
T = Toluene in milligrams per liter (parts per million)
E = Ethyl Benzene in milligrams per liter (parts per million)
X = Xylene in milligrams per liter (parts per million)

MW-1 – Groundwater Monitoring Wells

Brown and Caldwell Consultants
DALLAS–HOUSTON, TEXAS

APPROVED: _____ PROJECT MANAGER DATE _____

APPROVED: _____ BROWN AND CALDWELL DATE _____

REV.	DESCRIPTION	BY	DATE

0 20 40
SCALE: 1" = 40'

DRAWN BY: JDN DATE 3/9
CHK'D BY: JLC DATE 3/9
APPROVED: LMW DATE 3/9

TITLE DISSOLVED–PHASE CONCENTRATION MAP – FEBRUARY 9, 1993

DATE 04/21/93

CLIENT WESTERN COMPANY OF NORTH AMERICA

PROJECT NUMBER 7445–03

SITE LOCATION HOBBS, NEW MEXICO

FIGURE NUMBER 3–3

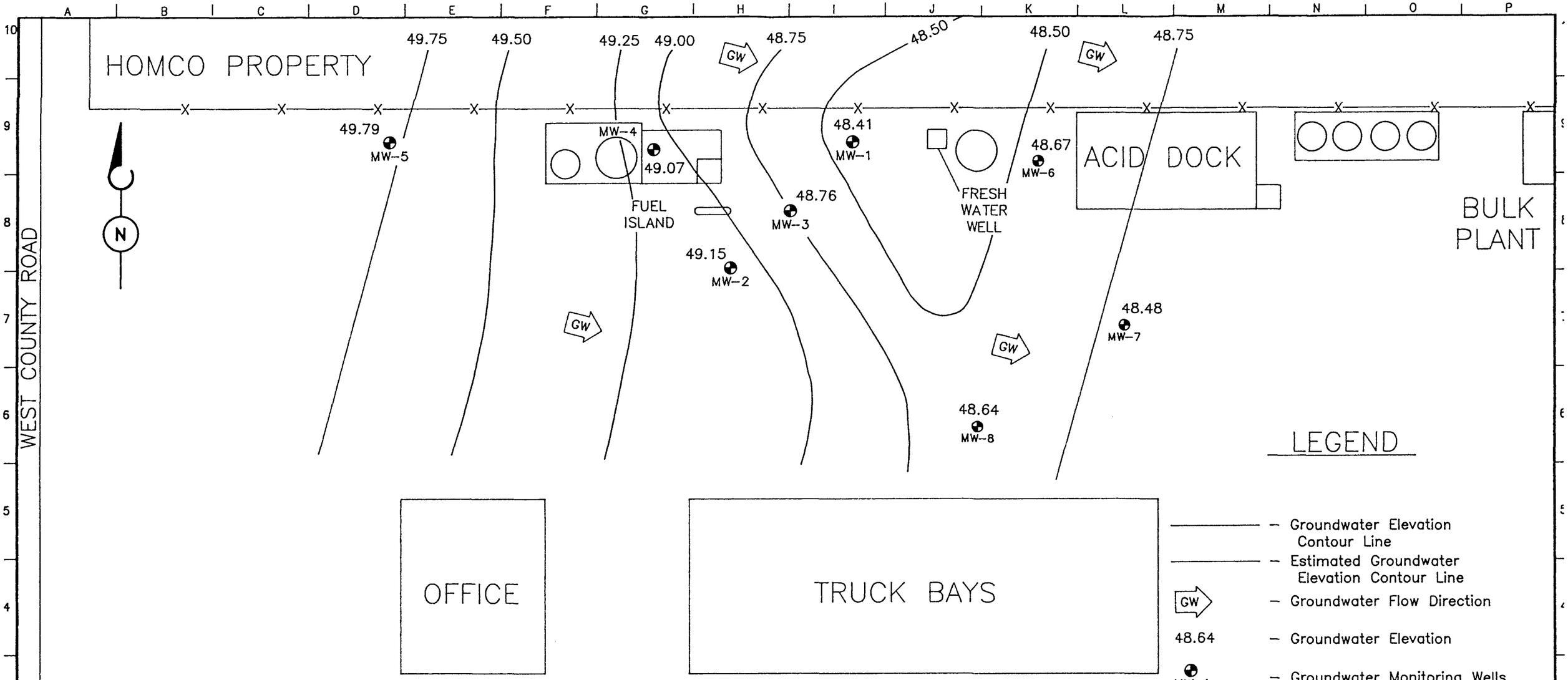
E:\7445\7445-03A

Dichlorobenzene, 1,4-Dichlorobenzene, ethyl benzene, toluene, and xylenes. Benzene concentrations ranged from 7.0 ppm in MW-6 to <0.002 ppm in MW-2, MW-5, MW-7, and MW-8. 1,2-Dichlorobenzene was detected in MW-1 at a concentration of 0.58 ppm. 1,2-Dichlorobenzene was detected in MW-1 at a concentration of 0.58 ppm. Ethyl benzene concentrations ranged from 3.1 ppm in MW-6 to <0.002 ppm in MW-2, MW-5, MW-7, MW-8, and the fresh water well. Toluene concentrations ranged from 19.0 ppm in MW-6 to <0.002 in MW-2, MW-5, MW-7, and MW-8. Xylene concentrations ranged from 10.0 ppm in MW-4 to <0.006 in MW-2, MW-5, MW-7, and MW-8.

The results of laboratory analyses for ICP metals indicated the presence of the following metals: antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, and zinc. None of the metals detected by laboratory analyses were above the groundwater standards set forth by the New Mexico Water Quality Control Commission published in the State of New Mexico-Energy, Minerals, and Natural Resources Department, Oil Conservation Division's "Environmental Regulations." These groundwater standards are included in Table 3-2 and 3-3 for those constituents for which a standard exists.

Determination of Groundwater Flow Direction and Gradient

On February 8, 1993, BCC recorded groundwater level measurements in each of the eight groundwater monitoring wells. To identify potential floating or sinking 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 survey elevation marked at the top of each well casing which were established by a survey conducted on August 10, 1992, by BCC. 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. Non-aqueous phase liquids were identified in MW-4 only, with a thickness of 0.01 feet. Groundwater elevation data for February 9, 1993 and August 10, 1992 is presented in Table 3-4. The groundwater flow direction at the site is to the east-northeast with a gradient of <0.01 feet per foot. Figure 3-4 presents the Groundwater Gradient Map for the Western Facility in Hobbs, New Mexico.



Brown and Caldwell Consultants
DALLAS–HOUSTON, TEXAS

APPROVED: _____ PROJECT MANAGER DATE _____

APPROVED: _____ BROWN AND CALDWELL DATE _____

REV.	DESCRIPTION	BY	DATE

0 20 40
SCALE: 1" = 40'

DRAWN BY: JDN DATE 3/9
CHK'D BY: JLC DATE 3/9
APPROVED: LMW DATE 3/9

TITLE: GROUNDWATER GRADIENT MAP FEBRUARY 8, 1993

CLIENT: WESTERN COMPANY OF NORTH AMERICA

SITE LOCATION: HOBBS, NEW MEXICO

DATE: 04/21/93

PROJECT NUMBER: 7445-03

FIGURE NUMBER: 3-4

E:\7445\7445-03A

Table 3-2 Cumulative Summary of Selected Organic Laboratory Analyses for Groundwater Samples

Organic Analyses	Well Number									WQCC[a] Groundwater Standard (mg/L)
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	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	<0.004	NS
February 9, 1993	2.10	<0.002	0.13	5.20	<0.02	7.0	<0.02	<0.002	0.077	0.01
1,2-Dichlorobenzene										
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA
February 9, 1993	0.42	<0.004	<0.02	<0.40	<0.004	<0.40	<0.004	<0.004	<0.004	NA
1,4-Dichlorobenzene										
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA
February 9, 1993	0.58	<0.003	<0.015	0.57	<0.003	0.31	<0.003	<0.003	<0.003	NA
Ethyl benzene										
August 10, 1992	2.16	<0.004	0.676	2.16	<0.004	NS	NS	NS	NS	NS
February 9, 1993	1.30	<0.002	<0.01	2.20	<0.002	3.10	<0.002	<0.002	<0.002	0.75
Toluene										
August 10, 1992	12.09	<0.004	2.099	10.36	<0.004	NS	NS	NS	<0.004	NS
February 9, 1993	6.50	<0.002	<0.01	15.0	<0.002	19.0	<0.002	<0.002	0.01	0.75
Xylenes										
August 10, 1992	7.37	<0.004	1.586	6.74	<0.004	NS	NS	NS	<0.004	NS
February 9, 1993	7.40	<0.006	0.19	10.0	<0.006	7.20	<0.006	<0.006	0.073	0.62
EPA Method 601 (mg/L)										
1,2-Dichloroethane										
August 10, 1992	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	<0.003	0.01

Table 3-2 Cumulative Summary of Selected Organic Laboratory Analyses for Groundwater Samples (Cont'd)

Organic Analyses	Well Number									WQCC[a] Groundwater Standard (mg/L)
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	Fresh Water Well	
1,1-Dichloroethane										
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA
February 9, 1993	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA
EPA Method 8100/610										
Polynuclear Aromatics (ug/L)										
August 10, 1992	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	NS
February 9, 1993	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.
NA = New Mexico Water Quality Control Commission standard does not exist for this parameter
[a]=Water Quality Control Commission
BDL= Below Detection Limits for all constituents
ug/L= micrograms per liter = parts per billion
mg/L= milligrams per liter = parts per million

Table 3-3 Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples

Inorganic Analyses	Well Number									WQCC[a] Groundwater Standard (mg/L)
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	Fresh Water Well	
EPA Method 8100/610 ICP Metals (mg/L)										
Antimony August 10, 1992 February 9, 1993	NS <0.05	NS <0.05	NS <0.05	NS <0.05	NS <0.05	NS <0.05	NS <0.05	NS <0.05	NS <0.05	NA NA
Arsenic August 10, 1992 February 9, 1993	NS 0.009	NS 0.004	NS 0.0026	NS 0.01	NS 0.0023	NS 0.018	NS 0.007	NS 0.006	NS 0.003	NS 0.1
Beryllium August 10, 1992 February 9, 1993	NS <0.001	NS <0.0001	NS 0.0008	NS <0.0001	NS 0.0002	NS 0.0004	NS 0.0006	NS 0.0003	NS <0.0001	NA NA
Cadmium August 10, 1992 February 9, 1993	NS <0.0001	NS <0.0001	NS <0.0001	NS 0.0007	NS 0.0001	NS 0.0039	NS 0.0011	NS 0.0013	NS <0.0001	NS 0.01
Chromium August 10, 1992 February 9, 1993	NS <0.01	NS 0.012	NS <0.01	NS 0.02	NS <0.01	NS 0.039	NS 0.05	NS 0.041	NS 0.014	NS 0.05
Copper August 10, 1992 February 9, 1993	NS <0.01	NS <0.01	NS <0.01	NS <0.01	NS <0.01	NS 0.03	NS 0.03	NS 0.017	NS 0.034	NS 1.0
Lead August 10, 1992 February 9, 1993	NS 0.004	NS 0.0094	NS <0.001	NS 0.0035	NS 0.0018	NS 0.0114	NS 0.0106	NS 0.0075	NS 0.0029	NS 0.05

Table 3-3 Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples (Cont'd)

Inorganic Analyses	Well Number									WQCC[a] Groundwater Standard (mg/L)
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	Fresh Water Well	
Mercury										
August 10, 1992	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	<0.001	0.002
Nickel										
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NA
February 9, 1993	<0.01	0.012	<0.01	0.015	<0.01	0.036	0.04	0.031	<0.01	NA
Selenium										
August 10, 1992	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	<0.001	0.05
Silver										
August 10, 1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
February 9, 1993	<0.0001	<0.0001	0.0002	<0.0001	<0.0008	<0.0001	<0.0001	<0.0001	<0.0001	0.05
Zinc										
August 10, 1992	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	0.449	10.0
EPA 310.1										
Hydroxide (mg/L)										
August 10, 1992	0	0	0	0	0	0	NS	NS	NS	NS
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
EPA 310.1										
Carbonate (mg/L)										
August 10, 1992	0	0	0	0	0	0	NS	NS	NS	NS
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 3-3 Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples (Cont'd)

Inorganic Analyses	Well Number									WQCC[a] Groundwater Standard (mg/L)
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	Fresh Water Well	
EPA 310.1										
Bicarbonate (mg/L)										
August 10, 1992	383	287	315	361	305	NS	NS	NS	216	NS
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
GPA 200.7										
Calcium (mg/L)										
August 10, 1992	133	171	149	138	91.8	NS	NS	NS	366	NS
February 9, 1993	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	621	NS
February 9, 1993	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	0.83	NS
February 9, 1993	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	1147	NS
February 9, 1993	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	56.4	NS
February 9, 1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 3-3 Cumulative Summary of Selected Inorganic Laboratory Analyses for Groundwater Samples (Cont'd)

Inorganic Analyses	Well Number									WQCC* Groundwater Standard (mg/L)
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	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	2.32	NS
February 9, 1993	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	4.70	NS
February 9, 1993	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	101	NS
February 9, 1993	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	251	NS
February 9, 1993	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.
NA = New Mexico Water Quality Control Commission standard does not exist for this parameter
*=Water Quality Control Commission
BDL= Below Detection Limits for all constituents
ug/L= micrograms per liter = parts per billion
mg/L= milligrams per liter = parts per million

Table 3-4 Cumulative Groundwater Level and Elevation Data
Western-Hobbs, New Mexico Facility

Well Number	Top of Casing Elevation	Depth of Water form Top of Casing (feet)	Groundwater Elevation
MW-1			
August 10, 1992	101.44	53.22	48.22
February 9, 1993	101.44	53.03	48.41
MW-2			
August 10, 1992	101.50	52.82	48.68
February 9, 1993	98.75	49.60	49.15
MW-3			
August 10, 1992	101.44	52.99	48.45
February 9, 1993	101.44	52.72	48.72
MW-4			
August 10, 1992	99.33	50.55	48.78
February 9, 1993	99.33	50.26	49.07
MW-5			
August 10, 1992	101.85[a]	52.38	49.47
February 9, 1993	101.85[a]	52.06	49.79
MW-6			
August 10, 1992	NS	NS	NS
February 9, 1993	99.25	50.58	48.67
MW-7			
August 10, 1992	NS	NS	NS
February 9, 1993	98.96	50.53	48.43
MW-8			
August 10, 1992	NS	NS	NS
February 9, 1993	99.12	50.48	48.64

NS = No sample taken on this date.
[a]MW-5 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. BCC has remeasured the top of casing elevation for this well, it remains 101.85 feet.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Based on these additional investigations BCC has the following recommendations for The Western Company of North America (Western) Hobbs, New Mexico facility site.

Conclusions

Based on field investigations and laboratory analytical results:

- Total benzene, toluene, ethyl benzene, and xylenes (BTEX) concentrations were found to be 10.0 parts per billion (ppb) in SB-10 at a depth of 50 to 52 feet, and 260 ppb in SB-11 at a depth of 28 to 30 feet. Ethyl benzene and xylenes were the major constituents.

- Total BTEX concentrations in SB-12 were below detection limits.

- Total petroleum hydrocarbons (TPH) were found to be below detection limits in SB-10 and SB-12 and 297 parts per million (ppm) in SB-11 at a depth of 28 to 30 feet.

- Total BTEX and TPH detected in SB-11 were from a shallower depth (28 to 30 feet) than previous soil samples (40 to 50 feet) with hydrocarbon constituents above detection limits. Therefore, hydrocarbons detected in SB-11 appear to be unrelated to the hydrocarbons detected in previous soil borings completed in August 1992.

- Hydrocarbons were detected in the groundwater at concentrations of up to 36.1 ppm total BTEX. This concentration was found in MW-6.

- Detectable ICP metals were below New Mexico Water Quality Control Groundwater Standards in all wells sampled.

- Concentrations of total BTEX in MW-7 and MW-8 were found to be below detection limits. Concentrations of metals in these two wells were below New Mexico Water Quality Control Commission standards, as applicable.

- Based on this investigation, the fresh water well does affect local groundwater gradient. A limited cone of depression appears to have formed around the fresh water well.

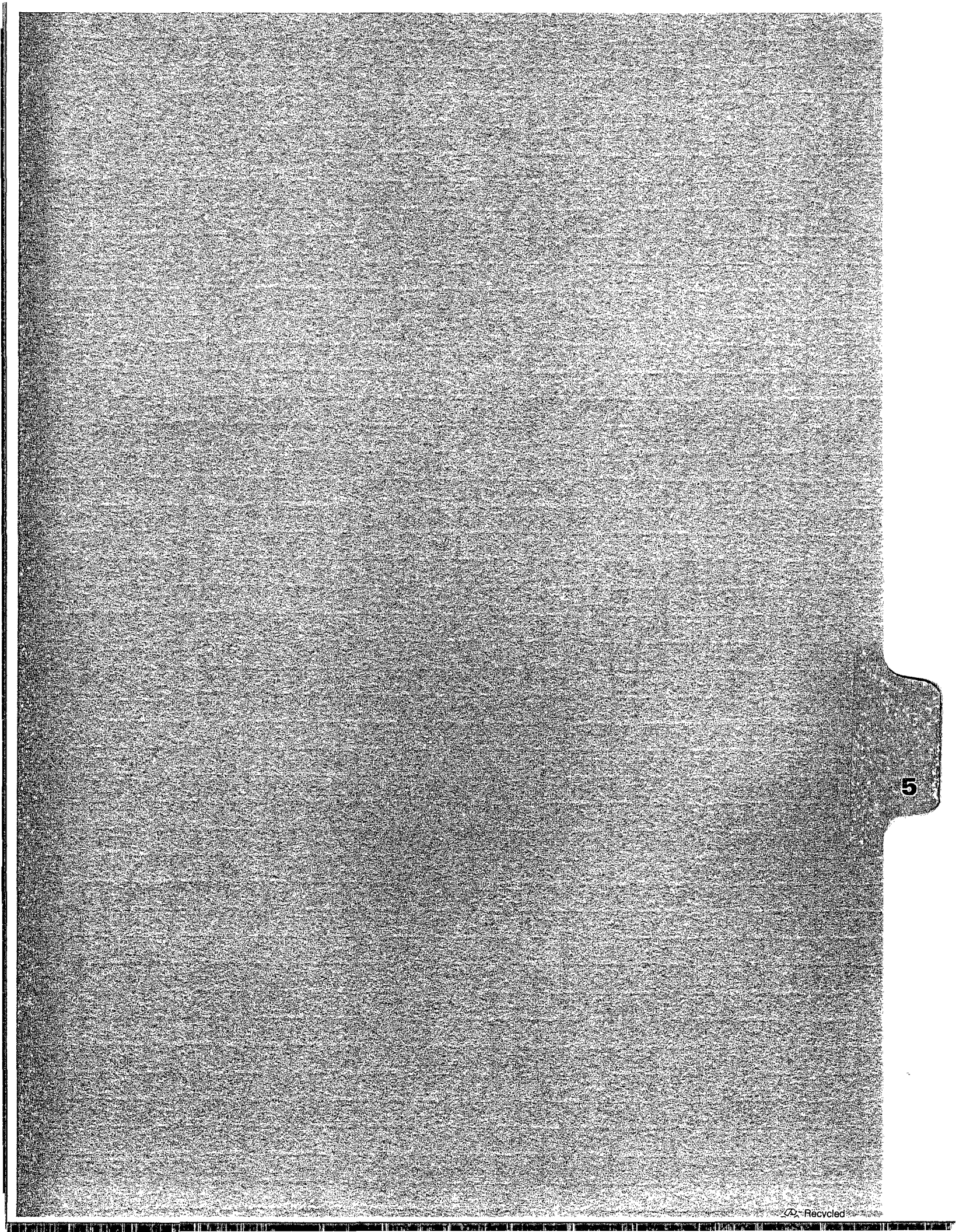
- Based on this investigation, Brown and Caldwell Consultants (BCC) has determined groundwater gradient to be <0.01 feet per foot with a flow direction toward the east-southeast.

Recommendations

Based on information obtained to date, BCC recommends the following:

- Perform a tank and line tightness test on the aboveground storage tanks (ASTs) and repair any identified leaks.

- Conduct pilot studies for the installation of a soil and groundwater remediation program. This program is outlined in Chapter 5 of this report.



CHAPTER 5

ACTION PLAN FOR SOIL AND GROUNDWATER REMEDIATION

As requested by the New Mexico Oil Conservation Division (OCD) in a letter dated December 2, 1992, Brown and Caldwell Consultants (BCC) has prepared a plan for the remediation and long-term monitoring at The Western Company of North America (Western) Hobbs, New Mexico facility (Hobbs facility).

Groundwater Remediation

Based on the analytical results for groundwater samples taken on February 9, 1993, groundwater has been affected in MW-6 which appears to be down-gradient of the fresh water well (see Figure 3-3). BCC proposes to utilize the on-site fresh water well to extract the hydrocarbon-affected groundwater instead of MW-1 and MW-4. The fresh water well is a 6 5/8-inch inside diameter well, screened between 55 and 125 feet in depth. The pump that is currently used in association with the fresh water well is a 5 1/2 horsepower "Red Jacket" pump. The well record for the on-site fresh water well is presented in Appendix D. BCC anticipates that the fresh water well, with its existing pump, will be sufficient to produce an effective capture zone to facilitate the removal of the hydrocarbon-affected groundwater. This will be verified by conducting a pump test on the fresh water well.

The groundwater removed by utilizing the fresh water well is anticipated to be used by The Western Company of North America (Western) as make-up water for its acid transport tanks. Because the volume of groundwater extracted may be greater than that used, an additional water storage tank may be required. Excess groundwater that cannot be used as Western's make-up water will be treated by means of an aeration tank, sparge tank, or an air stripping tower. The final selection of these treatment alternatives will be completed following the scheduled pilot tests. BCC also proposes that any treated groundwater will also be used in Western's truck washing operation. Excess treated groundwater that may remain is anticipated to be used to control groundwater flow by reintroduction to the water table via injection wells or an infiltration gallery. Any reinjection or infiltration operation will be conducted according to the New Mexico Water Quality Control Commission's (WQCC) groundwater standards. Effluent samples will be taken on a regular basis to ensure that WQCC groundwater standards are being met.

Groundwater Monitoring

After groundwater remediation has been initiated, groundwater samples will be obtained on a quarterly basis from each on-site monitoring well, as well as a monitoring well that is to be installed on an adjacent property to the north. The groundwater samples will be analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) to evaluate the effectiveness of the remediation activities.

Soil Remediation

BCC proposes to remediate the affected soils at the Hobbs facility by in situ soil vapor extraction. This remedial alternative will enhance the proposed groundwater remediation plan described above. In order to determine the appropriate number of soil venting wells, BCC will conduct a pilot test during the week of April 12, 1993. It is anticipated that all vapors collected by the soil remediation system will not be treated prior to release.

Implementation Schedule for Remediation

Following the groundwater and soil pilot testing (April 1993), BCC will complete a preliminary design, obtain OCD approval, complete the final design, and construct the proposed remediation system. It is estimated that construction of this system can be implemented within 60 days following approval by OCD of the preliminary design.

A

APPENDIX A

REGULATORY CORRESPONDENCE

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

DRUG FREE

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

December 2, 1992

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-922

Mr. Phillip Box
Manager Real Estate and EPA Compliance
The Western Company of North America
515 Post Oak Blvd., Suite 915
Houston, Texas 77027

RE: SOILS AND GROUND WATER INVESTIGATION
THE WESTERN COMPANY OF NORTH AMERICA HOBBS FACILITY
LEA COUNTY, NEW MEXICO

Dear Mr. Box:

The New Mexico Oil Conservation Division (OCD) has completed a review of Brown and Caldwell's October 12, 1992 "Soil and Groundwater Investigation, The Western Company of North America, Hobbs, New Mexico Facility" submitted to the OCD on October 13, 1992. The report contains the results of a soil and ground water investigation pertaining to the hydrocarbon contamination of both the soils and ground water around the fueling area at the north end of the facility.

Based upon review of the above referenced report, the OCD has the following requests for additional work:

1. Monitor Well Drilling: The investigation does not appear to have adequately defined the extent of the soil and ground water contamination. The OCD requests that the Western Company of North America (WCNA) install four (4) additional monitor wells in accordance with the following descriptions and attached facility diagram. Alternative locations due to obstructions must receive prior OCD approval.

a) One monitor well will be located between the fresh water well and the acid dock.

b) One monitor well will be located between the truck sump and the fresh water well.

c) One monitor well will be located to the southeast of the fresh water well.

d) One monitor well will be located adjacent to and north of the fueling area.

2. Monitor Well Construction: All monitor wells will be constructed as previously installed monitor wells.

3. Soil Sampling: The OCD requires that soil monitoring be conducted during drilling of the above monitor wells. Soil vapor measurements will be taken with an organic vapor meter (OVM) every 2 feet on all soil borings. For each soil boring, laboratory samples will be taken at the highest OVM reading. Analyses will be done using the EPA Toxic Characteristic Leaching Procedure (TCLP) and the appropriate EPA analytical methods for all TC constituents listed except herbicides and pesticides. In addition, the samples will be analyzed for totals using EPA method 8020 for volatile aromatic organics (BTEX), and for total petroleum hydrocarbons (TPH) using modified EPA method 8015. The OCD requires both types of analyses for correlation with the soil samples analyzed during the previous investigation.

4. Ground Water Sampling: Ground water samples from both the new monitor wells and the 5 existing monitor wells will be analyzed for volatile organics using EPA methods 601/602 and for heavy metals detected using the ICAP scan. In addition, field measurements will be taken for pH and specific conductivity. Sampling events for all of the monitor wells will be conducted within a 48-hour time period.

5. Initiation of the Investigation: Investigation of the ground water and soil contamination will be initiated by February 15, 1993. Please contact the OCD at least 7 days prior to all soil borings, monitor well installations, and sampling events so that the OCD has the opportunity to have a witness present and to split samples.

6. Ground Water Remediation: The OCD requires that WCNA initiate interim ground water remediation by converting monitor wells number 1 and 4 to recovery wells. Fluid recovery from these wells will begin after the one time ground water sampling event, but prior to March 1, 1993. Treatment and/or disposal of the recovered fluids must be approved prior to operation.

7. Soil Remediation: The OCD action levels for removal/remediation of petroleum contaminated soils are 100 ppm TPH, 50 ppm BTEX, and 10 ppm benzene. All soils above these levels must either be removed and taken to an approved OCD disposal facility or remediated. Prior OCD approval is required for all removal/remedial actions.

(Note: Wastes generated at oil field service companies are not exempt from federal RCRA hazardous waste regulations. Prior to disposal of facility wastes, WCNA will have to demonstrate that the wastes do not exhibit hazardous waste characteristics by testing (TCLP) representative samples of each waste type generated.)

8. Investigation Report: WCNA will submit an investigation report to the OCD for approval by April 1, 1993. The investigation report will include a comprehensive plan for long term ground water remediation and monitoring.

Please be advised that additional investigation may be required should the above requirements fail to fully delineate the extent of contamination related to WCNA's activities. In addition, the above requirements do not relieve you of liability which may be actionable under any other laws and/or regulations.

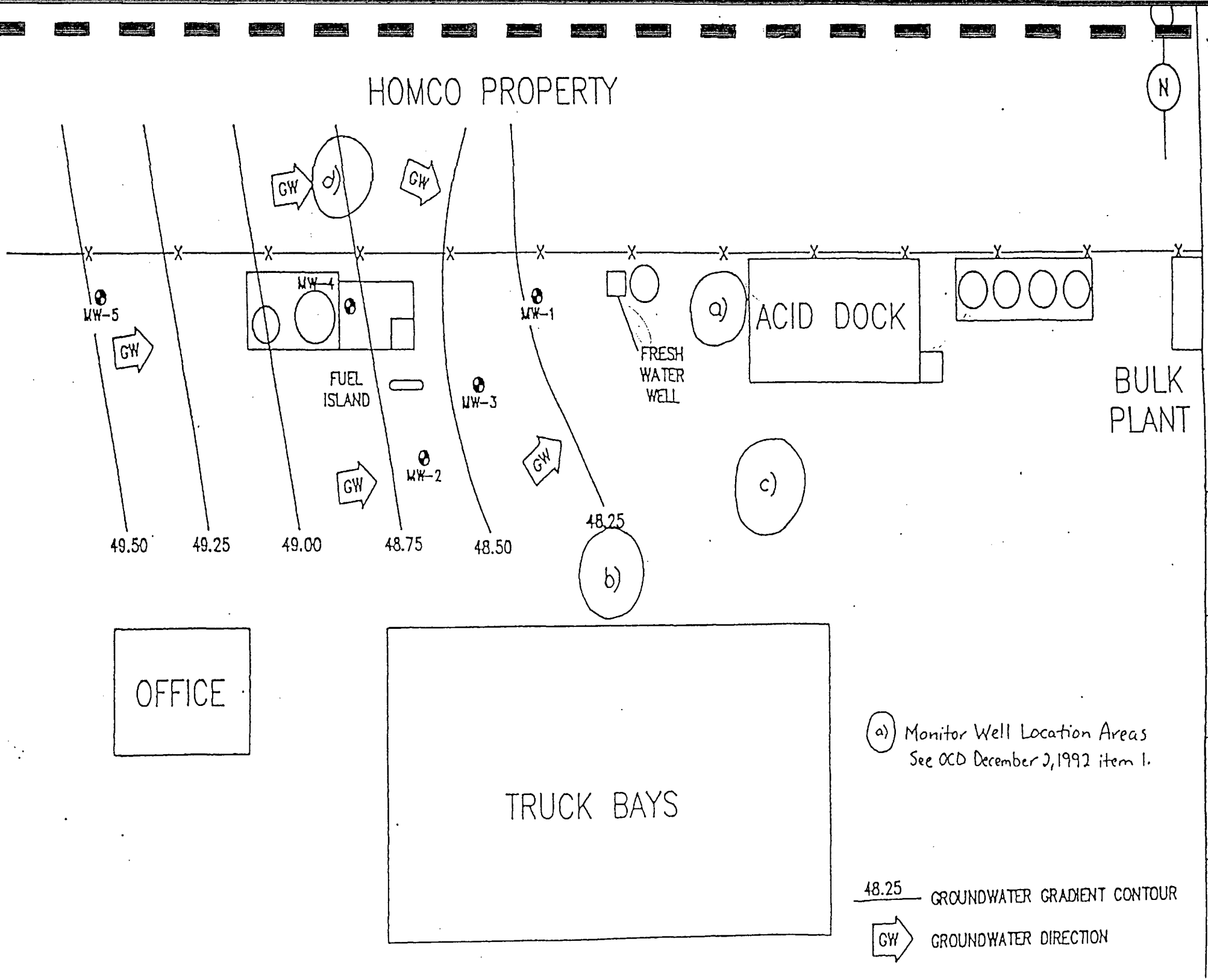
If you have any questions, please contact me at (505) 827-5884.

Sincerely,

Kathy M. Brown

Kathy M. Brown
Geologist

xc: Jerry Sexton - OCD Hobbs Office
Ed Horst - EDHW


HOMCO PROPERTY
N
GW
d)
GW
MW-5
GW
MW-4
MW-1
a)
ACID DOCK
FRESH WATER WELL
BULK PLANT
FUEL ISLAND
MW-3
GW
MW-2
GW
c)
49.50
49.25
49.00
48.75
48.50
48.25
b)
OFFICE
TRUCK BAYS
a) Monitor Well Location Areas
See OCD December 3, 1992 item 1.
48.25 GROUNDWATER GRADIENT CONTOUR
GW GROUNDWATER DIRECTION

B

APPENDIX B

SOIL BORING LOGS

Brown and Caldwell Consultants

BORING LOG

Project Name: WESTERN - Hobbs, NM Facility Project Number: 7445

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-10 / MW-6 Sheet 1 of 2

Boring Location		Elevation and Datum	
Drilling Contractor: HARRISON DRILLING		Date Started: 2-3-92	Date Finished: 2-4-92
Drilling Equipment: Hollow Stem Auger		Completed Depth(Feet): 62.5'	Water Depth (Feet): ~ 50.0 below T.O.C.
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 silica sand
Logged By: J. COOPER	Checked By:	Development Method: manual bailer	

Depth (Feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hard pack -- gravel, sand and clay				Concrete	2" Sch. 40 PVC		No sample, dry
5		Caliche -- weathered, some sand and clay; tan, pink and white		1				1.6	Dry, no odor
				2				1.8	Dry, no odor
				3				1.6	Dry, no odor
10		Silty clay -- abundant gravel, fine calcite and calcified layers; tan, pink and white		4		Grout		0.6	Dry, no odor
									No recovery; dry, no odor
15									No recovery; no odor
									No recovery; no odor
				5				2.4	Dry; no odor
20		Silty sand -- tan to pink with gravel, fine grained		6				0.2	Dry to slightly moist; no odor
				7				0.0	Slightly moist; no odor
25		- large gravel							No recovery
		Sand -- fine grained with minor sandstone gravel and silt; tan		8				0.2	Dry; no odor
				9				0.2	Slightly moist; no odor
30				10				0.0	Slightly moist; no odor

Brown and Caldwell
Consultants

BORING LOG

Project Name: _____ Project Number: _____

Soil Boring ☐ Monitoring Well ☐ Boring/Well Number: SB-10/MW-6 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor		Date Started:	Date Finished:
Drilling Equipment		Completed Depth(Feet):	Water Depth (Feet):
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☐		WELL CONSTRUCTION	
Drilling Fluid:		Type and Diameter of Well Casing:	
Backfill Material:		Slot Size:	Filter Material:
Logged By:	Checked By:	Development Method:	

Depth(Feet)	USC Soil Type	Description	Blow Counts / Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
35		Sand -- fine grained with minor sandstone gravel and silt; tan	10		Grout	2" Schedule 40 PVC	0.0	Slightly moist; no odor
			11				0.0	" "
			12				0.0	" "
			13				0.0	" "
40			14		Bentonite		0.0	" "
			15				0.0	Moist, no odor
			16		20-40 Silica Sand		0.0	" "
45			17			2" Sch. 40 0.010" slotted PVC	1.4	Moist; no odor
			18				2.0	Moist to very moist; no odor
50			19				80.0	Very moist to wet; hydrocarbon odor
			20					Boring advanced to 62.5' to allow for a 2.5' silt trap and 15' of screen
55								
60						2" Sch. 40 Blank		
62.5								

T.D. at 62.5'

Brown and Caldwell Consultants

BORING LOG

Project Name: Western - Hobbs, NM Facility Project Number: 7445

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-11 / MW-7 Sheet 1 of 2

Boring Location		Elevation and Datum	
Drilling Contractor: Harrison		Date Started: 2-4-93	Date Finished: 2-5-93
Drilling Equipment: HSA		Completed Depth (Feet): 62.5'	Water Depth (Feet): ± 58.0 below T.O.C.
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 silica sand
Logged By: J. Cooper	Checked By:	Development Method: manual bailer	

Depth (Feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hard pack -- clay, silt and gravel; tan to brown				Concrete	2" Sch. 40 PVC		~~Dry to moist;~~ No sample; dry to moist
5		Caliche -- weathered with abundant gravel, white				Grout			Dry; no odor
10		Silty clay -- abundant caliche gravel, tan to white		1				0.0	" "
15									" "
				2				0.0	" "
				3				0.0	" "
20		Silty sand -- fine grained with some gravel, calcite stringers; tan to pink		4				18.4	Slightly moist; no odor
				5				44.0	Moist; odor
25		-- grey							Slightly moist; odor
				6				77.5	Slightly moist; diesel odor
				7				81.5	" " " "
30		Sand -- fine grained, minor gravel and silt, tan		8				13.0	Slightly moist; slight odor

Brown and Caldwell Consultants

BORING LOG

Project Name: _____ Project Number: _____

Soil Boring ☐ Monitoring Well ☐ Boring/Well Number: SB-11/MW-7 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor		Date Started:	Date Finished:
Drilling Equipment		Completed Depth (Feet):	Water Depth (Feet):
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☐		WELL CONSTRUCTION	
Drilling Fluid:		Type and Diameter of Well Casing:	
Backfill Material:		Slot Size:	Filter Material:
Logged By:	Checked By:	Development Method:	

Depth (Feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
35		Sand -- fine grained, minor gravel and silt, tan		08		Grout	2" Sch. 40 PVC	130	Slightly moist; slight odor
				9				0.4	
				10				0.4	
40						Bentonite			
				11				0.0	
45				12		20-40 silica sand		0.0	
				13			2" Sch. 40 0.010" slotted PVC	0.0	
50				14				0.0	
				15				0.0	
55									Boring advanced to 62.5' to allow for 2.5' silt trap and 15' of screen
60									
62.5							2" Sch. 40 PVC		

Brown and Caldwell Consultants

BORING LOG

Project Name: Western -- Hobbs, NM Facility Project Number: 7445

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-12/MW-8 Sheet 1 of 2

Boring Location		Elevation and Datum	
Drilling Contractor	Harrison	Date Started: 2-6-93	Date Finished: 2-6-93
Drilling Equipment	HSA	Completed Depth(Feet): 62.5'	Water Depth (Feet): ~ 50.0 below TOC
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: 2" Sch. 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Silica Sand
Logged By: J. Cooper	Checked By:	Development Method: manual bailer	

Depth(Feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hard pack -- caliche, clay and gravel				Concrete	2" sch. 40 PVC		Dry; no odor
5		Caliche -- weathered with gravel, white		1		Grout		0.0	Dry; no odor
				2				0.0	Dry; no odor
									" " "
10				3				0.0	" " "
		Silty clay -- abundant gravel, white to tan							Dry; no odor
15				4				0.0	Dry; no odor
									Dry; no odor
20				5				0.0	Dry; no odor
25				6				0.0	" " "
		Silty sand -- fine grained with calcite stringers		7				0.0	slightly moist; no odor
									" " " "
30				8				0.0	" " " "

Brown and Caldwell
Consultants

BORING LOG

Project Name: _____ Project Number: _____

Soil Boring ☐ Monitoring Well ☐ Boring/Well Number: SB-12/MW-8 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor		Date Started:	Date Finished:
Drilling Equipment		Completed Depth(Feet):	Water Depth (Feet):
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☐		WELL CONSTRUCTION	
Drilling Fluid:		Type and Diameter of Well Casing:	
Backfill Material:		Slot Size:	Filter Material:
Logged By:	Checked By:	Development Method:	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Silty sand -- (as above)		8			2" Sch 40 PVC	0.0	Slightly moist; no odor
				9				0.0	" " " "
35		Sandstone -- massive				Grout			No recovery
									No Sample
		Sand - fine grained with calcite stringers and gravel		10				0.0	Moist; no odor
40				11				0.0	" " "
						Bentonite			" " "
				12		20-40 silica sand		0.0	" " "
45				13			2" Sch. 40 0.010" slotted PVC	0.0	" " "
				14				0.0	" " "
50				15				0.0	Very moist to wet; no odor
									Boring advanced to 62.5' to allow for 2.5' silt trap at 15' of screen
55									
60							2" Sch 40 PVC		
62.5		TD at 62.5							

C

APPENDIX C

LABORATORY ANALYTICAL REPORTS

NDRC LABORATORIES, INC.

A member of Inchcape Environmental

11155 South Main, Houston, Texas 77025 • (713) 661-8150 • FAX (713) 661-2661

BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-863-1
REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-10-19
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
ANALYSIS METHOD : EPA 8020
ANALYZED BY : HYL
ANALYZED ON : 18-FEB-1993
DILUTION FACTOR : 1

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	10.0 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene(SS)	100 µg/Kg	104 %

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Chief Executive Officer

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SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-10-19
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
ANALYSIS METHOD : EPA 8240
ANALYZED BY : CFM
ANALYZED ON : 13-FEB-1993
DILUTION FACTOR : 1

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	0.05 mg/L	< 0.05 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

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-863-1
ANALYSIS METHOD : EPA 8240

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
1,2-Dichloroethane-d4(SS)	50.0 µg/L	100 %
Toluene-d8(SS)	50.0 µg/L	102 %
Bromofluorobenzene(SS)	50.0 µg/L	102 %

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SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-10-19
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
PREPARATION METHOD : EPA 1311/3520
PREPARED BY : RHT
PREPARED ON : 16-FEB-1993
ANALYSIS METHOD : EPA 8270
ANALYZED BY : MLL
ANALYZED ON : 18-FEB-1993
DILUTION FACTOR : 1

TCLP EXTRACTABLE ORGANICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
o-Cresol	0.08 mg/L	< 0.08 mg/L
m+p-Cresols	0.08 mg/L	< 0.08 mg/L
2,4-Dinitrotoluene	0.04 mg/L	< 0.04 mg/L
Hexachlorobenzene	0.04 mg/L	< 0.04 mg/L
Hexachlorobutadiene	0.04 mg/L	< 0.04 mg/L
Hexachloroethane	0.04 mg/L	< 0.04 mg/L
Nitrobenzene	0.04 mg/L	< 0.04 mg/L
Pentachlorophenol	0.20 mg/L	< 0.20 mg/L
Pyridine	0.04 mg/L	< 0.04 mg/L
2,4,5-Trichlorophenol	0.04 mg/L	< 0.04 mg/L
2,4,6-Trichlorophenol	0.04 mg/L	< 0.04 mg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-863-1
ANALYSIS METHOD : EPA 8270

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Nitrobenzene-d5(SS)	50.0 µg/L	89.8 %
2-Fluorobiphenyl(SS)	50.0 µg/L	75.2 %
Terphenyl-d14(SS)	50.0 µg/L	106 %
Phenol-d6(SS)	50.0 µg/L	60.3 %
2-Fluorophenol(SS)	50.0 µg/L	72.5 %
2,4,6-Tribromophenol(SS)	50.0 µg/L	106 %

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REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-10-19
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
ANALYSIS METHOD : EPA 8015
ANALYZED BY : YH
ANALYZED ON : 16-FEB-1993
DILUTION FACTOR : 1

TRPH BY MODIFIED EPA 8015 (DIESEL)		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbons	10 mg/Kg	< 10 mg/Kg

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ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
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ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-10-19
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993

TCLP METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.01 mg/L	< 0.01 mg/L
Dilution Factor : 1 Prepared using EPA 1311/7760 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Arsenic	0.2 mg/L	< 0.2 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Barium	0.1 mg/L	1.1 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Cadmium	0.01 mg/L	< 0.01 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Chromium	0.050 mg/L	< 0.050 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Mercury	0.001 mg/L	< 0.001 mg/L
Dilution Factor : 1 Prepared using EPA 1311/7470 on 16-FEB-1993 by BR Analyzed using EPA 7470 on 17-FEB-1993 by JAI		

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TCLP METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Lead	0.020 mg/L	0.030 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Selenium	0.2 mg/L	< 0.2 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		

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SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-10-19
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993

MISCELLANEOUS ANALYSES		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Solids	1.0 %	75.3 %
Analyzed using EPA 160.3 on 16-FEB-1993 by RLM		

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-863-2
REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-11-7
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
ANALYSIS METHOD : EPA 8020
ANALYZED BY : HYL
ANALYZED ON : 18-FEB-1993
DILUTION FACTOR : 1

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	25.0 µg/Kg
Xylenes	2.0 µg/Kg	260 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene(SS)	100 µg/Kg	118 %

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REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-11-7
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
ANALYSIS METHOD : EPA 8240
ANALYZED BY : CFM
ANALYZED ON : 13-FEB-1993
DILUTION FACTOR : 1

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	0.05 mg/L	< 0.05 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

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-863-2
ANALYSIS METHOD : EPA 8240

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
1,2-Dichloroethane-d4(SS)	50.0 µg/L	103 %
Toluene-d8(SS)	50.0 µg/L	101 %
Bromofluorobenzene(SS)	50.0 µg/L	101 %

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ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-11-7
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
PREPARATION METHOD : EPA 1311/3520
PREPARED BY : RHT
PREPARED ON : 16-FEB-1993
ANALYSIS METHOD : EPA 8270
ANALYZED BY : MLL
ANALYZED ON : 18-FEB-1993
DILUTION FACTOR : 1

TCLP EXTRACTABLE ORGANICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
o-Cresol	0.08 mg/L	< 0.08 mg/L
m+p-Cresols	0.08 mg/L	< 0.08 mg/L
2,4-Dinitrotoluene	0.04 mg/L	< 0.04 mg/L
Hexachlorobenzene	0.04 mg/L	< 0.04 mg/L
Hexachlorobutadiene	0.04 mg/L	< 0.04 mg/L
Hexachloroethane	0.04 mg/L	< 0.04 mg/L
Nitrobenzene	0.04 mg/L	< 0.04 mg/L
Pentachlorophenol	0.20 mg/L	< 0.20 mg/L
Pyridine	0.04 mg/L	< 0.04 mg/L
2,4,5-Trichlorophenol	0.04 mg/L	< 0.04 mg/L
2,4,6-Trichlorophenol	0.04 mg/L	< 0.04 mg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-863-2
ANALYSIS METHOD : EPA 8270

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Nitrobenzene-d5(SS)	50.0 µg/L	87.1 %
2-Fluorobiphenyl(SS)	50.0 µg/L	107 %
Terphenyl-d14(SS)	50.0 µg/L	88.2 %
Phenol-d6(SS)	50.0 µg/L	61.0 %
2-Fluorophenol(SS)	50.0 µg/L	94.7 %
2,4,6-Tribromophenol(SS)	50.0 µg/L	109 %

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REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-11-7
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993
ANALYSIS METHOD : EPA 8015
ANALYZED BY : YH
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

TRPH BY MODIFIED EPA 8015 (DIESEL)		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbons	10 mg/Kg	297 mg/Kg

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DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-863-2
REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-11-7
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993

TCLP METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.01 mg/L	< 0.01 mg/L
Dilution Factor : 1 Prepared using EPA 1311/7760 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Arsenic	0.2 mg/L	< 0.2 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Barium	0.1 mg/L	1.3 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Cadmium	0.01 mg/L	< 0.01 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Chromium	0.050 mg/L	< 0.050 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Mercury	0.001 mg/L	< 0.001 mg/L
Dilution Factor : 1 Prepared using EPA 1311/7470 on 16-FEB-1993 by BR Analyzed using EPA 7470 on 17-FEB-1993 by JAI		

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BEAUMONT **DALLAS** **HOUSTON**

TCLP METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Lead	0.020 mg/L	0.050 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		
Selenium	0.2 mg/L	< 0.2 mg/L
Dilution Factor : 1 Prepared using EPA 1311/3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 16-FEB-1993 by VLR		

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REPORT NUMBER : H93-863-2
REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-11-7
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 4-FEB-1993

MISCELLANEOUS ANALYSES		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Solids	1.0 %	94.3 %
Analyzed using EPA 160.3 on 20-FEB-1993 by VYF		

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-863-3
REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-12-15
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 6-FEB-1993
ANALYSIS METHOD : EPA 8020
ANALYZED BY : HYL
ANALYZED ON : 18-FEB-1993
DILUTION FACTOR : 1

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	< 2.0 µg/Kg

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene(SS)	100 µg/Kg	106 %

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-863-3
REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-12-15
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 6-FEB-1993
ANALYSIS METHOD : EPA 8015
ANALYZED BY : YH
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

TRPH BY MODIFIED EPA 8015 (DIESEL)		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbons	10 mg/Kg	< 10 mg/Kg

NDRC Laboratories, Inc. David R. Godwin Ph.D.

David R. Godwin, Ph.D.
Chief Executive Officer

NDRC LABORATORIES, INC.

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-863-3
REPORT DATE : 23-FEB-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Soil
ID MARKS : SB-12-15
PROJECT : 7032-21/WCNA-Hobbs
DATE SAMPLED : 6-FEB-1993

MISCELLANEOUS ANALYSES		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Solids	1.0 %	86.6 %
Analyzed using EPA 160.3 on 20-FEB-1993 by VYF		

NDRC Laboratories, Inc. David R. Godwin Ph.D.

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BEAUMONT DALLAS HOUSTON

SUMMARY REPORT

CLIENT : Brown & Caldwell
PROJECT : 7032-21/WCNA-Hobbs

JOB NUMBER : H93-863
REPORT DATE : 23-FEB-1993

SAMPLE NO.	ID MARKS	MATRIX	DATE SAMPLED
1	SB-10-19	Soil	4-FEB-1993
2	SB-11-7	Soil	4-FEB-1993
3	SB-12-15	Soil	6-FEB-1993

BTEX ANALYSIS, EPA 8020		1	2	3	
Benzene	µg/Kg	< 2.0	< 2.0	< 2.0	
Toluene	µg/Kg	< 2.0	< 2.0	< 2.0	
Ethyl benzene	µg/Kg	< 2.0	25.0	< 2.0	
Xylenes	µg/Kg	10.0	260	< 2.0	

TCLP VOLATILE ORGANICS, EPA 8240		1	2	3	
Benzene	mg/L	< 0.01	< 0.01	-	
Carbon tetrachloride	mg/L	< 0.01	< 0.01	-	
Chlorobenzene	mg/L	< 0.01	< 0.01	-	
Chloroform	mg/L	< 0.01	< 0.01	-	
1,4-Dichlorobenzene	mg/L	< 0.01	< 0.01	-	
1,2-Dichloroethane	mg/L	< 0.01	< 0.01	-	
1,1-Dichloroethene	mg/L	< 0.01	< 0.01	-	
Methyl ethyl ketone	mg/L	< 0.05	< 0.05	-	
Tetrachloroethene	mg/L	< 0.01	< 0.01	-	
Trichloroethene	mg/L	< 0.01	< 0.01	-	
Vinyl chloride	mg/L	< 0.02	< 0.02	-	

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BEAUMONT DALLAS HOUSTON

SUMMARY REPORT

CLIENT : Brown & Caldwell
PROJECT : 7032-21/WCNA-Hobbs

JOB NUMBER : H93-863
REPORT DATE : 23-FEB-1993

SAMPLE NO.	ID MARKS	MATRIX	DATE SAMPLED
1	SB-10-19	Soil	4-FEB-1993
2	SB-11-7	Soil	4-FEB-1993
3	SB-12-15	Soil	6-FEB-1993

TCLP EXTRACTABLE ORGANICS, EPA 8270		1	2	3	
o-Cresol	mg/L	< 0.08	< 0.08	-	
m+p-Cresols	mg/L	< 0.08	< 0.08	-	
2,4-Dinitrotoluene	mg/L	< 0.04	< 0.04	-	
Hexachlorobenzene	mg/L	< 0.04	< 0.04	-	
Hexachlorobutadiene	mg/L	< 0.04	< 0.04	-	
Hexachloroethane	mg/L	< 0.04	< 0.04	-	
Nitrobenzene	mg/L	< 0.04	< 0.04	-	
Pentachlorophenol	mg/L	< 0.20	< 0.20	-	
Pyridine	mg/L	< 0.04	< 0.04	-	
2,4,5-Trichlorophenol	mg/L	< 0.04	< 0.04	-	
2,4,6-Trichlorophenol	mg/L	< 0.04	< 0.04	-	

TRPH BY MODIFIED EPA 8015 (DIESEL), EPA 8015		1	2	3	
Total Petroleum Hydrocarbons	mg/Kg	< 10	297	< 10	

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BEAUMONT **DALLAS** **HOUSTON**

SUMMARY REPORT

CLIENT : Brown & Caldwell
PROJECT : 7032-21/WCNA-Hobbs

JOB NUMBER : H93-863
REPORT DATE : 23-FEB-1993

SAMPLE NO.	ID MARKS	MATRIX	DATE SAMPLED
1	SB-10-19	Soil	4-FEB-1993
2	SB-11-7	Soil	4-FEB-1993
3	SB-12-15	Soil	6-FEB-1993

TCLP METALS		1	2	3	
Arsenic	mg/L	< 0.2	< 0.2	-	
Barium	mg/L	1.1	1.3	-	
Cadmium	mg/L	< 0.01	< 0.01	-	
Chromium	mg/L	< 0.050	< 0.050	-	
Lead	mg/L	0.030	0.050	-	
Mercury	mg/L	< 0.001	< 0.001	-	
Selenium	mg/L	< 0.2	< 0.2	-	
Silver	mg/L	< 0.01	< 0.01	-	

MISCELLANEOUS ANALYSES		1	2	3	
Total Solids	%	75.3	94.3	86.6	

David R. Godwin

3F

TCLP VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name:NDRC HOUSTON Contract:GCMS/VOA

Lab Code: HPVOA1 Case No.: AD-76 SAS No.: 12345 SDG No.:930213

Matrix Spike - EPA Sample No.: 93-863-2

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC LIMITS REC.
Vinyl Chloride	100.00	0.00	89.59	90	61-125
1,1-Dichloroethene	100.00	0.00	94.25	94	61-125
Chloroform	100.00	0.00	112.45	112	70-125
1,2-Dichloroethane	100.00	0.00	106.48	106	70-125
2-Butanone (MEK)	100.00	0.00	87.43	87	61-125
Trichloroethene	100.00	0.00	95.73	96	70-125
Benzene	100.00	0.00	100.29	100	70-125
Carbon Tetrachloride	100.00	0.00	104.10	104	70-125
Tetrachloroethene	100.00	0.00	93.09	93	70-125
Chlorobenzene	100.00	0.00	98.33	98	70-125
1,4-Dichlorobenzene	100.00	0.00	93.96	94	70-125

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Vinyl Chloride	100.00	95.83	96	6	15	61-125
1,1-Dichloroethene	100.00	95.14	95	1	15	61-125
Chloroform	100.00	113.42	113	1	15	70-125
1,2-Dichloroethane	100.00	109.29	109	3	15	70-125
2-Butanone (MEK)	100.00	83.36	83	5	15	70-125
Trichloroethene	100.00	95.00	95	1	15	70-125
Benzene	100.00	101.50	102	2	15	70-125
Carbon Tetrachloride	100.00	104.02	104	0	15	70-125
Tetrachloroethene	100.00	89.23	89	4	15	70-125
Chlorobenzene	100.00	99.99	100	2	15	70-125
1,4-Dichlorobenzene	100.00	90.36	90	4	15	70-125

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of qc limits

RPD: 0 out of 12 outside limits
Spike Recovery: 0 out of 24 outside limits

COMMENTS: _____

3E

TCLP SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name:NDRC HOUSTON Contract:GCMS/SVOA

Lab Code: HPBNA1 Case No.: AD-76 SAS No.: M.L. SDG No.: 930218

Matrix Spike - EPA Sample No.: 93-863-1

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC LIMITS REC.
Pyridine	50.00	0.00	19.42	39	30-130
2-Methylphenol	50.00	0.00	30.56	61	40-150
3+4 Methylphenol	100.00	0.00	58.93	59	40-150
1,4-Dichlorobenzene	50.00	0.00	35.26	71	40-150
Nitrobenzene	50.00	0.00	40.84	82	40-150
Hexachloroethane	50.00	0.00	35.45	71	40-150
Hexachlorobutadiene	50.00	0.00	44.23	88	40-150
2,4,6-Trichlorophenol	50.00	0.00	50.15	100	40-150
2,4,5-Trichlorophenol	50.00	0.00	55.71	111	40-150
2,4-Dinitrotoluene	50.00	0.00	49.92	100	40-150
Hexachlorobenzene	50.00	0.00	62.07	124	40-150
Pentachlorophenol	50.00	0.00	64.15	128	20-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Pyridine	50.00	21.67	43	10	40	30-130
2-Methylphenol	50.00	29.86	60	2	40	40-150
3+4 Methylphenol	100.00	54.16	54	9	40	40-150
1,4-Dichlorobenzene	50.00	40.34	81	13	40	40-150
Nitrobenzene	50.00	45.17	90	9	40	40-150
Hexachloroethane	50.00	42.79	86	19	40	40-150
Hexachlorobutadiene	50.00	52.82	106	19	40	40-150
2,4,6-Trichlorophenol	50.00	70.76	142	35	40	40-150
2,4,5-Trichlorophenol	50.00	73.38	177	28	40	40-150
2,4-Dinitrotoluene	50.00	62.92	126	23	40	40-150
Hexachlorobenzene	50.00	60.55	121	3	40	40-150
Pentachlorophenol	50.00	61.79	124	4	40	20-130

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of qc limits

RPD: 0 out of 12 outside limits
Spike Recovery: 0 out of 24 outside limits

COMMENTS: _____

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-863:1-3
REPORT DATE: 23-FEB-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	Benzene	Analysis Method:	EPA 8020
Technician:	HYL	Extraction Method:	EPA 5030
Sample Extracted:	18-FEB-1993	MS/MSD RPD:	12%
QC Extracted:	18-FEB-1993	Average Spike Recovery:	94%
Sample Analyzed:	18-FEB-1993	Duplicate RPD:	---
QC Analyzed:	18-FEB-1993	Method Blank:	< 2.0 µg/Kg
QC Sample Number:	863-1	LCS Recovery:	100%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Toluene	Analysis Method:	EPA 8020
Technician:	HYL	Extraction Method:	EPA 5030
Sample Extracted:	18-FEB-1993	MS/MSD RPD:	10%
QC Extracted:	18-FEB-1993	Average Spike Recovery:	99%
Sample Analyzed:	18-FEB-1993	Duplicate RPD:	---
QC Analyzed:	18-FEB-1993	Method Blank:	< 2.0 µg/Kg
QC Sample Number:	863-1	LCS Recovery:	101%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Ethyl benzene	Analysis Method:	EPA 8020
Technician:	HYL	Extraction Method:	EPA 5030
Sample Extracted:	18-FEB-1993	MS/MSD RPD:	12%
QC Extracted:	18-FEB-1993	Average Spike Recovery:	94%
Sample Analyzed:	18-FEB-1993	Duplicate RPD:	---
QC Analyzed:	18-FEB-1993	Method Blank:	< 2.0 µg/Kg
QC Sample Number:	863-1	LCS Recovery:	98%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Xylenes	Analysis Method:	EPA 8020
Technician:	HYL	Extraction Method:	EPA 5030
Sample Extracted:	18-FEB-1993	MS/MSD RPD:	10%
QC Extracted:	18-FEB-1993	Average Spike Recovery:	92%
Sample Analyzed:	18-FEB-1993	Duplicate RPD:	---
QC Analyzed:	18-FEB-1993	Method Blank:	< 2.0 µg/Kg
QC Sample Number:	863-1	LCS Recovery:	104%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

NDRC Laboratories, Inc. David R. Godwin Pres

David R. Godwin, Ph.D.
Chief Executive Officer

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-863:1-3
REPORT DATE: 23-FEB-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	Silver-TCLP	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 1311/7760
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	---
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	17-FEB-1993	Method Blank:	< 0.01 mg/L
QC Sample Number:	948-1	LCS Recovery:	100%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	99%

ANALYSIS:	Arsenic-TCLP	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 1311/3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	---
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	16-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	16-FEB-1993	Method Blank:	< 0.2 mg/L
QC Sample Number:	948-1	LCS Recovery:	105%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	98%

ANALYSIS:	Barium-TCLP	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 1311/3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	---
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	16-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	16-FEB-1993	Method Blank:	< 0.1 mg/L
QC Sample Number:	948-1	LCS Recovery:	98%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	97%

ANALYSIS:	Cadmium-TCLP	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 1311/3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	---
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	16-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	16-FEB-1993	Method Blank:	< 0.01 mg/L
QC Sample Number:	948-1	LCS Recovery:	106%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	102%

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-863:1-3
REPORT DATE: 23-FEB-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	Chromium-TCLP	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 1311/3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	---
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	16-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	16-FEB-1993	Method Blank:	< 0.05 mg/L
QC Sample Number:	948-1	LCS Recovery:	102%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	97%

ANALYSIS:	Mercury-TLCP	Analysis Method:	EPA 7470
Technician:	JAI	Extraction Method:	EPA 1311/7470
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	---
QC Extracted:	17-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	17-FEB-1993	Method Blank:	< 0.001 mg/L
QC Sample Number:	944-6	LCS Recovery:	90%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	95%

ANALYSIS:	Lead-TCLP	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 1311/3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	---
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	16-FEB-1993	Duplicate RPD:	17%
QC Analyzed:	16-FEB-1993	Method Blank:	< 0.02 mg/L
QC Sample Number:	948-1	LCS Recovery:	110%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	92%

ANALYSIS:	Selenium-TCLP	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 1311/3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	---
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	16-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	16-FEB-1993	Method Blank:	< 0.2 mg/L
QC Sample Number:	948-1	LCS Recovery:	105%
TCLP Leachate Date:	15-FEB-1993	TCLP Spike Recovery:	107%

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-863:1-3
REPORT DATE: 23-FEB-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	TPH	Analysis Method:	EPA 8015
Technician:	YH	Extraction Method:	EPA 3550
Sample Extracted:	12-FEB-1993	MS/MSD RPD:	10.6%
QC Extracted:	12-FEB-1993	Average Spike Recovery:	132%
Sample Analyzed:	16-FEB-1993	Duplicate RPD:	---
QC Analyzed:	16-FEB-1993	Method Blank:	< 10 mg/Kg
QC Sample Number:	831-3	LCS Recovery:	147%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

David R. Godwin Knw

CHAIN OF CUSTODY RECORD — NDRC — BORE RIE[illegible] ALL[illegible], INC — 11[illegible] South[illegible], Ho[illegible], TX[illegible] (7[illegible] 61-8[illegible]

ORIGINAL

QC

Submitted by	Bill to
Name: Brown & Caldwell	Name: SAME
Address: 2710 Stemmons Fwy, 1150 Tower N	Address:
Dallas, Tx 75207	
Contact: Jack Cooper	Contact:
Phone: (214) 630-0001	Phone:
Fax: (214) 630-9866	Fax:

Lab use only
Due Date: 2-22-93
$ TAQC
RCRA ☐
NPDES ☐
Section / Date

Proj. No.: 7032-21
Project Name: WCNA - Hobbs
No. of Containers[2]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	BTEX 8020	TPH (diesel) Mod. 8015	TCLP Volatiles	TCLP Semivolatiles	TCLP Metals	Lab. Sample ID
S	2-4-93	1015		X	SB-10-19			4		X	X	X	X	X	863-1
S	2-4-93	1730		X	SB-11-7			4		X	X	X	X	X	2
S	2-6-93	1915		X	SB-12-15			2		X	X				3

QC REPORT

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

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	2-9-93	1500	FEDERAL EXPRESS	2-9-93	1500
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Fed Ex			[signature]	2/10/93	1030
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Bill according to Quotation #1193-048

[1] Matrix W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

NDRC cannot accept verbal changes.
Please Fax written changes to
214-238-5588

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-1
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-1
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L	<	3.0	µg/L
1,1-Dichloroethane	1.0	µg/L		8.0	µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-1
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
1,2-Dibromoethane(SS)	50.0	µg/L	118	%

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Chief Executive Officer

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-1
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-1
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 100

PURGEABLE AROMATICS			
TEST REQUESTED	DETECTION LIMIT		RESULTS
Benzene	200 µg/L		2100 µg/L
Chlorobenzene	200 µg/L	<	200 µg/L
1,2-Dichlorobenzene	400 µg/L		420 µg/L
1,3-Dichlorobenzene	400 µg/L	<	400 µg/L
1,4-Dichlorobenzene	300 µg/L		580 µg/L
Ethyl benzene	200 µg/L		1300 µg/L
Toluene	200 µg/L		6500 µg/L
Xylenes	600 µg/L		7400 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-BROMOFLUOROBENZENE	50.0 µg/L	101 %

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-1
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-1
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 16-FEB-1993 by BR Analyzed using EPA 7761 on 18-FEB-1993 by KC		
Arsenic	1.0 µg/L	9.0 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 17-FEB-1993 by BR Analyzed using EPA 7060 on 19-NOV-1858 by KC		
Beryllium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 6010 on 24-FEB-1993 by KC		
Cadmium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7131 on 25-FEB-1993 by KC		
Chromium	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Copper	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Mercury	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 17-FEB-1993 by BR Analyzed using EPA 7470 on 18-FEB-1993 by KC		
Nickel	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Lead	1.0 µg/L	4.0 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7421 on 18-NOV-1993 by KC		
Antimony	50 µg/L	< 50 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Selenium	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 17-FEB-1993 by BR Analyzed using EPA 7740 on 19-FEB-1993 by KC		
Thallium	1 µg/L	8 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7481 on 24-FEB-1993 by KC		
Zinc	2.0 µg/L	10.0 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-2
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-2
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L	<	3.0	µg/L
1,1-Dichloroethane	1.0	µg/L	<	1.0	µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-2
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA					
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED		
1,2-Dibromoethane(SS)	50.0	µg/L	86.0	%	

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DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-2
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-2
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 1

PURGEABLE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2.0 µg/L	< 2.0 µg/L
Chlorobenzene	2.0 µg/L	< 2.0 µg/L
1,2-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,3-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,4-Dichlorobenzene	3.0 µg/L	< 3.0 µg/L
Ethyl benzene	2.0 µg/L	< 2.0 µg/L
Toluene	2.0 µg/L	< 2.0 µg/L
Xylenes	6.0 µg/L	< 6.0 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-BROMOFLUOROBENZENE	50.0 µg/L	112 %

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DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-2
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-2
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 16-FEB-1993 by BR Analyzed using EPA 7761 on 18-FEB-1993 by KC		
Arsenic	1.0 µg/L	4.0 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 17-FEB-1993 by BR Analyzed using EPA 7060 on 19-NOV-1858 by KC		
Beryllium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 6010 on 24-FEB-1993 by KC		
Cadmium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7131 on 25-FEB-1993 by KC		
Chromium	10 µg/L	12 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Copper	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Mercury	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 17-FEB-1993 by BR Analyzed using EPA 7470 on 18-FEB-1993 by KC		
Nickel	10 µg/L	12 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Lead	1.0 µg/L	9.4 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7421 on 18-FEB-1993 by KC		
Antimony	50 µg/L	< 50 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Selenium	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 17-FEB-1993 by BR Analyzed using EPA 7740 on 19-FEB-1993 by KC		
Thallium	1 µg/L	12 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7481 on 24-FEB-1993 by KC		
Zinc	2.0 µg/L	28.0 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-3
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-3
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L	<	3.0	µg/L
1,1-Dichloroethane	1.0	µg/L	<	1.0	µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-3
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
1,2-Dibromoethane(SS)	50.0	µg/L	98.0	%

NDRC Laboratories, Inc. David R. Godwin Ph.D.

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-3
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-3
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 5

PURGEABLE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	10.0 µg/L	130 µg/L
Chlorobenzene	10.0 µg/L	< 10.0 µg/L
1,2-Dichlorobenzene	20.0 µg/L	< 20.0 µg/L
1,3-Dichlorobenzene	20.0 µg/L	< 20.0 µg/L
1,4-Dichlorobenzene	15.0 µg/L	< 15.0 µg/L
Ethyl benzene	10.0 µg/L	< 10.0 µg/L
Toluene	10.0 µg/L	< 10.0 µg/L
Xylenes	30.0 µg/L	190 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-BROMOFLUOROBENZENE	50.0 µg/L	101 %

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 23-FEB-1993

REPORT NUMBER : H93-1127-1
REPORT DATE : 9-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-3
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	0.2 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 2-MAR-1993 by BR Analyzed using EPA 7761 on 8-MAR-1993 by KC		
Arsenic	1.0 µg/L	2.6 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 25-FEB-1993 by RGR Analyzed using EPA 7060 on 1-MAR-1993 by KC		
Beryllium	0.1 µg/L	0.8 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 4-MAR-1993 by KC		
Cadmium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 7131 on 4-MAR-1993 by KC		
Chromium	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR		
Copper	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

TOTAL METALS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Mercury	1.0	µg/L	<	1.0	µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 25-FEB-1993 by RGR Analyzed using EPA 7470 on 2-MAR-1993 by KC					
Nickel	10	µg/L	<	10	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR					
Lead	1.0	µg/L	<	1.0	µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 7421 on 1-MAR-1993 by KC					
Antimony	50	µg/L	<	50	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR					
Selenium	1.0	µg/L	<	1.0	µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 25-FEB-1993 by RGR Analyzed using EPA 7740 on 26-FEB-1993 by KC					
Thallium	1	µg/L		8	µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 7481 on 2-MAR-1993 by KC					
Zinc	2.0	µg/L		16.0	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR					

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-4
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-4
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Bromodichloromethane	1.0 µg/L	< 1.0 µg/L
Bromoform	2.0 µg/L	< 2.0 µg/L
Bromomethane	12.0 µg/L	< 12.0 µg/L
Carbon tetrachloride	2.0 µg/L	< 2.0 µg/L
Chlorobenzene	3.0 µg/L	< 3.0 µg/L
Chloroethane	6.0 µg/L	< 6.0 µg/L
2-Chloroethylvinyl ether	3.0 µg/L	< 3.0 µg/L
Chloroform	1.0 µg/L	< 1.0 µg/L
Chloromethane	5.0 µg/L	< 5.0 µg/L
Dibromochloromethane	1.0 µg/L	< 1.0 µg/L
1,2-Dichlorobenzene	2.0 µg/L	< 2.0 µg/L
1,3-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,4-Dichlorobenzene	3.0 µg/L	< 3.0 µg/L
Dichlorodifluoromethane	20.0 µg/L	< 20.0 µg/L
1,1-Dichloroethene	2.0 µg/L	< 2.0 µg/L
1,2-Dichloroethane	3.0 µg/L	48.0 µg/L
1,1-Dichloroethane	1.0 µg/L	< 1.0 µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-4
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA					
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED		
1,2-Dibromoethane(SS)	50.0	µg/L	144	%	*

* Interference matrix effect

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-4
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-4
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 100

PURGEABLE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	200 µg/L	5200 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	570 µg/L
Ethyl benzene	200 µg/L	2200 µg/L
Toluene	200 µg/L	15000 µg/L
Xylenes	600 µg/L	10000 µg/L

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

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BEAUMONT **DALLAS** **HOUSTON**

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-4
REPORT DATE : 22-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-4
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 16-FEB-1993 by BR Analyzed using EPA 7761 on 18-FEB-1993 by KC		
Arsenic	1.0 µg/L	10.0 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 17-FEB-1993 by BR Analyzed using EPA 7060 on 19-NOV-1858 by KC		
Beryllium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 6010 on 24-FEB-1993 by KC		
Cadmium	0.1 µg/L	0.7 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7131 on 25-FEB-1993 by KC		
Chromium	10 µg/L	20 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Copper	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Mercury	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 17-FEB-1993 by BR Analyzed using EPA 7470 on 18-FEB-1993 by KC		
Nickel	10 µg/L	15 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Lead	1.0 µg/L	3.5 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7421 on 18-FEB-1993 by KC		
Antimony	50 µg/L	< 50 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Selenium	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 17-FEB-1993 by BR Analyzed using EPA 7740 on 19-FEB-1993 by KC		
Thallium	1 µg/L	8 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7481 on 24-FEB-1993 by KC		
Zinc	2.0 µg/L	20.0 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-5
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-5
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L	<	3.0	µg/L
1,1-Dichloroethane	1.0	µg/L	<	1.0	µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-5
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
1,2-Dibromoethane(SS)	50.0	µg/L	109	%

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-5
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-5
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 1

PURGEABLE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2.0 µg/L	< 2.0 µg/L
Chlorobenzene	2.0 µg/L	< 2.0 µg/L
1,2-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,3-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,4-Dichlorobenzene	3.0 µg/L	< 3.0 µg/L
Ethyl benzene	2.0 µg/L	< 2.0 µg/L
Toluene	2.0 µg/L	< 2.0 µg/L
Xylenes	6.0 µg/L	< 6.0 µg/L

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

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 23-FEB-1993

REPORT NUMBER : H93-1127-2
REPORT DATE : 9-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-5
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	0.8 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 2-MAR-1993 by BR Analyzed using EPA 7761 on 8-MAR-1993 by KC		
Arsenic	1.0 µg/L	2.3 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 25-FEB-1993 by RGR Analyzed using EPA 7060 on 1-MAR-1993 by KC		
Beryllium	0.1 µg/L	2.0 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 4-MAR-1993 by KC		
Cadmium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 7131 on 4-MAR-1993 by KC		
Chromium	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR		
Copper	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR		

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TOTAL METALS					
TEST REQUESTED	DETECTION LIMIT			RESULTS	
Mercury	1.0	µg/L	<	1.0	µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 25-FEB-1993 by RGR Analyzed using EPA 7470 on 2-MAR-1993 by KC					
Nickel	10	µg/L	<	10	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR					
Lead	1.0	µg/L		1.8	µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 7421 on 1-MAR-1993 by KC					
Antimony	50	µg/L	<	50	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR					
Selenium	1.0	µg/L	<	1.0	µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 25-FEB-1993 by RGR Analyzed using EPA 7740 on 26-FEB-1993 by KC					
Thallium	1	µg/L		1	µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 25-FEB-1993 by RGR Analyzed using EPA 7481 on 2-MAR-1993 by KC					
Zinc	2.0	µg/L		14.0	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 25-FEB-1993 by RGR Analyzed using EPA 6010 on 25-FEB-1993 by VLR					

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-6
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-6
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L		11.3	µg/L
1,1-Dichloroethane	1.0	µg/L	<	1.0	µg/L

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BEAUMONT DALLAS HOUSTON

ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
1,2-Dibromoethane(SS)	50.0	µg/L	100	%

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-6
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-6
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 100

PURGEABLE AROMATICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	
Benzene	200	µg/L	7000	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	310	µg/L
Ethyl benzene	200	µg/L	3100	µg/L
Toluene	200	µg/L	19000	µg/L
Xylenes	600	µg/L	7200	µg/L

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

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-6
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-6
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 16-FEB-1993 by BR Analyzed using EPA 7761 on 18-FEB-1993 by KC		
Arsenic	1.0 µg/L	18.0 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 17-FEB-1993 by BR Analyzed using EPA 7060 on 19-NOV-1858 by KC		
Beryllium	0.1 µg/L	0.4 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 6010 on 24-FEB-1993 by KC		
Cadmium	0.1 µg/L	3.9 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7131 on 25-FEB-1993 by KC		
Chromium	10 µg/L	39 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Copper	10 µg/L	30 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Mercury	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 17-FEB-1993 by BR Analyzed using EPA 7470 on 18-FEB-1993 by KC		
Nickel	10 µg/L	36 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Lead	1.0 µg/L	11.4 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7421 on 18-FEB-1993 by KC		
Antimony	50 µg/L	< 50 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Selenium	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 17-FEB-1993 by BR Analyzed using EPA 7740 on 19-FEB-1993 by KC		
Thallium	1 µg/L	12 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7481 on 24-FEB-1993 by KC		
Zinc	2.0 µg/L	96.0 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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Chief Executive Officer

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-7
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-7
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L	<	3.0	µg/L
1,1-Dichloroethane	1.0	µg/L	<	1.0	µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-7
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA					
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED		
1,2-Dibromoethane(SS)	50.0	µg/L	90.0	%	

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-7
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-7
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 1

PURGEABLE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2.0 µg/L	< 2.0 µg/L
Chlorobenzene	2.0 µg/L	< 2.0 µg/L
1,2-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,3-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,4-Dichlorobenzene	3.0 µg/L	< 3.0 µg/L
Ethyl benzene	2.0 µg/L	< 2.0 µg/L
Toluene	2.0 µg/L	< 2.0 µg/L
Xylenes	6.0 µg/L	< 6.0 µg/L

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

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-7
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-7
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 16-FEB-1993 by BR Analyzed using EPA 7761 on 18-FEB-1993 by KC		
Arsenic	1.0 µg/L	7.0 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 17-FEB-1993 by BR Analyzed using EPA 7060 on 19-NOV-1858 by KC		
Beryllium	0.1 µg/L	0.6 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 6010 on 24-FEB-1993 by KC		
Cadmium	0.1 µg/L	1.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7131 on 25-FEB-1993 by KC		
Chromium	10 µg/L	50 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Copper	10 µg/L	30 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

TOTAL METALS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Mercury	1.0	µg/L	<	1.0	µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 17-FEB-1993 by BR Analyzed using EPA 7470 on 18-FEB-1993 by KC					
Nickel	10	µg/L		40	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR					
Lead	1.0	µg/L		10.6	µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7421 on 18-FEB-1993 by KC					
Antimony	50	µg/L	<	50	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR					
Selenium	1.0	µg/L	<	1.0	µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 17-FEB-1993 by BR Analyzed using EPA 7740 on 19-FEB-1993 by KC					
Thallium	1	µg/L		13	µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7481 on 24-FEB-1993 by KC					
Zinc	2.0	µg/L		102	µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR					

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-8
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-8
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L	<	3.0	µg/L
1,1-Dichloroethane	1.0	µg/L	<	1.0	µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-8
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA					
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED		
1,2-Dibromoethane(SS)	50.0	µg/L	103	%	

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-8
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-8
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 1

PURGEABLE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2.0 µg/L	< 2.0 µg/L
Chlorobenzene	2.0 µg/L	< 2.0 µg/L
1,2-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,3-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,4-Dichlorobenzene	3.0 µg/L	< 3.0 µg/L
Ethyl benzene	2.0 µg/L	< 2.0 µg/L
Toluene	2.0 µg/L	< 2.0 µg/L
Xylenes	6.0 µg/L	< 6.0 µg/L

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

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-8
REPORT DATE : 22-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : MW-8
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 16-FEB-1993 by BR Analyzed using EPA 7761 on 18-FEB-1993 by KC		
Arsenic	1.0 µg/L	6.0 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 17-FEB-1993 by BR Analyzed using EPA 7060 on 19-FEB-1993 by KC		
Beryllium	0.1 µg/L	0.3 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 6010 on 24-FEB-1993 by KC		
Cadmium	0.1 µg/L	1.3 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7131 on 25-FEB-1993 by KC		
Chromium	10 µg/L	41 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Copper	10 µg/L	17 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Mercury	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 17-FEB-1993 by BR Analyzed using EPA 7470 on 18-FEB-1993 by KC		
Nickel	.10 µg/L	31 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Lead	1.0 µg/L	7.5 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7421 on 18-FEB-1993 by KC		
Antimony	50 µg/L	< 50 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Selenium	1.0 µg/L	1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 17-FEB-1993 by BR Analyzed using EPA 7740 on 19-FEB-1993 by KC		
Thallium	1 µg/L	14 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7481 on 24-FEB-1993 by KC		
Zinc	2.0 µg/L	60.0 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-9
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : Fresh Water Well
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 601
ANALYZED BY : MHT
ANALYZED ON : 17-FEB-1993
DILUTION FACTOR : 1

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Bromodichloromethane	1.0	µg/L	<	1.0	µg/L
Bromoform	2.0	µg/L	<	2.0	µg/L
Bromomethane	12.0	µg/L	<	12.0	µg/L
Carbon tetrachloride	2.0	µg/L	<	2.0	µg/L
Chlorobenzene	3.0	µg/L	<	3.0	µg/L
Chloroethane	6.0	µg/L	<	6.0	µg/L
2-Chloroethylvinyl ether	3.0	µg/L	<	3.0	µg/L
Chloroform	1.0	µg/L	<	1.0	µg/L
Chloromethane	5.0	µg/L	<	5.0	µg/L
Dibromochloromethane	1.0	µg/L	<	1.0	µg/L
1,2-Dichlorobenzene	2.0	µg/L	<	2.0	µg/L
1,3-Dichlorobenzene	4.0	µg/L	<	4.0	µg/L
1,4-Dichlorobenzene	3.0	µg/L	<	3.0	µg/L
Dichlorodifluoromethane	20.0	µg/L	<	20.0	µg/L
1,1-Dichloroethene	2.0	µg/L	<	2.0	µg/L
1,2-Dichloroethane	3.0	µg/L	<	3.0	µg/L
1,1-Dichloroethane	1.0	µg/L	<	1.0	µg/L

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BEAUMONT DALLAS HOUSTON

REPORT NUMBER : H93-862-9
ANALYSIS METHOD : EPA 601

PURGEABLE HALOCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
trans-1,2-Dichloroethene	1.0	µg/L	<	1.0	µg/L
1,2-Dichloropropane	1.0	µg/L	<	1.0	µg/L
cis-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
trans-1,3-Dichloropropene	2.0	µg/L	<	2.0	µg/L
Methylene chloride	5.0	µg/L	<	5.0	µg/L
1,1,2,2-Tetrachloroethane	1.0	µg/L	<	1.0	µg/L
Tetrachloroethene	1.0	µg/L	<	1.0	µg/L
1,1,1-Trichloroethane	1.0	µg/L	<	1.0	µg/L
1,1,2-Trichloroethane	1.0	µg/L	<	1.0	µg/L
Trichloroethene	1.0	µg/L	<	1.0	µg/L
Trichlorofluoromethane	5.0	µg/L	<	5.0	µg/L
Vinyl chloride	5.0	µg/L	<	5.0	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
1,2-Dibromoethane(SS)	50.0	µg/L	108	%

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-9
REPORT DATE : 4-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : Fresh Water Well
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993
ANALYSIS METHOD : EPA 602
ANALYZED BY : MHT
ANALYZED ON : 19-FEB-1993
DILUTION FACTOR : 1

PURGEABLE AROMATICS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	2.0 µg/L	77.0 µg/L
Chlorobenzene	2.0 µg/L	< 2.0 µg/L
1,2-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,3-Dichlorobenzene	4.0 µg/L	< 4.0 µg/L
1,4-Dichlorobenzene	3.0 µg/L	< 3.0 µg/L
Ethyl benzene	2.0 µg/L	< 2.0 µg/L
Toluene	2.0 µg/L	10.0 µg/L
Xylenes	6.0 µg/L	73.0 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
4-BROMOFLUOROBENZENE	50.0 µg/L	103 %

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 10-FEB-1993

REPORT NUMBER : H93-862-9
REPORT DATE : 22-MAR-1993

SAMPLE SUBMITTED BY : Brown & Caldwell
ADDRESS : 2710 Stemmons Frwy., 1100 Tower N
: Dallas, TX 75207
ATTENTION : Mr. Jack Cooper

SAMPLE MATRIX : Water
ID MARKS : Fresh Water Well
PROJECT : WCNA Hobbs
DATE SAMPLED : 9-FEB-1993

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Silver	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 7761 on 16-FEB-1993 by BR Analyzed using EPA 7761 on 18-FEB-1993 by KC		
Arsenic	1.0 µg/L	3.0 µg/L
Dilution Factor : 1 Prepared using EPA 7060 on 17-FEB-1993 by BR Analyzed using EPA 7060 on 19-FEB-1993 by KC		
Beryllium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 6010 on 24-FEB-1993 by KC		
Cadmium	0.1 µg/L	< 0.1 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7131 on 25-FEB-1993 by KC		
Chromium	10 µg/L	14 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Copper	10 µg/L	34 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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BEAUMONT DALLAS HOUSTON

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Mercury	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7470 on 17-FEB-1993 by BR Analyzed using EPA 7470 on 18-FEB-1993 by KC		
Nickel	10 µg/L	< 10 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Lead	1.0 µg/L	2.9 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7421 on 18-FEB-1993 by KC		
Antimony	50 µg/L	< 50 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		
Selenium	1.0 µg/L	< 1.0 µg/L
Dilution Factor : 1 Prepared using EPA 7740 on 17-FEB-1993 by BR Analyzed using EPA 7740 on 19-FEB-1993 by KC		
Thallium	1 µg/L	9 µg/L
Dilution Factor : 1 Prepared using EPA 3020 on 17-FEB-1993 by BR Analyzed using EPA 7481 on 24-FEB-1993 by KC		
Zinc	2.0 µg/L	449 µg/L
Dilution Factor : 1 Prepared using EPA 3010 on 16-FEB-1993 by BR Analyzed using EPA 6010 on 17-FEB-1993 by VLR		

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David R. Godwin, Ph.D.
Chief Executive Officer

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-862:1-9
REPORT DATE: 4-MAR-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	1,2-Dichloroethane	Analysis Method:	EPA 601
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	5%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	100%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	---
QC Analyzed:	17-FEB-1993	Method Blank:	< 3.0 µg/L
QC Sample Number:	862-9	LCS Recovery:	91%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Trichloroethane	Analysis Method:	EPA 601
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	0%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	106%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	---
QC Analyzed:	17-FEB-1993	Method Blank:	< 1 µg/L
QC Sample Number:	862-9	LCS Recovery:	108%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Tetrachloroethene	Analysis Method:	EPA 601
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	4%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	109%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	---
QC Analyzed:	17-FEB-1993	Method Blank:	< 1.0 µg/L
QC Sample Number:	862-9	LCS Recovery:	115%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Chlorobenzene	Analysis Method:	EPA 601
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	1%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	101%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	---
QC Analyzed:	17-FEB-1993	Method Blank:	< 3.0 µg/L
QC Sample Number:	862-9	LCS Recovery:	113%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-862:1-9
REPORT DATE: 4-MAR-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	Carbon Tetrachloride	Analysis Method:	EPA 601
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	6%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	100%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	---
QC Analyzed:	17-FEB-1993	Method Blank:	< 2 µg/L
QC Sample Number:	862-9	LCS Recovery:	92%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Benzene	Analysis Method:	EPA 602
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	19-FEB-1993	BS/BSD RPD:	4%
QC Extracted:	19-FEB-1993	Average Spike Recovery:	92%
Sample Analyzed:	19-FEB-1993	Duplicate RPD:	---
QC Analyzed:	19-FEB-1993	Method Blank:	< 2.0 µg/L
QC Sample Number:	Blank Spike	LCS Recovery:	---
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Toluene	Analysis Method:	EPA 602
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	19-FEB-1993	BS/BSD RPD:	4%
QC Extracted:	19-FEB-1993	Average Spike Recovery:	98%
Sample Analyzed:	19-FEB-1993	Duplicate RPD:	---
QC Analyzed:	19-FEB-1993	Method Blank:	< 2.0 µg/L
QC Sample Number:	Blank Spike	LCS Recovery:	---
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Ethyl benzene	Analysis Method:	EPA 602
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	19-FEB-1993	BS/BSD RPD:	2%
QC Extracted:	19-FEB-1993	Average Spike Recovery:	91%
Sample Analyzed:	19-FEB-1993	Duplicate RPD:	---
QC Analyzed:	19-FEB-1993	Method Blank:	< 2.0 µg/L
QC Sample Number:	Blank Spike	LCS Recovery:	---
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-862:1-9
REPORT DATE: 4-MAR-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	Xylenes	Analysis Method:	EPA 602
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	19-FEB-1993	BS/BSD RPD:	1%
QC Extracted:	19-FEB-1993	Average Spike Recovery:	97%
Sample Analyzed:	19-FEB-1993	Duplicate RPD:	---
QC Analyzed:	19-FEB-1993	Method Blank:	< 6.0 µg/L
QC Sample Number:	Blank Spike	LCS Recovery:	---
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	1,3-Dichlorobenzene	Analysis Method:	EPA 602
Technician:	MHT	Extraction Method:	EPA 5030
Sample Extracted:	19-FEB-1993	BS/BSD RPD:	1%
QC Extracted:	19-FEB-1993	Average Spike Recovery:	99%
Sample Analyzed:	19-FEB-1993	Duplicate RPD:	---
QC Analyzed:	19-FEB-1993	Method Blank:	< 4.0 µg/L
QC Sample Number:	Blank Spike	LCS Recovery:	---
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Silver	Analysis Method:	EPA 7761
Technician:	KC	Extraction Method:	EPA 7761
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	< 1%
QC Extracted:	16-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	18-FEB-1993	Duplicate RPD:	< 1%
QC Analyzed:	18-FEB-1993	Method Blank:	< 0.1 µg/L
QC Sample Number:	1080-1	LCS Recovery:	---
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Arsenic	Analysis Method:	EPA 7060
Technician:	KC	Extraction Method:	EPA 7060
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	17%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	117%
Sample Analyzed:	19-NOV-1858	Duplicate RPD:	2%
QC Analyzed:	19-NOV-1858	Method Blank:	< 1.0 µg/L
QC Sample Number:	884-1	LCS Recovery:	94%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-862:1-9
REPORT DATE: 4-MAR-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	Beryllium	Analysis Method:	EPA 6010
Technician:	KC	Extraction Method:	EPA 3020
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	---
QC Extracted:	17-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	24-FEB-1993	Duplicate RPD:	---
QC Analyzed:	24-FEB-1993	Method Blank:	< 0.1 µg/L
QC Sample Number:	862-1	LCS Recovery:	---
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Cadmium	Analysis Method:	EPA 7131
Technician:	KC	Extraction Method:	EPA 3020
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	---
QC Extracted:	17-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	25-FEB-1993	Duplicate RPD:	---
QC Analyzed:	25-FEB-1993	Method Blank:	< 0.1 µg/L
QC Sample Number:	862-1	LCS Recovery:	104%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Chromium	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	2%
QC Extracted:	16-FEB-1993	Average Spike Recovery:	76%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	5%
QC Analyzed:	17-FEB-1993	Method Blank:	< 10 µg/L
QC Sample Number:	902-4	LCS Recovery:	97%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Copper	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	0%
QC Extracted:	16-FEB-1993	Average Spike Recovery:	90%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	17-FEB-1993	Method Blank:	< 10 µg/L
QC Sample Number:	902-4	LCS Recovery:	102%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-862:1-9
REPORT DATE: 4-MAR-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS QUALITY CONTROL REPORT

ANALYSIS:	Mercury	Analysis Method:	EPA 7470
Technician:	KC	Extraction Method:	EPA 7470
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	1%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	104%
Sample Analyzed:	18-FEB-1993	Duplicate RPD:	< 1%
QC Analyzed:	18-FEB-1993	Method Blank:	< 1.0 µg/L
QC Sample Number:	862-1	LCS Recovery:	117%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Nickel	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	0%
QC Extracted:	16-FEB-1993	Average Spike Recovery:	101%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	17-FEB-1993	Method Blank:	< 10 µg/L
QC Sample Number:	902-4	LCS Recovery:	105%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Lead	Analysis Method:	EPA 7421
Technician:	KC	Extraction Method:	EPA 3020
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	15%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	90%
Sample Analyzed:	18-NOV-1993	Duplicate RPD:	63%
QC Analyzed:	18-NOV-1993	Method Blank:	< 1.0 µg/L
QC Sample Number:	940-1	LCS Recovery:	80%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Antimony	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	5%
QC Extracted:	16-FEB-1993	Average Spike Recovery:	80%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	17-FEB-1993	Method Blank:	< 50 µg/L
QC Sample Number:	902-4	LCS Recovery:	114%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

NDRC Laboratories, Inc. David R. Godwin

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED: 10-FEB-1993

REPORT NUMBER: H93-862:1-9
REPORT DATE: 4-MAR-1993

SAMPLE SUBMITTED BY: Brown & Caldwell

ATTENTION: Mr. Jack Cooper

LABORATORY ANALYSIS
QUALITY CONTROL REPORT

ANALYSIS:	Selenium	Analysis Method:	EPA 7740
Technician:	KC	Extraction Method:	EPA 7740
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	< 1%
QC Extracted:	17-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	19-FEB-1993	Duplicate RPD:	8%
QC Analyzed:	19-FEB-1993	Method Blank:	< 1.0 µg/L
QC Sample Number:	862-1	LCS Recovery:	100%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Thallium	Analysis Method:	EPA 7481
Technician:	KC	Extraction Method:	EPA 3020
Sample Extracted:	17-FEB-1993	MS/MSD RPD:	---
QC Extracted:	17-FEB-1993	Average Spike Recovery:	---
Sample Analyzed:	24-FEB-1993	Duplicate RPD:	---
QC Analyzed:	24-FEB-1993	Method Blank:	< 1 µg/L
QC Sample Number:	862-1	LCS Recovery:	101%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

ANALYSIS:	Zinc	Analysis Method:	EPA 6010
Technician:	VLR	Extraction Method:	EPA 3010
Sample Extracted:	16-FEB-1993	MS/MSD RPD:	3%
QC Extracted:	16-FEB-1993	Average Spike Recovery:	99%
Sample Analyzed:	17-FEB-1993	Duplicate RPD:	0%
QC Analyzed:	17-FEB-1993	Method Blank:	< 2.0 µg/L
QC Sample Number:	902-4	LCS Recovery:	117%
TCLP Leachate Date:	---	TCLP Spike Recovery:	---

David R Goodwin Pres.

CHAIN OF CUSTODY RECORD — NDRC LABORATORIES DALLAS, INC. — 11[redacted] South[redacted], Ho[redacted], TX[redacted] (7[redacted]61-8[redacted]

Submitted by	Bill to
Name: Brown & Caldwell	Name: SAME
Address: 2710 Stemmons Fwy, 1100 Tower N	Address:
DALLAS, Tx 75207	
Contact: Jack Cooper	Contact:
Phone: (214) 630-0001	Phone:
Fax: (214) 630-9866	Fax:

Lab use only
Due Date: 2-~~23~~93
QC & AQC
RCRA ☐
NPDES ☐
Section / Date

Proj. No. | Project Name: WCNA Hobbs | 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	ICAP Scan – Priority Pollutant Metals	Sb As Be Cd Cr Cu Pb Hg Ni Se Tl Zn Ag	Lab. Sample ID
W	2-9-93	1245/1300		X	MW-1	4	1			X	X	X		862-1
W		1115/1140			MW-2									2
W		1215/1230			MW-3 Rec. Broken Amb.								no metals	3
W		1315/1330			MW-4									4
W		945/1000			MW-5 Rec. Broken Amb								no metals	5
W		1145/1200			MW-6									6
W		1045/1100			MW-7									7
W		1015/1030			MW-8									8
W		1400/1405			~~Rinse~~ Fresh water Well									9

QC REPORT

Call 2/11 @ Broken Sample. Jack Cooper not in. Water Left Message to call back.

7-1L Amb
36-VOA

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

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	2-9-93	1500	FEDERAL EXPRESS	2-9-93	1500
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
FED EX			[signature]	2/10/93	1030
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: Bill according to Quotation #H93-048

[1] Matrix W - Water S - Soil SD - Solid L - Liquid A - Air Bag C - Charcoal tube
[2] Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

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

Brown and Caldwell
Consultants

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

October 12, 1992

File Copy

Brown and Caldwell
Consultants

Brown and Caldwell
Consultants

2710 Stemmons Freeway
1100 Tower North
Dallas
Texas 75207
(214) 630-0001
FAX (214) 630-9866

October 12, 1992

Mr. Bill Olsen
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

7032-12

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

Dear Mr. Olsen:

On behalf of The Western Company of North America (WCNA), Brown and Caldwell Consultants is submitting the enclosed soil and groundwater investigation report for the Hobbs facility. The report documents the field activities and analytical results for soil and groundwater samples collected at the site.

If you have any questions or require additional information, please contact me at (214) 630-0001.

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Lynn M. Wright
Project Manager

LMW:mae

cc: Mr. Phillip Box, WCNA, Houston, Texas
Mr. Teddy Gandy, WCNA, Hobbs, New Mexico
OCD Hobbs District Office

Contents

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LIST OF TABLES

LIST OF FIGURES

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*Figure follows page number listed.

CHAPTER 1

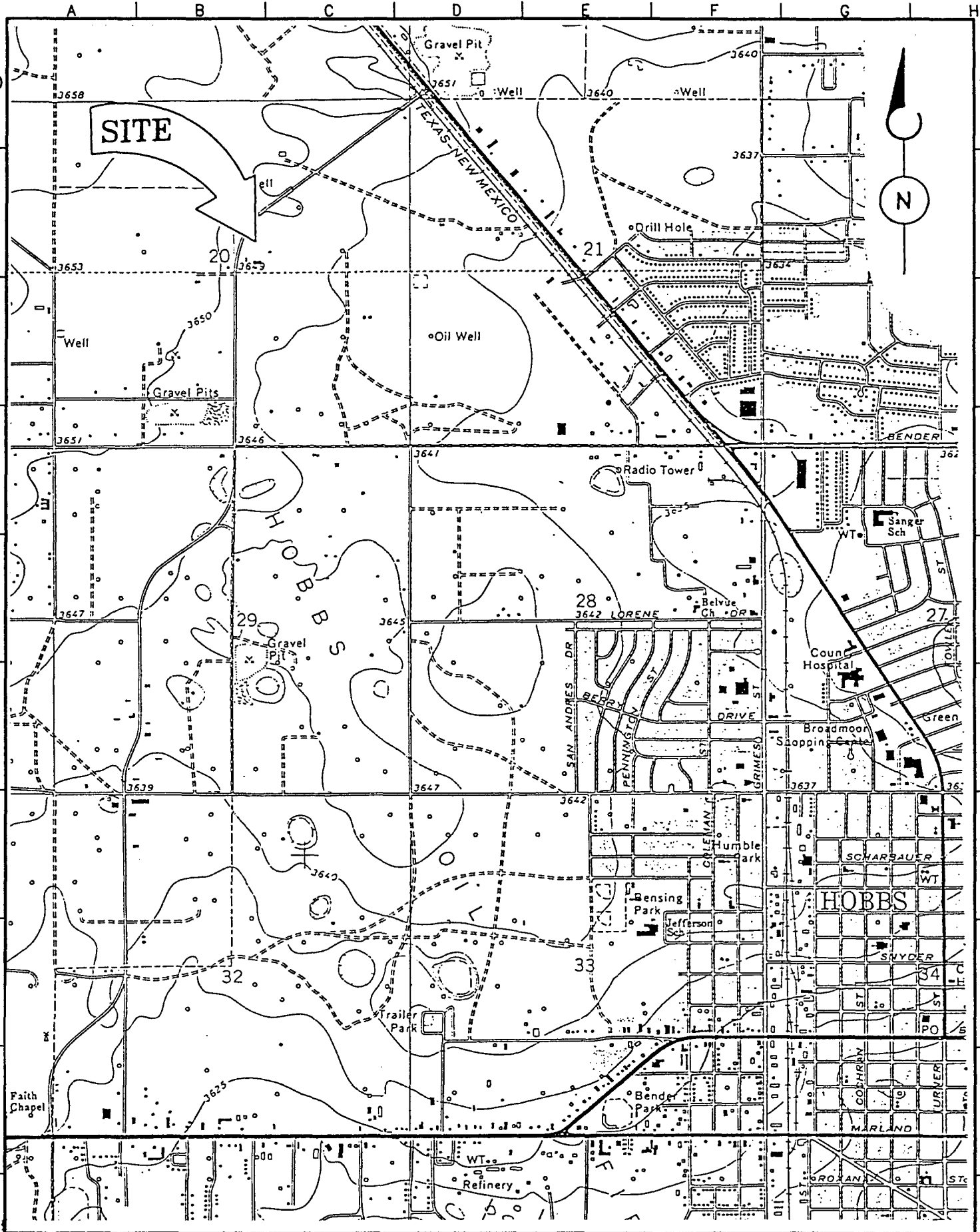
INTRODUCTION

Brown and Caldwell Consultants (BCC) conducted a soil and groundwater investigation at The Western Company of North America (WCNA) facility in Hobbs, New Mexico. The investigation was conducted to determine if soil and/or groundwater had been impacted by hydrocarbons from off-site sources, as well as on-site sources, if any.

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

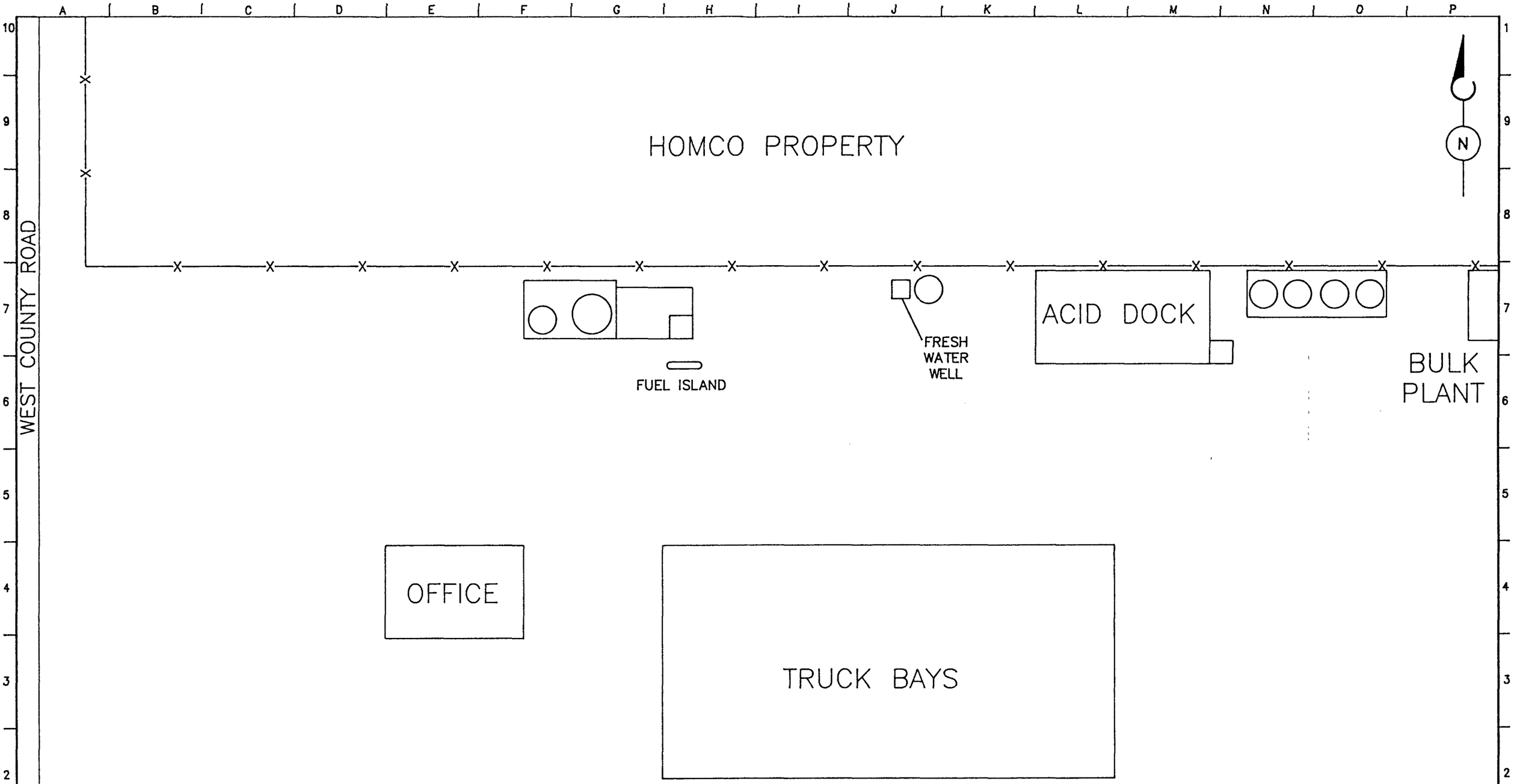
EPA ID No.:	NMD 052377637
Owner's Address:	The Western Company of North America 515 Post Oak Blvd., Suite 915 Houston, Texas 77027
Owner's Representative:	Mr. Phillip Box, Manager Real Estate and EPA Compliance
Owner's Telephone Number:	(713) 629-2861
Facility Address:	The Western Company of North America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

The WCNA Hobbs facility maintains a fueling operation on the north side of the service yard (Figure 1-2). The fuel island dispenses diesel fuel and unleaded gasoline to service vehicles. The diesel fuel is stored in a 22,500 gallon above ground storage



Brown and Caldwell Consultants, DALLAS–HOUSTON, TEXAS	0 1000 2000 SCALE: 1" = 2000'	TITLE: VICINITY MAP	DATE: 10/06/92
		CLIENT: WCNA	PROJECT NUMBER: 7032-13
	DRAWN BY: JDN DATE 10/6 CHK'D BY: JLC DATE 10/6 APPROVED: SAM DATE	SITE LOCATION: HOBBS, NEW MEXICO	FIGURE NUMBER: 1-1

REV.	DESCRIPTION	BY	DATE



Brown and Caldwell Consultants
DALLAS–HOUSTON, TEXAS

APPROVED: _____ DATE _____
PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

REV.	DESCRIPTION	BY	DATE

0 20 40
SCALE: 1" = 40'

DRAWN BY: JDN DATE 9/30
CHK'D BY: JLC DATE 9/30
APPROVED: SAM DATE ____

TITLE: SITE MAP

DATE: 10/06/92

CLIENT: WESTERN COMPANY OF NORTH AMERICA

PROJECT NUMBER: 7032–13

SITE LOCATION: HOBBS, NEW MEXICO

FIGURE NUMBER: 1–2

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.

CHAPTER 2

CHRONOLOGY OF EVENTS

On July 29 through August 10, 1992, Brown and Caldwell Consultants (BCC) conducted a soil and groundwater investigation at The Western Company of North America (WCNA) facility in Hobbs, New Mexico. Table 2-1 presents a chronology of events associated with the Hobbs facility.

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

Date	Activity
February 7, 1991	New Mexico Oil Conservation Division (OCD) conducts on-site inspection, including sampling of on-site fresh water well.
August 6, 1991	WCNA receives letter from OCD requesting submittal of investigation work plan.
September 5, 1991	Roberts/Schornick and Associates, Inc. (RSA) submits Technical Work Plan for soil and groundwater investigation to OCD on behalf of WCNA.
November 15, 1991	OCD approves technical work plan.
December 16, 1991	RSA samples fresh water well. Results submitted to OCD.
February 21, 1992	WCNA samples fresh water well. Results submitted to OCD.
July 29-August 10, 1992	BCC conducts soil and groundwater investigation according to approved technical work plan.

CHAPTER 3

TEXT

A. Background Information

On February 7, 1991, the New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division (OCD) conducted an on-site inspection at The Western Company of North America (WCNA) Hobbs, New Mexico facility. During this inspection, OCD personnel observed that soil near the fuel island was stained. A sample from the facility's fresh water well, collected by the OCD contained benzene, toluene, ethylbenzene and toluene (BTEX) concentrations above detection limits. Based on these results, the OCD requested on August 6, 1991, that WCNA submit an investigation work plan. On November 15, 1991, the OCD approved the Technical Work Plan for Soil and Groundwater Investigation with modifications to the sampling techniques and specific analyses required. This Technical Work Plan is presented in Appendix A.

On December 16, 1991, and February 21, 1921, the on-site fresh water well was re-sampled by RSA and WCNA personnel, respectively. The laboratory analysis for these two sampling events indicated that BTEX concentrations were significantly lower than the levels reported in the OCD sampling event of February 7, 1991.

The samples from the fresh water well were collected at the acid dock area which was the nearest point of access for sampling the fresh water well. Laboratory analytical results from the water samples collected by the OCD, RSA, and WCNA are presented in Appendix A.

B. Soil Investigation

On July 29 through August 5, 1992, BCC completed 9 air rotary-drilled soil borings and 6 hand augured soil borings. The following is a description of the completion, sampling, and laboratory results of the air rotary-drilled and hand augured soil borings at the WCNA Hobbs, New Mexico Facility site.

B.1 Deep Soil Boring Investigation

During July 29 through August 5, 1992, BCC completed nine deep soil borings. The locations of the borings were given in the approved Technical Work Plan prepared by RSA. Due to obstructions such as fences, overhead power lines, and other utilities, some boring locations were moved or eliminated. These modifications to the boring locations were approved by an OCD representative in the field. Each deep soil boring was drilled and continuously sampled to a depth ranging from 52 to 54 feet. The borings were drilled using air rotary-drilling methods. Soil samples were collected using a 1.5 inch diameter split spoon sampler. Due to the presence of heavy gravel in certain strata, the sampler was not able to obtain two feet of recovery; therefore, samples were

collected at varying intervals where there was sufficient recovery. Because of the presence of a layer of caliche near the surface in some borings, no recovery was obtained; however, drill cuttings were collected to be used for field screening purposes. Similarly, a sandstone layer was encountered in some borings between 30 and 32 feet. Again, no recovery was obtained and drill cuttings were collected for field screening. The locations of the borings as well as results of the laboratory analysis of deep soil boring samples are presented on the Affected Soil Map (Figure 3-1). Borehole logs prepared for each location are presented in Appendix B.

Two samples from each boring were selected for laboratory analysis. In each boring the sample with the highest flame ionization detector (FID) reading and the sample from the soil/groundwater interface were selected for analysis. 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 and the lid secured over the foil. Organic vapors were allowed to develop for approximately five minutes. During this headspace development period, the sample was shaken vigorously for approximately one minute. The aluminum foil was then pierced with the FID probe and an organic vapor reading was taken. Organic vapor readings are presented on the boring logs in Appendix B. At the conclusion of the sampling, the cooled samples were shipped via over night delivery to Southwestern Laboratories in Houston, Texas using proper chain-of-custody procedures. Upon receipt by the laboratory, the samples were logged in an assigned the log numbers shown on the analytical report presented in Appendix C.

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

All drill cuttings and excess soil generated by drilling activities were stored on heavy gauge plastic covered by heavy gauge plastic in a discreet area on-site to await proper disposal.

B.2 Deep Soil Boring Sample Analysis

All soil samples selected for laboratory analysis were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) EPA Method 8020, and Total Petroleum Hydrocarbons (Diesel Fraction) EPA Modified 8015. A summary of analytical results for the selected deep boring soil samples is presented in Table 3-1. The laboratory analytical reports are presented in Appendix B.

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–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–5

FUEL ISLAND

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

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REV.	DESCRIPTION	BY	DATE

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SCALE: 1" = 40'

DRAWN BY: JDN DATE 9/30
CHK'D BY: JLC 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: 3–1

Table 3-1 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	Xylenes	
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	<0.020	<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: Concentrations of constituents give or detection limit shown.
mg/Kg: milligrams per kilogram = parts per million

The analytical results of the deep boring soil samples indicate benzene concentrations ranging from <0.02 parts per million (ppm) to 17.95 ppm. Toluene was also present in concentrations ranging from <0.02 ppm to 103.32 ppm. Ethylbenzene was detected in concentrations ranging from <0.02 ppm to 56.49 ppm. Xylenes were found in concentrations ranging from <0.02 ppm to 177.17 ppm. Soil boring SB-1 contained the highest concentration of BTEX constituents at depths of 51 to 53 feet. The EPA Modified 8015 for the diesel fraction of Total Petroleum Hydrocarbons (TPH) showed concentrations ranging from <1.0 in borings SB-7 and SB-9 to 6680 ppm in boring SB-8. The 6680 ppm TPH in boring SB-8 was from the sample collected between the depths of 50 and 52 feet.

Based on laboratory analytical data for deep boring soil samples, hydrocarbons have affected soils between 48 and 50 feet in depth; however, existing information is not sufficient to determine the source(s) at this time.

B.3 Shallow Soil Boring Investigation

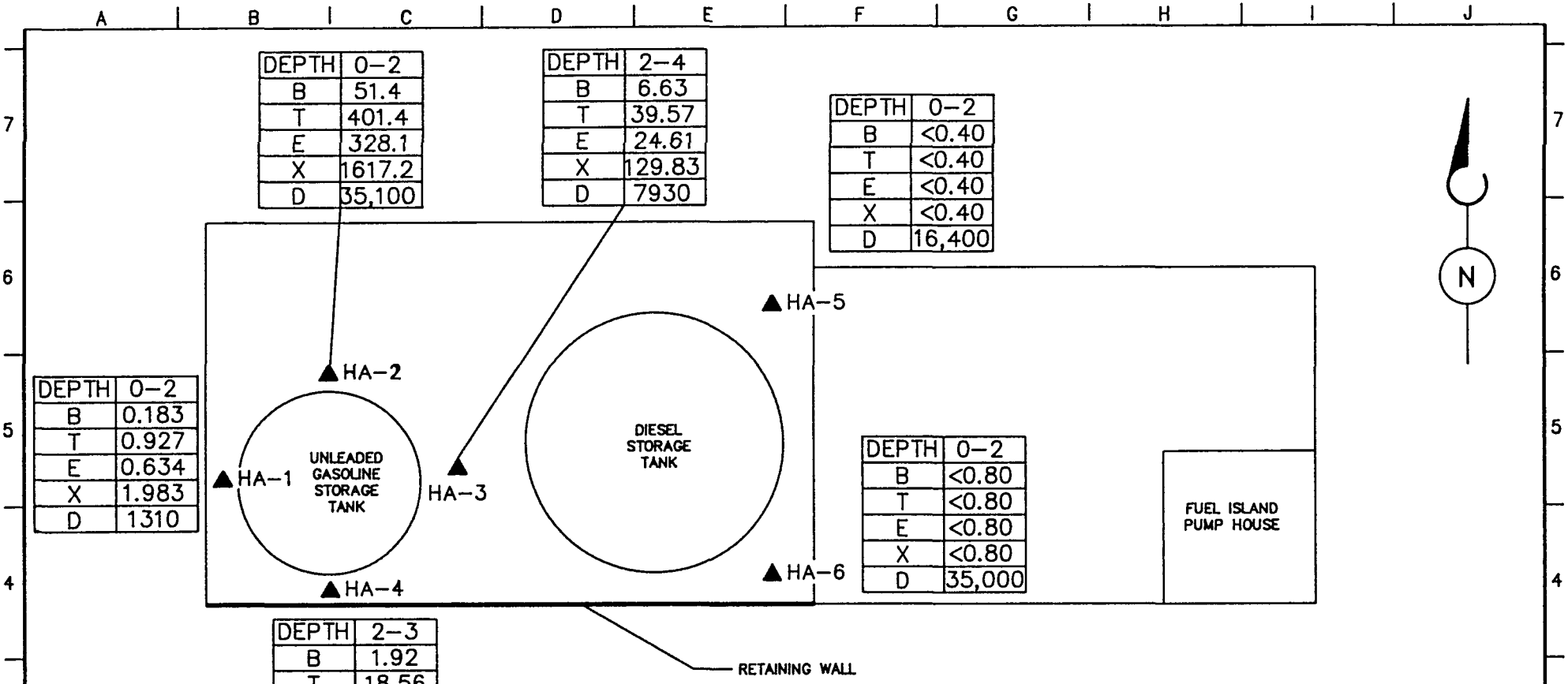
In the Technical Work Plan submitted by RSA and approved by the OCD, seven hand-augured shallow soil borings were proposed. These borings were located around the gasoline and diesel storage tanks within the retaining wall and were to be hand-augured to a depth of five feet or until refusal. On August 3, 1992, BCC completed six hand augured shallow soil borings in this area. Only two borings could be completed in the eastern portion of the retaining wall area instead of the proposed three due to the position of the diesel storage tank. The modifications to the proposed locations were approved by the OCD. Shallow boring locations are presented on Figure 3-2.

The shallow soil borings were completed using a four inch diameter stainless steel hand auger. The depths of the borings ranged from 32 inches to 4 feet below ground surface.

One soil sample from each shallow boring was selected for laboratory analysis. The sample with the highest FID reading was selected for laboratory analysis. Each sample was split and a headspace analysis was performed as in B.1 Deep Soil Boring Investigation. Decontamination and shipping procedures used for the deep soil boring investigation were utilized for sampling in the shallow soil borings. Excess soil generated during shallow soil borings was returned to its respective borehole.

B.4 Shallow Soil Boring Sample Analysis

All shallow soil samples collected for laboratory analysis were analyzed for BTEX, EPA 8020 and TPH (Diesel fraction) EPA Modified 8015. A summary of analytical results for the selected shallow boring soil samples is presented in Table 3-2 and may be found on the Affected Shallow Soils Map on Figure 3-2.



LEGEND

FUEL ISLAND

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

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APPROVED: _____ PROJECT MANAGER DATE _____
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REV.	DESCRIPTION	BY	DATE

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SCALE: 1" = 10'
DRAWN BY: JDN DATE
CHK'D BY: JLC DATE
APPROVED: LMW DATE

TITLE: AFFECTED SHALLOW SOIL MAP
CLIENT: WESTERN COMPANY OF NORTH AMERICA
SITE LOCATION: HOBBS, NEW MEXICO

DATE: 10/05/92
PROJECT NUMBER: 7032–13
FIGURE NUMBER: 3–2

Table 3-2 Summary of Laboratory Analyses for
Selected Shallow Boring Soil Samples
WCNA-Hobbs, New Mexico Facility

Sample Number (Sample Depth in Feet)	Laboratory Analyses				EPA Modified 8015 (Diesel fraction) mg/Kg)
	EPA 8020-mg/Kg				
	Benzene	Toluene	Ethylbenzene	Xylenes	
HA-2-2 (2-2.5)	51.4	401.4	328.1	1617.2	35100
HA-3-2 (2-4)	6.63	39.57	24.61	129.83	7930
HA-4-2 (2-3)	1.92	18.56	16.25	87.88	5860
HA-5-1 (0-2)	<0.40	<0.40	<0.40	<0.40	16400
HA-6-1 (0-2)	<0.80	<0.80	<0.80	<0.80	35000

Note: Concentrations for constituents given or detection limits shown
mg/KG = milligrams per kilogram = parts per million

The analytical results of the shallow boring soil samples indicate benzene concentrations ranging from <0.40 ppm to 51.40 ppm. Toluene was also present in concentrations ranging from <0.40 ppm to 401.4 ppm. Ethylbenzene was detected in concentrations ranging from <0.40 ppm to 328.1 ppm. Xylenes were found in concentrations ranging from <0.40 ppm to 1617.2 ppm. Samples selected for laboratory analysis from boring HA-5 and HA-6 were below the detection limits for all BTEX constituents. The highest concentration of BTEX constituents was found in boring HA-2 at depths of 2.0 to 2.5 feet. TPH (Diesel fraction) analysis by EPA Modified 8015, indicated concentrations ranging from 1310 ppm to 35,100. The highest concentration of TPH was found in boring HA-2 from 2.0 to 2.5 feet.

Based on the laboratory analysis, it appears that hydrocarbons from the ASTs have affected the shallow soils with the retaining wall area.

C. Groundwater Investigation

On August 6 through August 8, 1992, BCC installed monitoring wells in five of the nine deep soil borings. On August 8, through August 10, 1992, BCC developed, purged, and sampled the newly installed monitoring wells. Also, in accordance with the Technical Work Plan, the fresh water well on-site was also sampled. The following is

a description of the installation, development, purging, and sampling of the newly installed monitoring wells, as well as the purging and sampling of the fresh water well located on-site.

C.1 Description of Fresh Water Well

As indicated earlier in this report, WCNA has a fresh water well located on-site. The well was installed on August 15, 1975 by Abbott Brothers and is located to the north east of the fuel island area (See Figure 1-2). The fresh water well has a total depth of 125 feet and is screened between 55 and 125 feet.

The water produced from the well is stored in an adjacent 22,500 gallon AST. The water stored in the AST is transferred by PVC piping to the acid dock area to be used by WCNA in mixing acid solutions. The AST is marked with a "non-potable water" sign and is not used as a source of drinking water.

C.2 Monitor Well Installation

After soil sampling procedures were completed, five borings (selected by the OCD office in Santa Fe, New Mexico) were reamed to a suitable diameter and advanced to a total depth of approximately 62 feet in preparation for the installation of five, 2-inch diameter monitoring wells.

Each well consisted of approximately 1.2 feet of 2-inch diameter schedule 40 PVC blank, 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 50 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 45 feet, 30 feet, and 15 feet below ground surface.

Silica sand (20-40 Brady sand) was slowly poured down the borehole to provide a filter pack. The filter pack extends approximately two feet above the top of the screened interval and this depth was verified by measurement. Approximately two feet of bentonite pellets were poured down the borehole immediately above the filter pack and hydrated to form an annular seal. 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-1, MW-2, MW-3, and MW-5 were completed approximately three feet above grade as locking monument completions. Each monitoring well is protected by three steel guard posts set two feet below grade and extending three feet above grade. Each guard post is filled with concrete and set in concrete. Monitoring well MW-4 was completed with a flush-mount grade box surrounded by a small (approximately one foot diameter) concrete pad.

Monitor wells installed at the site were developed to remove fine sediments from the bottom of the well. Development was accomplished by using a clean stainless steel bailer to evacuate three to four well volumes. The evacuated water was placed in the on-site field waste tanks.

On August 12, 1992, the guard posts, monument pipe, and surface casing on monitoring well MW-2 were damaged by a WCNA truck. After discussion, BCC contracted Harrison Drilling and Environmental Services, Inc. to repair MW-2. On August 20 and 21, 1992, the above grade guard posts and monument pipe were removed. The surface casing was repaired and a flush-mount, traffic proof, manhole was installed as the surface completion.

C.2 Monitor Well Sampling

Groundwater samples for laboratory analysis were collected from each monitoring well on August 10, 1992. Prior to sample collection, a clean stainless steel bailer was used to purge each well. Water was removed until the pH, temperature, and specific conductance stabilized (two consecutive readings). After purging the monitor wells, they were allowed time to recharge to static water level and then sampled. The fresh water well was sampled almost immediately after purging.

The monitoring wells were sampled at static water level by lowering a clean Teflon bailer into the well. All equipment used for bailing and sampling was cleaned prior to each use by washing with a laboratory-grade detergent solution, rinsing with tap water, rinsing with distilled water, lightly rinsing with isopropyl alcohol, and a final rinse with distilled water. The water samples were placed in labeled, laboratory cleaned bottles. These bottles were immediately placed on ice to prevent the loss of any volatile constituents. At the conclusion of sampling, the cooled samples were shipped via overnight express to Southwestern Laboratories in Houston, Texas using proper chain-of-custody procedures.

On August 10, 1992, BCC collected a groundwater sample from the on-site fresh water well. Prior to sampling, the fresh water well was purged by allowing the pump to operate for approximately three minutes to evacuate any stagnant water.

A groundwater sample was collected immediately after purging the fresh water well. This sample was collected via a faucet connected directly to the well housing. The water sample was placed in labelled, laboratory cleaned bottles. The preservation and shipping procedures listed above for the monitoring well water samples were used for the fresh water well sample.

C.3 Groundwater Sample Analysis

The six groundwater samples were analyzed for BTEX (EPA 8020), polynuclear aromatic hydrocarbons (EPA 8100) and major cations and anions using appropriate EPA methods (See Table 3-3). A summary of the analytical results of groundwater samples is presented in Table 3-3 and BTEX analysis may also be found on the Dissolved-Phase Concentration Map (Figure 3-3). The laboratory analytical results are presented in Appendix C.

The analytical results of the groundwater sample indicate benzene concentrations ranging from <0.004 ppm to 5.55 ppm. Toluene was detected in concentrations ranging from <0.004 ppm to 12.09 ppm. Ethylbenzene was also present in concentrations ranging from <0.004 ppm to 2.16 ppm. Xylenes were found in concentrations of <0.004 in monitoring wells MW-5, MW-2, and the fresh water well.

Monitoring well MW-1 contained the highest concentration of BTEX constituents while BTEX constituents in MW-5 were below detection limits. Monitoring well MW-3 contained a benzene concentration of 0.0149 ppm while the other BTEX constituents were below detection limits. Polynuclear aromatic hydrocarbons were below detection limits in all monitoring well samples.

The fresh water well sample laboratory analysis indicated that all BTEX constituents and polynuclear aromatic hydrocarbons were below detection limits.

Based on the laboratory analytical data of all water samples, groundwater at the site has been affected by hydrocarbons; however, not there is not enough information to determine the source (s) of the hydrocarbons.

D. Determination of Groundwater Flow Direction and Gradient

On August 10, 1992, BCC recorded groundwater level measurements in each of the five newly installed monitoring wells. To identify potential floating or sinking 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 survey elevation marked at the top of each well casing which were established by a survey conducted on August 10, 1992, by BCC. 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. Non-aqueous phase liquids were not identified in the monitoring wells. Groundwater elevation data is presented in Table 3-4. The groundwater flow direction at the site is to the northeast with a gradient of <0.01 feet per foot. Figure 3-4 presents the Groundwater Gradient Map for the WCNA-Hobbs, New Mexico Facility site.

Table 3-3 Summary of Laboratory Analyses for Groundwater Samples WCNA-Hobbs, New Mexico Facility

Laboratory Analyses	Well Number					
	MW-1	MW-2	MW-3	MW-4	MW-5	Fresh Water Well
EPA 8020 (mg/L) Benzene	5.55	0.0149	0.3049	2.594	<0.004	<0.004
EPA 8020 (mg/L) Toluene	12.09	<0.004	2.099	10.36	<0.004	<0.004
EPA 8020 (mg/L) Ethylbenzene	2.16	<0.004	0.676	2.16	<0.004	<0.004
EPA 8020 (mg/L) Xylenes	7.37	<0.004	1.586	6.74	<0.004	<0.004
EPA 8020 (mg/L) Total BTEX	27.17	0.0149	4.665	21.85	<0.016	<0.016
EPA 8100 Polynuclear Aromatics (ug/L)	BDL	BDL	BDL	ND	ND	ND
EPA 310.1 Hydroxide (mg/L)	0	0	0	0	0	0
EPA 310.1 Carbonate (mg/L)	0	0	0	0	0	0
EPA 310.1 Bicarbonate (mg/L)	383	287	315	361	305	216
GPA 200.7 Calcium (mg/L)	133	171	149	138	91.8	366
EPA 325.3 Chloride (mg/L)	163	122	19.2	26	91	621
EPA 340.2 Fluoride (mg/L)	1.18	0.93	1.08	1.06	0.95	0.83
SM 2340B Hardness (mg/L)	494	629	553	518	330	1147
EPA 200.7 Magnesium (mg/L)	39.7	49.1	44.2	42.0	24.4	56.4
EPA 353.2 Nitrate (mg/L)	1.25	3.75	3.03	1.69	3.12	2.32
EPA 258.1 Potassium (mg/L)	614	7.67	5.83	7.15	7.74	4.70
EPA 200.7 Sodium (mg/L)	112	90.0	93.5	116	116	101
EPA 375.2 Sulfate (mg/L)	158	174	2.09	183	180	251

Note: Concentrations of constituents given or detection limit shown.
BDL= Below Detection Limits for all constituents
ug/L= micrograms per liter = parts per billion
mg/L= milligrams per liter = parts per million

HOMCO PROPERTY

WEST COUNTY ROAD

B	2.59
T	10.36
E	2.16
X	6.74

MW-4

B	5.55
T	12.09
E	2.16
X	7.37

MW-1

B	<0.004
T	<0.004
E	<0.004
X	<0.004

FRESH WATER WELL

MW-5

B	<0.004
T	<0.004
E	<0.004
X	<0.004

FUEL ISLAND

MW-3

B	0.304
T	2.099
E	0.676
X	1.586

MW-2

B	0.0149
T	<0.004
E	<0.004
X	<0.004

ACID DOCK

BULK PLANT

OFFICE

TRUCK BAYS

N

LEGEND

B = BENZENE – mg/L
T = TOLUENE – mg/L
E = ETHYL BENZENE – mg/L
X = XYLENE – mg/L

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REV.	DESCRIPTION	BY	DATE

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CHK'D BY: JLC DATE 9/30
APPROVED: SAM DATE ____

TITLE: DISSOLVED–PHASE CONCENTRATION MAP

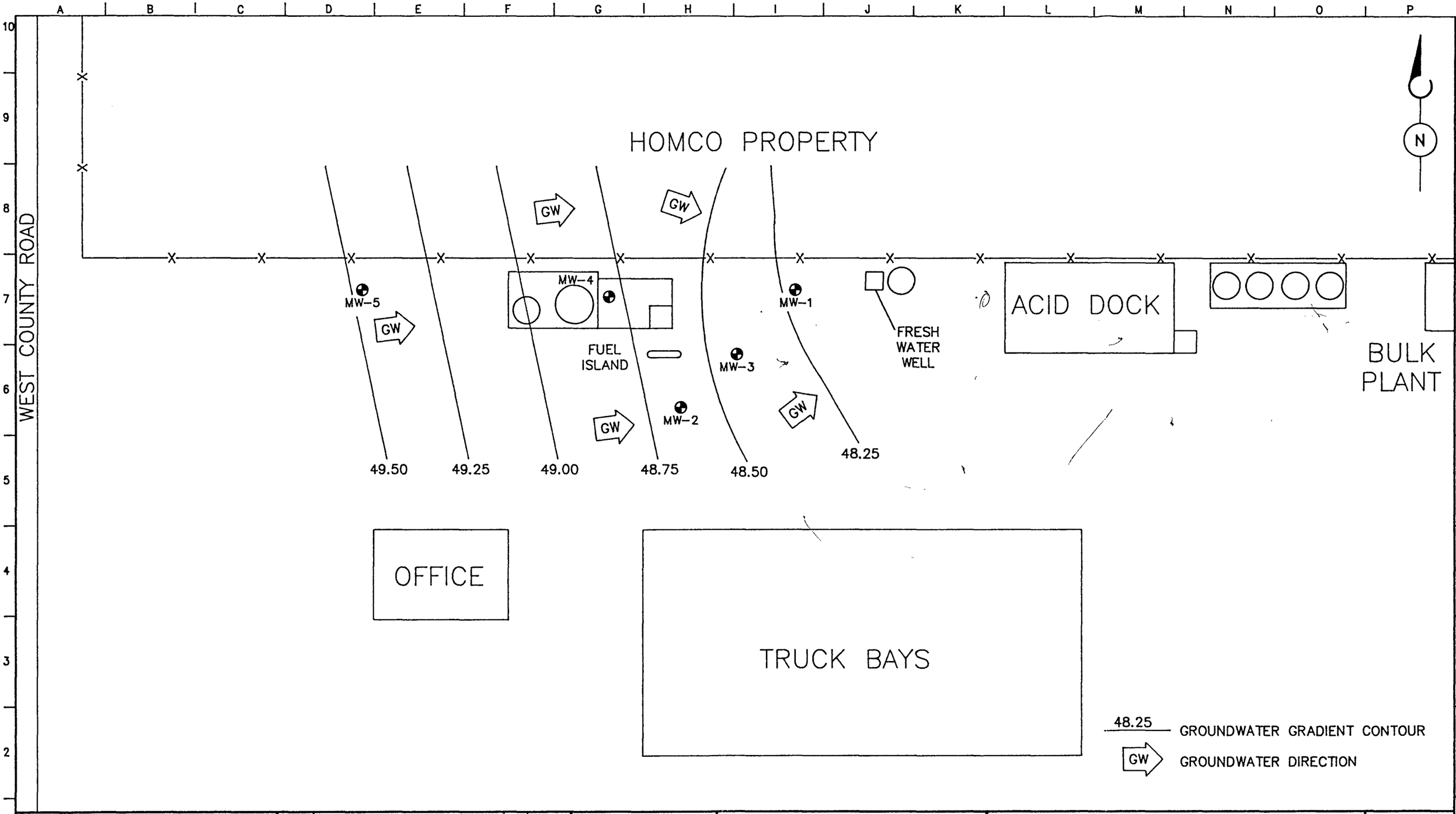
DATE: 10/06/92

CLIENT: WESTERN COMPANY OF NORTH AMERICA

PROJECT NUMBER: 7032–13

SITE LOCATION: HOBBS, NEW MEXICO

FIGURE NUMBER: 3–3



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BROWN AND CALDWELL

REV.	DESCRIPTION	BY	DATE

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DRAWN BY: JDN DATE 9/30
CHK'D BY: JLC DATE 9/30
APPROVED: SAM DATE _____

TITLE: GROUNDWATER GRADIENT MAP
DATE: 10/06/92
CLIENT: WESTERN COMPANY OF NORTH AMERICA
PROJECT NUMBER: 7032–13
SITE LOCATION: HOBBS, NEW MEXICO
FIGURE NUMBER: 3–4

Table 3-4 Groundwater Level Data
WCNA-Hobbs, New Mexico Facility

Well Number	Top of Casing Elevation	Depth of Water from Top of Casing (ft)	Groundwater Elevation
MW-1	101.44	53.22	48.22
MW-2	101.50	52.82	48.68
MW-3	101.44	52.99	48.45
MW-4	99.33	50.55	48.78
MW-5	101.85*	52.38	49.47

* MW-5 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. This in no way affects groundwater elevation in this monitor well.

E. Determination of Water-Bearing Zone Characteristics

On August 9, 1992, BCC conducted a preliminary slug test to determine the hydraulic characteristics of the water-bearing zone encountered at the WCNA-Hobbs, New Mexico Facility site. A clean stainless steel bailer was used to remove approximately one gallon of water from MW-1 and MW-5; however, both wells recovered to rapidly to adequately determine the hydraulic characteristics. Therefore, a review of reference data was performed to determine a range for characteristics of the water-bearing zone. Reference data collected from nearby Gaines and Yoakum Counties in west Texas, indicate that permeability is approximately 250 to 500 gallons per day per square foot while hydraulic conductivity is approximately 34 to 67 feet per day (from Texas Department of Water Resources Report 288. "Evaluating the Ground-Water Resources of the High Plains of Texas", Volume 1). These numbers correspond to accepted values for clean, fine to coarse sand which was encountered as the water-bearing strata of the WCNA-Hobbs, New Mexico Facility site.

Using the range for hydraulic conductivity of 34 to 67 ft/day, using 0.01 as the hydraulic gradient, and assuming a 40 percent effective porosity (average for a clean sand), an approximate range for linear groundwater velocity by:

$$V = \frac{Ki}{Nc}$$

Where V is linear groundwater velocity, K is the hydraulic conductivity, *i* is the hydraulic gradient and Nc is the effective porosity. The average range of linear groundwater velocity is estimated to be between 310 and 611 feet per year.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

The following is a listing of conclusions and recommendations given by Brown and Caldwell Consultants (BCC) for The Western Company of North America (WCNA) Hobbs, New Mexico Facility site.

4.a Conclusions

Based on field investigations and laboratory analysis results, BCC presents the following conclusions:

- Hydrocarbons were found in shallow soils to a depth of four feet, surrounding the aboveground fuel storage tanks (ASTs) at concentrations of up to 2398.1 ppm total BTEX and 35,100 ppm TPH. It appears that hydrocarbons from the ASTs have affected the shallow soils within the retaining wall area;

- Maximum hydrocarbons were found in deeper soils at a depth between 48 and 53 feet with concentrations of up to 354.93 ppm total BTEX and 7,610 ppm TPH. The source(s) of these hydrocarbons have not been fully determined at this time;

- Hydrocarbons were found in the groundwater at the site in concentrations of up to 27.17 ppm total BTEX. The source(s) of these hydrocarbons have not been fully determined;

- BTEX values for the fresh water well sample was below detection limits;

- Polynuclear Aromatic Hydrocarbons were below detection limits for all groundwater samples;

- Based on this investigation, BCC has determined groundwater gradient to be <0.01 feet per foot with a flow direction toward the northeast.

4.b Recommendations

Based on information obtained to date, BCC recommends the following:

- Visit OCD office in Santa Fe to obtain information on adjacent property(s);

- Install another permanent monitoring well southeast of the fresh water well to assist in determining groundwater gradient to the east of the fresh water

well. This well will assist in determining if the fresh water well is affecting groundwater gradient at the site;

- Conduct one more groundwater sampling event to verify groundwater gradient and flow direction as well as previous laboratory analytical results;

- Based on the results of the second sampling event and comments from the OCD on this report, prepare a Remedial Action Plan (RAP) to remediate the soil and groundwater at the WCNA-Hobbs, New Mexico Facility site to meet cleanup levels negotiated with the State of New Mexico.

A

APPENDIX A

- Approved Technical Work Plan
- OCD Approval Letter for the Technical Work Plan with Modifications
- Previous Laboratory Results for Fresh Water Well Sampling

TECHNICAL WORK PLAN

SOIL AND GROUNDWATER INVESTIGATION

The Western Company of North America

Hobbs, New Mexico

Prepared by

Roberts/Schornick and Associates, Inc.

Environmental Consultants

Norman, Oklahoma

(405) 321-3895

September 5, 1991

TABLE OF CONTENTS

TECHNICAL WORK PLAN
SOIL AND GROUNDWATER INVESTIGATION
THE WESTERN COMPANY OF NORTH AMERICA
HOBBS, NEW MEXICO
SEPTEMBER 5, 1991

1.0 BACKGROUND

1.1 Introduction

The Western Company of North America (Western) is responding to a suspected fuel release at its Hobbs, New Mexico facility (Facility), shown in Figure 1. The response is in accordance with the findings of a site inspection by the Oil Conservation Division (OCD) of the New Mexico Energy, Minerals and Natural Resources Department. During inspection of the Facility, OCD personnel observed that soils next to the fueling island showed evidence of fuel spills and leaks. Additionally, a sample collected from the Facility's fresh water well indicated elevated levels of benzene, toluene, ethylbenzene, and xylenes (BTEX).

The investigation described in this Work Plan will determine the extent of soil impact from fueling island spills and leaks, as well as investigate the sources and extent of groundwater impact at the Facility.

1.2 Facility Description

The Hobbs, New Mexico Facility operates as an oil and gas servicing company providing oil and gas well fracturing, acidizing, and cementing services to oil and gas producing

clients. Pertinent regulatory identification information is as follows:

1. Owner Address: The Western Company of North America
   P. O. Box 56006
   Houston, Texas 77256

2. Owner Representative: Mr. Ron McKeel, Director, Real Estate and Facilities Construction

3. Owner Telephone No.: 713/629-2861

4. Facility Address: The Western Company of North America
   2708 W. County Road
   Hobbs, New Mexico

5. Facility Representative: Mr. Sherman Walters, Environmental Coordinator

6. Facility Telephone No.: 505/392-5556

The Western Facility maintains a fueling operation on the north side of the Facility service yard (Figure 2). The fuel island dispenses unleaded gasoline and diesel fuel to service vehicles. The diesel fuel is stored in a 22,500 gallon above ground storage tank (AST), while the unleaded gasoline is stored in a 5,500 gallon AST. Fuel is transferred from the unleaded gasoline and diesel fuel ASTs to above ground dispenser pumps via underground fuel lines. The underground fuel lines are buried approximately two (2) to three (3) feet below grade.

1.3 Communication with the OCD

On February 7, 1991, the OCD conducted an on-site inspection at the Hobbs Facility. During this inspection, OCD personnel observed that soil near the fueling island showed signs of spill and leaks. Also, a sample collected from the Facility's fresh water well had elevated levels of BTEX. As a result of these findings, in an August 6, 1991 letter, OCD requested Western to submit an investigation Work Plan by September 6, 1991.

Conversations with OCD personnel indicated that Western's adjacent (and likely upgradient) neighbor recently completed a remediation project addressing soils which exhibited total petroleum hydrocarbon (TPH) and BTEX impacts. Therefore, this Work Plan is designed to evaluate the extent of soil or groundwater impacts from off-site sources, as well as on-site sources, if any.

2.0 HYDROGEOLOGICAL INVESTIGATION TECHNICAL WORK PLAN

2.1 Background Review

A literature review will be made to gather the following information:

1. Brief history of land use at the site and chronology of pertinent events leading up to the investigation.
2. Pertinent inventory records and description of inventory methodology. These must be reconciled to show loss or excess.
3. Any photos of damaged tanks or lines.
4. Results of any tank or line integrity tests including descriptions of test procedures.
5. Detailed plans of any petroleum vapor surveys on soil samples or in nearby basements, sewers, manholes, etc.
6. Relevant geotechnical reports conducted previously at the Site.
7. Record of any subsurface utility lines present at the Facility.
8. Pertinent OCD files, especially results of soil and/or groundwater investigations conducted by adjacent land owners.
9. Review of industry activity (including oil/gas drilling) in the immediate area.
10. A review of regional/site specific literature and water well records.

2.2 Water Well Analysis

Before any site investigation activities begin, the fresh water well at the Facility will be resampled and analyzed to confirm the results of the February 11, 1991 analysis. Parameters analyzed will be BTEX, TPH, total dissolved solids (TDS), specific conductance, pH, and chloride. If the results from the analysis confirm groundwater impacts, investigation activities will be conducted as described in this Work Plan.

2.3 Soil Borings

Western will drill approximately twelve (12) soil borings at the Facility for the purposes of evaluating the subsurface stratigraphy/hydrogeology and to delineate the horizontal and vertical extent of hydrocarbon impacts to soils/groundwater. One (1) boring will be located near an underground storage tank (Figure 2) to determine if there are any related soil/groundwater impacts. Also, concern for groundwater impacts from off-site sources may require the alteration of soil boring placement or the installation of additional monitor wells. Placement of monitor wells will allow a static shallow groundwater level to be established and the general shallow groundwater flow direction to be determined. The proposed boring locations are shown on Figure 3. The actual number and locations of borings and monitoring wells may vary according to the site geology. Air rotary or hollow stem auger drilling methods will be utilized, depending upon the

lithology encountered. Approximately 3 to 5 of these borings may become groundwater monitoring wells if impact to the uppermost groundwater system is indicated from the soil investigation or the results of the water well analysis. If no impact is indicated to the water supply well or from the soil boring program, then the need for monitor wells will be evaluated further. All borings will be drilled to a depth of approximately 65 feet and into the shallow or uppermost groundwater system beneath the Facility.

Soil samples will be collected from the borings at 2-foot increments. Lithological descriptions of the soil samples will be visually made according to the Unified Soil Classification System (ASTM D-2487). Soil boring logs will be generated for each boring. Selected soil samples will be collected and analyzed for TPH.

The air rotary or hollow stem auger drilling equipment and all downhole sampling equipment will be decontaminated prior to use in each boring utilizing a high temperature/pressure washer. All other sampling equipment will also be washed between each sampling event.

All boreholes not completed as monitor wells will be backfilled to approximately 1-foot from ground surface with a cement-bentonite grout mix. The grout slurry consists of

mixing 6.5 gallons of water with 3 to 5 pounds of powdered bentonite and 94 pounds of portland cement. All boreholes will be rechecked the day after grout placement and those boreholes where the grout has subsided will be "topped off" to the 1-foot depth. The remaining one foot of the borehole will be backfilled with a high-strength concrete.

2.4 Soil Headspace Gas Survey

A soil headspace gas survey typically is the measurement of relative or specific volatile hydrocarbon concentrations in soil pores in the unsaturated and saturated zone at various points, distributed vertically and horizontally. In the unsaturated zone, hydrocarbons can exist in the vapor phase in soil pores, adsorbed onto soil particles, and as free hydrocarbon liquid in soil pores. Hydrocarbons in the saturated zone are typically adsorbed onto soil particles over the zone of groundwater fluctuations or may exist as free liquid in the soil pores. By obtaining soil headspace gas data at vertically and horizontally distributed points, the extent of subsurface hydrocarbon impact can be defined.

The ambient temperature headspace (ATH) method (Van Zyl, 1987) consists of collecting discreet (or composite) soil samples from a borehole and placing the soil in a glass container, leaving a vacant headspace in the glass container. The headspace gas in each glass sample container is then analyzed

for organic vapors using a portable organic vapor monitor (OVM) photoionization detector.

Soil samples will be collected using a 4-inch hand auger at about seven (7) sample sites located within the retaining wall surrounding the above ground fuel tanks. Soil borings will be advanced to five (5) feet below grade or until auger refusal is encountered.

Soil boring samples will be collected at 2-foot increments and placed in glass jars (the jars are filled to 3/4 full). A layer of aluminum foil will be placed over the top of the jar and the cap screwed in place, sealing the jar. After waiting a period of time (samples are stored at ambient air temperatures), the OVM photoionization detector probe will be used to pierce the aluminum foil and an organic vapor headspace reading will be obtained. The resulting OVM headspace gas readings are in parts per million (ppm) of total ionizable hydrocarbon based upon a isobutylene standard. The OVM photoionization detector is calibrated to a known isobutylene gas standard prior to the headspace gas readings. The OVM detector has a limit of detection of 100 parts per billion of total ionizable hydrocarbon. Results of the OVM ambient temperature headspace gas readings are recorded (and presented in graphical form) on the soil boring logs. The OVM soil gas readings provide an important insight into both the

vertical and areal extent of hydrocarbon occurrence in the subsurface soils/groundwater in the Facility area.

Also, as part of the investigation, OVM soil gas readings will be made on all boreholes upon borehole completion. These readings are made by lowering the OVM photoionization chamber into the open borehole to a depth of approximately six (6) inches and recording the OVM borehole vapor readings on the soil boring logs. Soil samples will be collected from the boreholes based the OVM soil gas analyses and tested for TPH and BTEX.

2.5 Monitor Well Installation

If the soil investigation indicates impacts to the uppermost groundwater system, approximately 3 to 5 of the drilled boreholes may be completed as groundwater monitoring wells in order to monitor shallow groundwater quality beneath the Facility, test the aquifer physical properties, and measure groundwater elevations for hydraulic gradient/flow direction and seasonal water-level fluctuations. All appropriate OCD permits will be obtained prior to installing monitoring wells.

All monitor wells will be constructed with pre-cleaned, 2-inch, screw-coupled, tri-lock, PVC casing and 0.010-inch slot, 10 to 20-foot long, PVC screens. Screen placement will be chosen by centering the screen across and above the

groundwater level observed at the time of drilling. Placing the screen at this level in the zone of saturation allows for the monitoring of potential immiscible layers or lighter-than-water organics on the groundwater surface. The entire screen length annulus is surrounded with a clean 8-20 silica sand filter pack. A 0.75-foot long fines-catchment sump is placed below the screen interval and the bottom of the sump is fitted with a PVC screw plug. The sand filter pack extends from the bottom of the well to approximately 2.0 feet above the top of the screen. A 2-foot thick sodium bentonite seal is placed above the top of the sand pack. The well annulus from the top of the bentonite seal to approximately one (1) foot feet below ground level will be filled with a cement/bentonite grout mix. All completion materials (screen, sump, riser, plugs, protectors and caps) will be thoroughly cleaned with a high temperature/high pressure water wash before entering the borehole. The remaining one (1) foot of the borehole and well casing is covered with a watertight, steel, flush grade, protector placed over the PVC casing and anchored in concrete or a 4-inch abovegrade steel protector anchored in concrete. A watertight cap will also be placed over the monitor well for all below grade completions. Well completion diagrams will be generated for each well installed.

The monitor wells will be developed using a 1.67-inch diameter teflon bailer, bladder pump, or Brainard-Kilman hand pump. The wells will be purged until the water visibly clears of fine-grained sediment and the pH, temperature, and specific conductance of the developed groundwater stabilizes.

The monitor wells will determine the following:

1. Depth to groundwater,
2. The groundwater gradient and flow direction,
3. Recharge/discharge zones,
4. Seasonal fluctuations in groundwater levels,
5. Site geology,
6. Horizontal and vertical extent of impact, if any, and
7. Thickness and type of free petroleum product layer, if any.

2.6 Groundwater Sampling

Groundwater will be sampled for the purpose of characterizing the chemical quality of the shallow groundwater upgradient and downgradient from the any identified hydrocarbon release area(s).

Prior to sampling, all wells will be measured to determine static groundwater levels and well depth. In addition, the groundwater surface will be inspected to determine if any floating immiscible liquids are present. Following these

measurements, the wells will be purged of at least three casing/sand pack volumes of groundwater in order to eliminate stagnant fluids within the well casing and sand filter pack. Purging will be accomplished by bailing with precleaned, dedicated, teflon bailers. All bailers are fitted with clean monofilament line. All fluids purged from the wells will be collected in 55 gallon drums and retained on-site until disposal is arranged.

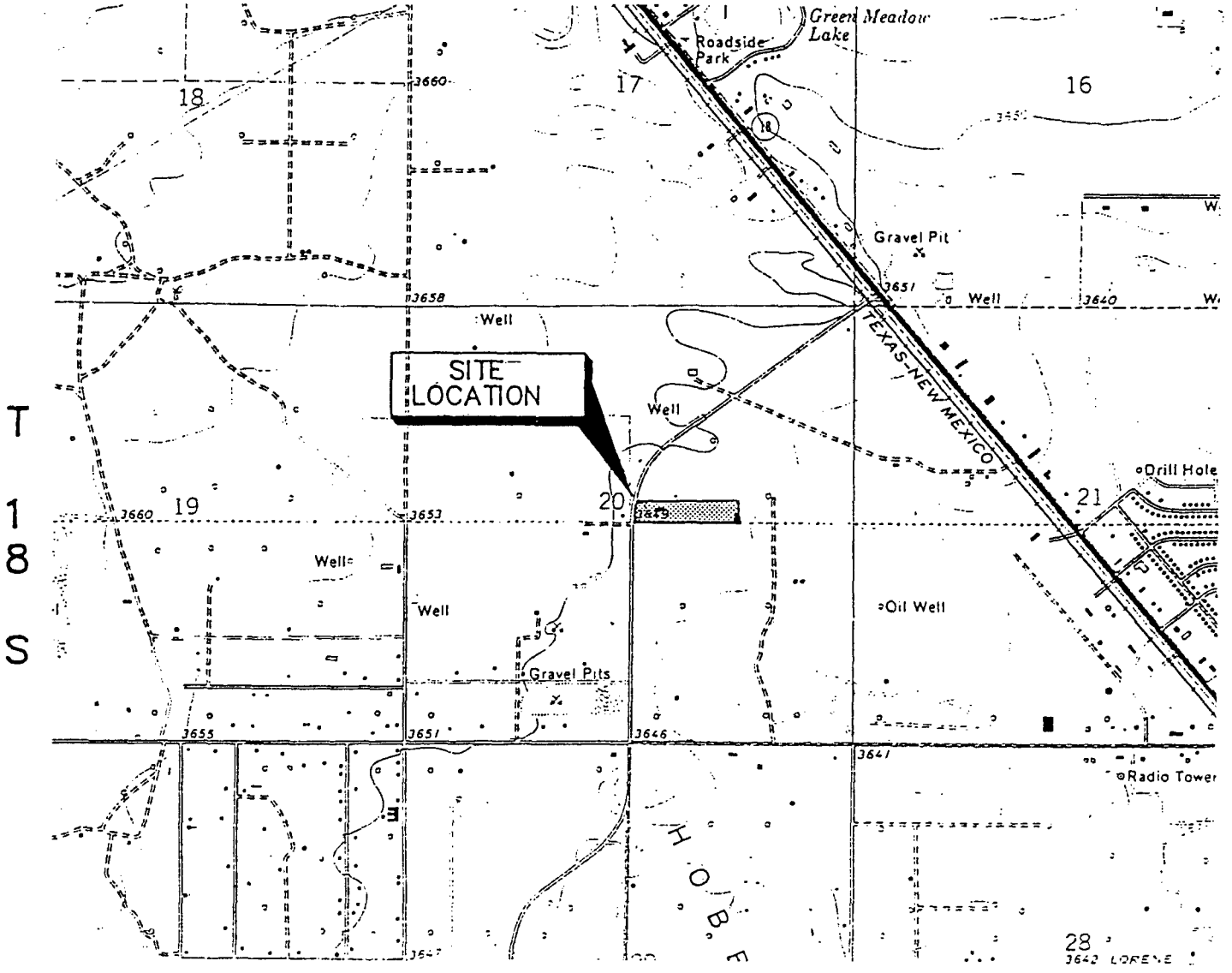
Groundwater samples will be collected with precleaned teflon bailers. The groundwater samples are carefully poured from the bailer directly into the appropriate sample bottles. Special care is exercised during sampling to avoid excess aeration of the sample. All sample bottles will be appropriately pre-cleaned by the analytical laboratory. The appropriate sample bottles are prepared with pre-measured acid preservatives by the analytical laboratory. All samples are packed in ice immediately after being collected, then shipped under chain-of-custody control by overnight air express to the laboratory for analysis.

The groundwater will be laboratory analyzed for BTEX, TPH, chloride, pH, specific conductance, and TDS. During well sampling, the pH, temperature, TDS, and specific conductivity of all groundwater samples are also tested. BTEX and TPH are indicator parameters for gasoline and diesel fuel releases to

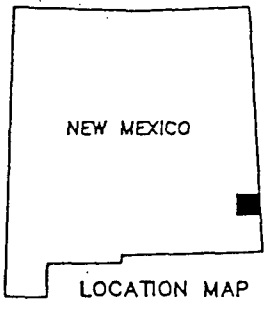
groundwater. The remaining parameters act as indicators of inorganic impacts to the groundwater.

2.7 Schedule

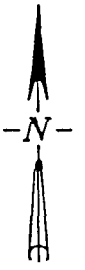
Western will initiate the hydrogeological investigation within 30 working days following approval of the Technical Work Plan by the New Mexico OCD. The investigation results along with a Corrective Action Plan, if required, will be submitted to the OCD following completion of the investigation.



AFTER U.S.G.S. 7.5 MIN, TOPO. QUAD., HOBBS, NEW MEXICO, REVISED 1971



LOCATION MAP



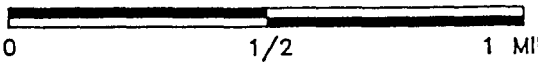
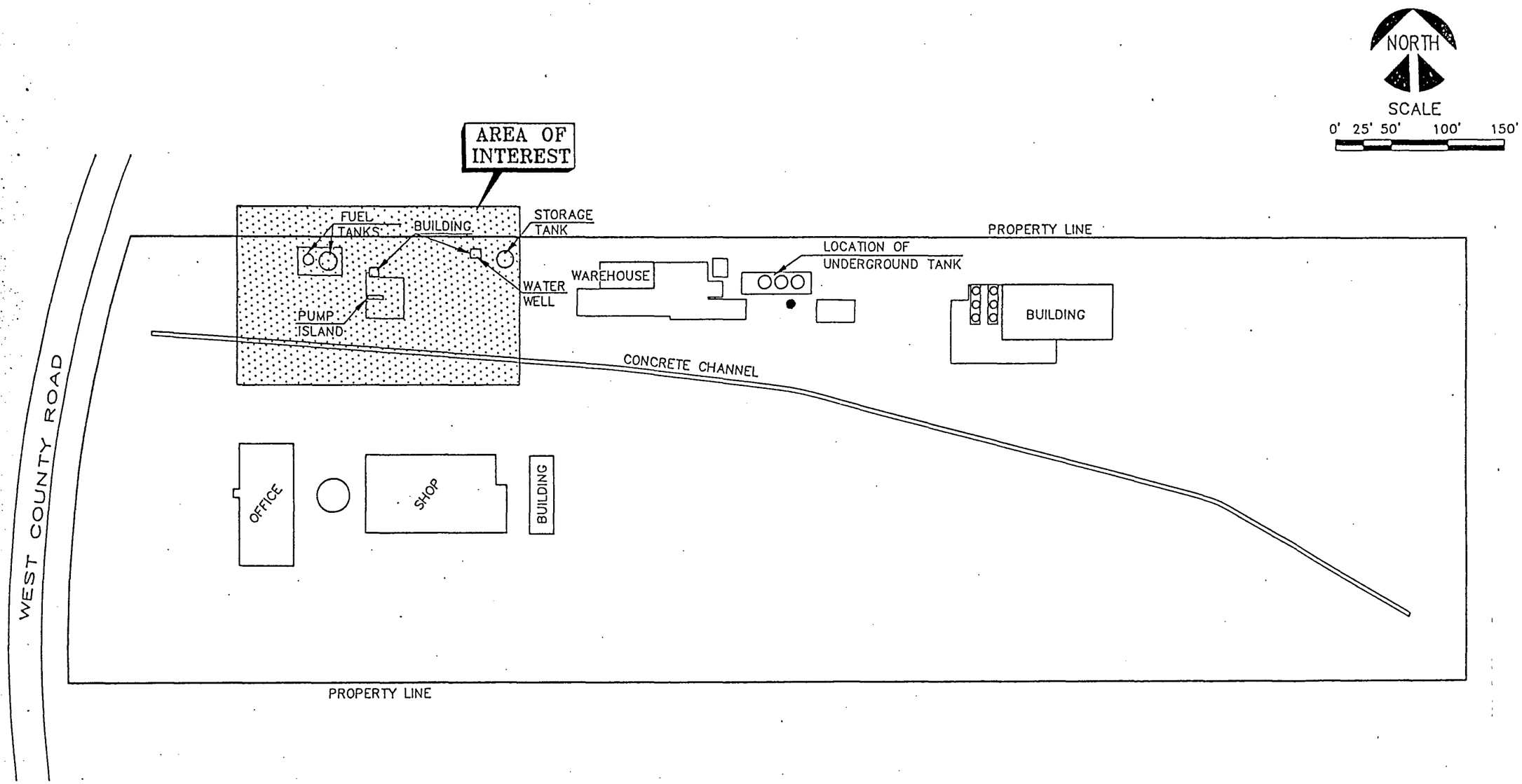


Figure Title: SITE LOCATION AND TOPOGRAPHIC MAP	Client: THE WESTERN COMPANY OF NORTH AMERICA
Document Title: HYDROLOGICAL INVESTIGATION	Location: HOBBS, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

DATE: 8/27/91	PREPARED BY: J.M.B.
	CHECKED BY: B.J.S.
SCALE: AS SHOWN	DRAFTED BY: B.D.R.
PROJECT NO: 91037.01	FIGURE NO.: 1



LEGEND

● TENTATIVE SOIL BORING LOCATION

Figure Title: FACILITY LAYOUT	Client: THE WESTERN COMPANY OF NORTH AMERICA
Document Title: HYDROGEOLOGICAL INVESTIGATION	Location: HOBBS, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3686

DATE: 9/29/91	PREPARED BY: B.D.
SCALE 1"=100'	CHECKED BY: B.J.S.
	DRAFTED BY: RWL
PROJECT NO: 91037 M01	FIGURE NO.: 2

NORTH

SCALE

0' 10' 20' 30' 40'

PROPERTY LINE

BUILDING

WATER WELL

X

STORAGE TANK

FUEL TANK

FUEL TANK

BUILDING

PUMP ISLAND

ADDITIONAL TENTATIVE SOIL BORING LOCATION SHOWN ON FIGURE 2.

CONCRETE CHANNEL

LEGEND

- ▲ TENTATIVE HAND AUGER BORING LOCATION
- ● TENTATIVE SOIL BORING LOCATION
- ■ TENTATIVE MONITOR WELL LOCATION
- EXPECTED GROUNDWATER FLOW DIRECTION

Figure Title: PROPOSED LOCATIONS OF SOIL BORINGS AND MONITOR WELLS	Client: THE WESTERN COMPANY OF NORTH AMERICA
Document Title: HYDROGEOLOGICAL INVESTIGATION	Location: HOBBS, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3893

DATE: 9/29/91	PREPARED BY: D.B.
	CHECKED BY: B.J.S.
SCALE: 1"=20'	DRAFTED BY: RML
PROJECT NO: 91037 M02	FIGURE NO.: 3

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

November 15, 1991

CERTIFIED MAIL
RETURN RECEIPT NO. P-106-675-384

Mr. Benny Ho
The Western Company of North America
P.O. Box 56006
Houston, Texas 77256

RE: Hobbs Service Facility (GW-72)
Soil & Groundwater Contamination Investigation
Lea County, New Mexico

Dear Mr. Ho:

The Oil Conservation Division (OCD) has received the September 5, 1991 "Technical Work Plan, Soil and Groundwater Investigation," submitted on behalf of The Western Company of North America (WCNA) by Roberts/Schornick and Associates, Inc. The above document outlines a plan for an investigation into the sources and extent of soil and groundwater contamination at the WCNA Hobbs Service Facility. The OCD approves the Technical Work Plan with the following conditions:

1. All groundwater samples will be analyzed for Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Polynuclear Aromatic Hydrocarbons (PAH's), and major cations and anions using standard EPA methods.

2. If the results from the fresh water well analysis confirm groundwater impacts then investigation activities will be conducted as described in the Work Plan. However, if the results indicate that groundwater has not been impacted, the WCNA is still required to investigate the extent of the soil contamination from facility leaks and spills and submit a clean-up and remediation plan.

3. The WCNA has proposed 12 soil borings at the facility to delineate the extent of hydrocarbon impacts to soils and groundwater. Any changes in either the number or location of these proposed borings must be approved by the OCD.

4. Soil vapor measurements will be taken with the organic vapor meter (OVM) every 2 feet on all soil borings. For each soil boring, laboratory samples will be taken at the highest OVM reading and at approximately 2 feet above the water table if there is any OVM reading at this location. These samples will be analyzed for volatile aromatic organics using the EPA method 602 and for Total Petroleum Hydrocarbons (TPH) using the modified EPA method 8015.

5. All monitor wells will be constructed with a minimum of 10 feet of screen below the water table and 5 feet of screen above the water table.

6. The WCNA will submit an investigation report to the OCD within 60 days of the last sampling event conducted during the investigation.

Please contact the OCD at least 7 days prior to all soil borings, monitor well installations, and sampling events so that the OCD has the opportunity to have a representative present and split samples.

Please be advised that the OCD approval does not limit you to the work proposed if the investigation fails to fully delineate the extent of contamination related to the WCNA's activities. In addition, the OCD approval does not relieve you of liability which may be actionable under any other laws and/or regulations.

If you have any questions, please contact me at (505) 827-5884.

Sincerely,

Kathy M. Brown

Kathy M. Brown
Geologist

xc: OCD Hobbs District Office
Herschel Roberts, Roberts/Schornick & Associates, Inc.

GROUNDWATER ANALYTICAL DATA

ANA-LAB CORPORATION

FEBRUARY 7, 1991

HALL CORP.
THE COMPLETE SERVICE LAB

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

Analytical Chemistry • Utility Operations • Equipment Sales

03/15/91

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

Sample Identification: 9102070955 HOBBS AMERICA
Collected By: O/A/B
Date & Time Taken: 02/07/91 0955
On Site Data: FRESH WATER WESTERN CO.
Other:
LOW DETECTION LIMIT REQUESTED

Lab Sample Number: 181399 Received: 02/11/91 Client: SMZ

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Alkalinity	220	mg/l as C	1100	02/13/91	EPA Method 310.1	BC
Boron	.050	mg/l	1245	02/13/91	EPA Method 212.3	SV
Bromide	14	mg/l	1100	03/03/91		ES
Cation-Anion Balance	37.3/37.9	meq/meq	0800	03/13/91		SK
Carbonate	.7	mg/l	1000	02/25/91	APHA Method 263	BC
Chloride	890	mg/l	0945	02/18/91	EPA Method 325.3	SV
Specific Conductance	3500	Micromhos	1020	02/15/91	EPA Method 120.1	GS
Fluoride	7.8	mg/l	1315	02/21/91	EPA Method 340.1	GS
Bicarbonate	250	mg/l	1000	02/25/91	APHA Method 263	BC
Sulfate	330	mg/l	0815	02/19/91	EPA Method 375.4	DG
Total Dissolved Solids	2286	mg/l	0830	02/22/91	EPA Method 160.1	BC
pH	7.2	SU	1600	02/14/91	EPA Method 150.1	CJ
Silver	<.03	mg/l	1300	02/14/91	EPA Method 6010	GI
Aluminum	.4	mg/l	1130	02/19/91	EPA Method 6010	MI
Arsenic	<.1	mg/l	1300	02/14/91	EPA Method 6010	GJ

Continued

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THE COMPLETE SERVICE LAB
2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551
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181399 Continued

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Barium	.13	mg/l	1100	02/20/91	EPA Method 6010	GC
Beryllium	<.001	mg/l	1300	02/14/91	EPA Method 6010	GK
Dissolved Calcium	500	mg/l	0830	02/15/91	EPA Method 6010	XT
Cadmium	<.01	mg/l	1300	02/14/91	EPA Method 6010	GK
Cobalt	<.05	mg/l	2045	02/18/91	EPA Method 6010	GK
Chromium	<.03	mg/l	1300	02/14/91	EPA Method 6010	GK
Copper	<.03	mg/l	1300	02/14/91	EPA Method 6010	GK
Dissolved Iron	<.05	mg/l	0830	02/15/91	EPA Method 6010	XT
Dissolved Potassium	1.3	mg/l	0830	02/15/91	EPA Method 6010	XT
Dissolved Magnesium	26	mg/l	0830	02/15/91	EPA Method 6010	XT
Manganese	.02	mg/l	0830	02/15/91	EPA Method 6010	XT
Molybdenum	<.2	mg/l	2045	02/18/91	EPA Method 6010	GK
Dissolved Sodium	120	mg/l	0830	02/15/91	EPA Method 6010	XT
Nickel	<.05	mg/l	1300	02/14/91	EPA Method 6010	GK
Lead	<.1	mg/l	1300	02/14/91	EPA Method 6010	GK
Antimony	<.05	mg/l	1300	02/14/91	EPA Method 6010	GK
Selenium	<.1	mg/l	1300	02/14/91	EPA Method 6010	GK
Silicon (as Silica)	30	mg/l	2045	02/18/91	EPA Method 6010	GK
Thallium	<.1	mg/l	1300	02/14/91	EPA Method 6010	GK
Vanadium	<.05	mg/l	2045	02/18/91	EPA Method 6010	GK
Zinc	.06	mg/l	1300	02/14/91	EPA Method 6010	GK

Continued

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181399 Continued

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Benzene	130	ug/l	0800	02/18/91	EPA Method 8020	KJ
Ethyl benzene	5	ug/l	0800	02/18/91	EPA Method 8020	KJ
Toluene	160	ug/l	0800	02/18/91	EPA Method 8020	KJ
Xylenes	40	ug/l	0800	02/18/91	EPA Method 8020	KJ
Acrolein	ND(100) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Acrylonitrile	ND(100) *	ug/l	1647	02/15/91	EPA Method 824	PM
Benzene	230	ug/l	1647	02/15/91	EPA Method 8240	PM
Bromoform	ND(4.7) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Bromomethane	ND(10) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Carbon Tetrachloride	ND(2.8) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Chlorobenzene	ND(6.0) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Chloroethane	ND(10) *	ug/l	1647	02/15/91	EPA Method 8240	PM
2-Chloroethylvinyl ether	ND(10) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Chloroform	ND(1.6) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Chloromethane	ND(10 *	ug/l	1647	02/15/91	EPA Method 8240	PM
Dibromochloromethane	ND(3.1) *	ug/l	1647	02/15/91	EPA Method 8240	PM
Bromodichloromethane	ND(2.2) *	ug/l	1647	02/15/91	EPA Method 8240	PM
1,1-Dichloroethane	ND(4.7) *	ug/l	1647	02/15/91	EPA Method 8240	PM
1,2-Dichloroethane	ND(2.8) *	ug/l	1647	02/15/91	EPA Method 8240	PM
1,1-Dichloroethene	ND(2.8) *	ug/l	1647	02/15/91	EPA Method 8240	PM
trans-1,2-Dichloroethene	ND(1.6) *	ug/l	1647	02/15/91	EPA Method 8240	PM

Continued

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Analytical Chemistry • Utility Operations • Equipment Sales

181399 Continued

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
2-Dichloropropane	ND(6.0) *	ug/l	1647	02/15/91	EPA Method 8240	PK
cis-1,3-Dichloropropene	ND(5.0) *	ug/l	1647	02/15/91	EPA Method 8240	PK
thyl benzene	ND(7.2) *	ug/l	1647	02/15/91	EPA Method 8240	PK
Methylene Chloride	ND(2.8) *	ug/l	1647	02/15/91	EPA Method 8240	PK
1,2,2-Tetrachloroethane	ND(6.9) *	ug/l	1647	02/15/91	EPA Method 8240	PK
etrachloroethene	ND(4.1) *	ug/l	1647	02/15/91	EPA Method 8240	PK
Toluene	220	ug/l	1647	02/15/91	EPA Method 8240	PK
1,1-Trichloroethane	ND(3.8) *	ug/l	1647	02/15/91	EPA Method 8240	PK
1,1,2-Trichloroethane	ND(5.0) *	ug/l	1647	02/15/91	EPA Method 8240	PK
richloroethene	ND(1.9) *	ug/l	1647	02/15/91	EPA Method 8240	PK
Vinyl Chloride	ND(10) *	ug/l	1647	02/15/91	EPA Method 8240	PK
trans-1,3-Dichloropropene	ND(10) *	ug/l	1647	02/15/91	EPA Method 8240	PK
ylenes	520	ug/l	1647	02/15/91	EPA Method 8240	PK

Quality Assurance for the SET with Sample 181399

ample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Alkalinity					
	Standard	2038	mg\l	2038		112	1100	02/13/91	BC
181397	Duplicate	210	mg\l	210		100	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
181397	Spike		mg\l		100	99	1100	02/13/91	BC
				Boron					
	Standard	.89	mg/l	1.0		112	1245	02/13/91	SW
181400	Duplicate	.190	mg/l	.194		102	1245	02/13/91	SW
				Bromide					
	Blank	<5	ppm				1100	03/03/91	ES
	Standard	96	ppm	100		104	1100	03/03/91	ES
181407	Duplicate	572	ppm	527		108	1100	03/03/91	ES
				Chloride					

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Quality Assurance for the SET with Sample 181393

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date
	Specific Conductance							
	Standard	1423	Microchos	1413		101	1020	02/15/91
181397	Duplicate	1681	Microchos	1677		100	1020	02/15/91
	Fluoride							
181397	Spike		mg/l		.5	96	1315	02/21/91
	Sulfate							
	Standard	50	mg/l	50		100	0815	02/19/91
181309	Duplicate	32	mg/l	32		100	0815	02/19/91
181311	Duplicate	47	mg/l	47		100	0815	02/19/91
	Total Dissolved Solids							
	Blank	0.0000	g				0830	02/22/91
	pH							
	Standard	Calibrate	SU	7.0			1600	02/14/91
	Standard	Calibrate	SU	4.0			1600	02/14/91
	Standard	6.0	SU	6.0		100	1600	02/14/91
	Silver							
	Blank	<.03	mg/l				1300	02/14/91
	Standard	.21	mg/l	.20		105	1300	02/14/91
	Standard	1.0	mg/l	1.0		100	1300	02/14/91
181401	Duplicate	<.03	mg/l	<.03		100	1300	02/14/91
181401	Spike		mg/l		.20	80	1300	02/14/91
	Aluminum							
	Blank	<.1	mg/l				1130	02/19/91
	Blank	<.1	mg/l				1130	02/19/91
	Standard	1.0	mg/l	1.0		100	1130	02/19/91
	Standard	5.1	mg/l	5.0		102	1130	02/19/91
181397	Duplicate	.2	mg/l	.2		100	1130	02/19/91
181401	Spike		mg/l		1.0	99	1130	02/19/91
	Arsenic							
	Blank	<.1	mg/l				1300	02/14/91
	Standard	1.0	mg/l	1.0		100	1300	02/14/91
	Standard	5.0	mg/l	5.0		100	1300	02/14/91
181401	Duplicate	.69	mg/l	.71		103	1300	02/14/91
181401	Spike		mg/l		1.7	92	1300	02/14/91
	Barium							
	Blank	<.05	mg/l				1100	02/20/91
	Blank	<.05	mg/l				1100	02/20/91
	Standard	1.0	mg/l	1.0		100	1100	02/20/91
	Standard	5.1	mg/l	5.0		102	1100	02/20/91
181397	Duplicate	.17	mg/l	.16		106	1100	02/20/91

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2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 903/984-0551

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Quality Assurance for the SET with Sample 181399

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date
181401	Duplicate	.12	mg/l	.08		140	1100	02/20/91
181399	Spike		mg/l		2.0	84	1100	02/20/91
				Beryllium				
	Blank	<.001	mg/l				1300	02/14/91
	Standard	.41	mg/l	.40		102	1300	02/14/91
	Standard	2.0	mg/l	2.0		100	1300	02/14/91
181401	Duplicate	<.001	mg/l	<.001		100	1300	02/14/91
181401	Spike		mg/l		.40	83	1300	02/14/91
				Dissolved Calcium				
	Blank	.27	mg/l				0830	02/15/91
	Standard	10	mg/l	10		100	0830	02/15/91
	Standard	50	mg/l	50		100	0830	02/15/91
181397	Duplicate	160	mg/l	160		100	0830	02/15/91
181399	Spike		mg/l		20	99	0830	02/15/91
				Cadmium				
	Blank	<.01	mg/l				1300	02/14/91
	Standard	.51	mg/l	.50		102	1300	02/14/91
	Standard	2.5	mg/l	2.5		100	1300	02/14/91
181401	Duplicate	<.01	mg/l	<.01		100	1300	02/14/91
				Cobolt				
	Blank	<.05	mg/l				2045	02/18/91
	Standard	1.0	mg/l	1.0		100	2045	02/18/91
	Standard	5.2	mg/l	5.0		104	2045	02/18/91
181397	Duplicate	<.05	mg/l	<.05		100	2045	02/18/91
181401	Duplicate	<.05	mg/l	<.05		100	2045	02/18/91
				Chromium				
	Blank	<.03	mg/l				1300	02/14/91
	Standard	1.0	mg/l	1.0		100	1300	02/14/91
	Standard	5.0	mg/l	5.0		100	1300	02/14/91
181401	Duplicate	<.03	mg/l	<.03		100	1300	02/14/91
				Copper				
	Blank	<.03	mg/l				1300	02/14/91
	Standard	1.0	mg/l	1.0		100	1300	02/14/91
	Standard	5.1	mg/l	5.0		102	1300	02/14/91
181401	Duplicate	<.03	mg/l	<.03		100	1300	02/14/91
181401	Spike		mg/l		1.0	86	1300	02/14/91
				Dissolved Iron				
	Blank	<.05	mg/l				0830	02/15/91
	Standard	1.0	mg/l	1.0		100	0830	02/15/91
	Standard	5.1	mg/l	5.0		102	0830	02/15/91
181397	Duplicate	.07	mg/l	.06		115	0830	02/15/91
181397	Duplicate	.07	mg/l	.06		115	0830	02/15/91
181399	Spike		mg/l		2.0	81	0830	02/15/91
				Dissolved Potassium				

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Quality Assurance for the SET with Sample 181399

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
				Dissolved Magnesium					
	Blank	<2	mg/l				0830	02/15/91	XT
	Standard	9.8	mg/l	10		102	0830	02/15/91	XT
	Standard	48	mg/l	50		104	0830	02/15/91	XT
181397	Duplicate	6.0	mg/l	5.9		102	0830	02/15/91	XT
181399	Spike		mg/l		2.0	87	0830	02/15/91	XT
				Manganese					
	Blank	<.01	mg/l				0830	02/15/91	XT
	Standard	10	mg/l	10		100	0830	02/15/91	XT
	Standard	50	mg/l	50		100	0830	02/15/91	XT
181397	Duplicate	25	mg/l	25		100	0830	02/15/91	XT
181399	Spike		mg/l		20	92	0830	02/15/91	XT
				Molybdenum					
	Blank	<.01	mg/l				0830	02/15/91	XT
	Standard	1.0	mg/l	1.0		100	0830	02/15/91	XT
	Standard	5.1	mg/l	5.0		102	0830	02/15/91	XT
181401	Duplicate	.26	mg/l	.26		100	0830	02/15/91	XT
181401	Spike		mg/l		1.0	95	0830	02/15/91	XT
				Dissolved Sodium					
	Blank	<.2	mg/l				2045	02/18/91	RJ
	Standard	10	mg/l	10		100	2045	02/18/91	RJ
181397	Duplicate	<.2	mg/l	<.2		100	2045	02/18/91	RJ
181401	Duplicate	<.2	mg/l	<.2		100	2045	02/18/91	RJ
181401	Spike		mg/l		2.0	87	2045	02/18/91	RJ
				Nickel					
	Blank	<1	mg/l				0830	02/15/91	XT
	Standard	9.8	mg/l	10		102	0830	02/15/91	XT
	Standard	50	mg/l	50		100	0830	02/15/91	XT
181397	Duplicate	170	mg/l	180		106	0830	02/15/91	XT
181399	Spike		mg/l		20	93	0830	02/15/91	XT
				Antimony					
	Blank	<.05	mg/l				1300	02/14/91	JJ
	Standard	1.0	mg/l	1.0		100	1300	02/14/91	JJ
	Standard	5.0	mg/l	5.0		100	1300	02/14/91	JJ
181401	Duplicate	<.05	mg/l	<.05		100	1300	02/14/91	JJ
				Selenium					
	Blank	<.05	mg/l				1300	02/14/91	JJ
	Standard	1.0	mg/l	1.0		100	1300	02/14/91	JJ
	Standard	5.0	mg/l	5.0		100	1300	02/14/91	JJ
181401	Duplicate	<.05	mg/l	<.05		100	1300	02/14/91	JJ
				Selenium					
	Blank	<.1	mg/l				1300	02/14/91	JJ
	Standard	1.0	mg/l	1.0		100	1300	02/14/91	JJ
	Standard	5.1	mg/l	5.0		102	1300	02/14/91	JJ

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Quality Assurance for the SET with Sample 181399

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date
181401	Duplicate	<.1	mg/l	<.1		100	1300	02/14/91
				Silicon (as Silica)				
	Blank	.1	mg/l				2045	02/18/91
	Standard	10	mg/l	10		100	2045	02/18/91
181401	Duplicate	34	mg/l	34		100	2045	02/18/91
181397	Duplicate	29	mg/l	30		103	2045	02/18/91
181401	Spike		mg/l		2.0	105	2045	02/18/91
				Thallium				
	Blank	<.1	mg/l				1300	02/14/91
	Standard	1.1	mg/l	1.0		110	1300	02/14/91
	Standard	5.2	mg/l	5.0		104	1300	02/14/91
181401	Duplicate	<.1	mg/l	<.1		100	1300	02/14/91
				Vanadium				
	Blank	<.05	mg/l				2045	02/18/91
	Standard	1.0	mg/l	1.0		100	2045	02/18/91
	Standard	5.0	mg/l	5.0		100	2045	02/18/91
181397	Duplicate	<.05	mg/l	<.05		100	2045	02/18/91
181401	Duplicate	<.05	mg/l	<.05		100	2045	02/18/91
181401	Spike		mg/l		1.0	88	2045	02/18/91
				Zinc				
	Blank	<.01	mg/l				1300	02/14/91
	Standard	1.0	mg/l	1.0		100	1300	02/14/91
	Standard	4.9	mg/l	5.0		102	1300	02/14/91
181401	Duplicate	.03	mg/l	.03		100	1300	02/14/91
181401	Spike		mg/l		1.0	87	1300	02/14/91
				Benzene				
	Blank	<5	ppb				0800	02/18/91
	Standard	68	ppb	50			0800	02/18/91
181438	Duplicate	<5	ppb	<5		100	0800	02/18/91
181438	Spike		ppb		50	103	0800	02/18/91
				Ethyl benzene				
	Blank	<5	ppb				0800	02/18/91
	Standard	66	ppb	50			0800	02/18/91
181438	Duplicate	<5	ppb	<5		100	0800	02/18/91
181438	Spike		ppb		50	99	0800	02/18/91
				Toluene				
	Blank	<5	ppb				0800	02/18/91
	Standard	66	ppb	50			0800	02/18/91
181438	Duplicate	<5	ppb	<5		100	0800	02/18/91
181438	Spike		ppb		50	104	0800	02/18/91
				Xylenes				
	Blank	<5	ppb				0800	02/18/91
	Standard	73	ppb	50			0800	02/18/91

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Quality Assurance for the SET with Sample 181399

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
181438	Duplicate	<5	ppb	<5		100	0800	02/18/91	KI
181438	Spike		ppb		50	98	0800	02/18/91	KI

Results reported as "ND" (Not Detected) have the EPA Practical Quantitation Limit in parentheses.
Note that the EPA states that actual PQL's are highly matrix dependent.

I hereby certify that these results were obtained using the methods specified in this report.

C. H. Whiteside, Ph.D., President

GROUNDWATER ANALYTICAL DATA

NDRC LABORATORIES, INC.

DECEMBER 16, 1991

NDRC LABORATORIES, INC.

A member of the Inchcape Environmental Group

11155 South Main, Houston, Texas 77025 • (713) 661-8150 • FAX (713) 661-2561

BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 17-DEC-1991

REPORT NUMBER : H91-4243-1
REPORT DATE : 31-DEC-1991

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : N/A
PROJECT : 91137.01/The Western Co.
PURCHASE ORDER NO : 551
DATE SAMPLED : 16-DEC-1991
ANALYSIS METHOD : EPA 8020

BTEX ANALYSIS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		
Benzene	1.0	µg/L		22.0	µg/L
Toluene	1.0	µg/L		12.0	µg/L
Ethyl benzene	1.0	µg/L	<	1.0	µg/L
Xylenes	1.0	µg/L	<	1.0	µg/L

QUALITY CONTROL DATA				
SURROGATE COMPOUND	SPIKE LEVEL		SPIKE RECOVERED	
Bromofluorobenzene(SS)	100	µg/L	102	%

NDRC Laboratories, Inc.

David R. Godwin, Ph.D.
Chief Executive Officer

NDRC LABORATORIES, INC.

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 17-DEC-1991

REPORT NUMBER : H91-4243-1
REPORT DATE : 6-JAN-1992

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : N/A
PROJECT : 91137.01/The Western Co.
PURCHASE ORDER NO : 551
DATE SAMPLED : 16-DEC-1991
ANALYSIS METHOD : EPA 8015

TRPH BY MODIFIED EPA 8015 (PURGE + TRAP)		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbon *	50 µg/L	460 µg/L

* Gasoline, Lightends.
By purge and trap using FID.

NDRC Laboratories, Inc.

David R. Godwin, Ph.D.
Chief Executive Officer

JAN 2 1 1992

NDRC LABORATORIES, INC.

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 17-DEC-1991

REPORT NUMBER : H91-4243-1
REPORT DATE : 6-JAN-1992

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : N/A
PROJECT : 91137.01/The Western Co.
PURCHASE ORDER NO : 551
DATE SAMPLED : 16-DEC-1991
ANALYSIS METHOD : EPA 8015

TRPH BY MODIFIED EPA 8015		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Total Petroleum Hydrocarbon *	0.2 mg/L	< 0.2 mg/L

* As Diesel, Heavy ends.
By extraction and direct injection using FID.

NDRC Laboratories, Inc. David R. Godwin PhD

David R. Godwin, Ph.D.
Chief Executive Officer

NDRC LABORATORIES, INC.

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 17-DEC-1991

REPORT NUMBER : H91-4243-1
REPORT DATE : 31-DEC-1991

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : N/A
PROJECT : 91137.01/The Western Co.
PURCHASE ORDER NO : 551
DATE SAMPLED : 16-DEC-1991

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS
Chloride	50 mg/L	784 mg/L
Conductivity	1 µmhos	3040 µmhos
pH		7.2
Total Dissolved Solids	1.0 mg/L	2130 mg/L

NDRC Laboratories, Inc.

David R. Godwin, Ph.D.
Chief Executive Officer

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 17-DEC-1991

REPORT NUMBER : H91-4243-2
REPORT DATE : 31-DEC-1991

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : Trip Blank
PROJECT : 91137.01/The Western Co.
PURCHASE ORDER NO : 551
DATE SAMPLED : 14-DEC-1991
ANALYSIS METHOD : EPA 8020

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

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene(SS)	100 µg/L	102 %

NDRC Laboratories, Inc.

David R. Godvin, Ph.D.
Chief Executive Officer

CLIENT NAME: Western Co.

SITE MANAGER: Mark Larson

PROJECT NO.: 91137.01

PROJECT NAME: Hobbs, NM

PAGE 1 OF 1

LAB. PO # 551

PARAMETERS/METHOD NUMBER

CHAIN-OF-CUSTODY RECORD

ROBERTS/SCHORNICK & ASSOCIATES, INC.
Environmental Consultants
3700 West Robinson, Suite 200
Norman, Oklahoma 73072
(405) 321-3895

DATE	TIME	WATER	SOIL	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	BTEX 602	TPH - GC (Calif. Method)	TDS	Chloride 300.0	Sp. Conductance	pH	8015 GRO & Diesel TPH			LAB. I.D. NUMBER (LAB USE ONLY)	REMARKS (I.E., FILTERED, UNFILTERED, PRESERVED, UNPRESERVED, GRAB COMPOSITE)
12-16-91	1345	X			2	X									4243-1	ORIGINAL
12-16-91	1345	X			1		X									
12-16-91	1345	X			1			X	X	X	X					
		X		Trip blanks	2	X									2	
				1-1L Amb												water
				1-1L Plas												Due: 12-31
				4-VOA												Coder
				Talked w/ D McElreath. She said to run GRO & Diesel for TPH												

SAMPLED BY: (Signature) Bob Wilson — DATE: 12-16-91 TIME: 1345

RELINQUISHED BY: (Signature) — DATE: TIME:

RECEIVED BY: (Signature) — DATE: TIME:

RELINQUISHED BY: (Signature) Bob Wilson — DATE: 12-16-91 TIME: 1420

RECEIVED BY: (Signature) — DATE: TIME:

SAMPLE SHIPPED BY: (Circle)
FEDEX PURO AIRBILL # _____
HAND DELIVERED UPS OTHER: _____

COMMENTS:

TURNAROUND TIME NEEDED: Standard

WHITE - RECEIVING LAB
YELLOW - RECEIVING LAB (TO BE RETURNED TO RSA AFTER RECEIPT)
PINK - PROJECT MANAGER
GOLD - QA/QC COORDINATOR

RECEIVING LABORATORY: NRRC Laboratory
ADDRESS: 11155 S. Main
CITY: Houston STATE: TX ZIP: 77025
CONTACT: Frank Murph PHONE: 713-661-8150

RECEIVED BY: (Signature)
DATE: 12-17-91 TIME: 10:30AM

SAMPLE CONDITION WHEN RECEIVED: Intact / Cool

RSA CONTACT PERSON: DEBBY McELREATH / Mark Larson

PHONE # 405-321-3895/360-7410

NDRC LABORATORIES, INC. Nº 850

Houston - 11155 South Main • Houston, Texas 77025 • (713) 661-8150 • Fax (713) 661-2661

SAMPLE PRESERVATION INFORMATION SHEET

Field Sampling ☐ Incoming Samples ☐

GENERAL

Company: ROBERTS/SCHORNICK Job No: 4243

No. of Cooler(s): 1 Temperature of Cooler(s): 4

PRESERVATION INFORMATION

Sample No.	Temperature of Sample	Sample Container	Volume	Preservation used *	Initial pH	Final pH	Bottles generated	Comments
1	4	Amb	1000	4	<2		0	TPH
	4	PLAS	1000	1	7.2		0	TDS, pH, Sp.Cond, Cl-
	4	2VOA	80	1			0	BTEX
2	4	2VOA	80	1			0	BTEX

PRESERVATION USED *

1 - Cool to 4° C
2 - H_2SO_4 to pH < 2
3 - HNO_3 to pH < 2
4 - HCL to pH < 2
5 - NaOH to pH > 12
6 - $Na_2S_2O_2$ 0.008%
7 - 2 mL Zinc Acetate and NaOH to pH > 12
8 - None required

CR

Received by

12-17-91/1:37p

Date/Time

GROUNDWATER ANALYTICAL DATA

NDRC LABORATORIES, INC.

FEBRUARY 21, 1992

NDRC LABORATORIES, INC.

A member of the Landscape Environmental Group

11165 South Main, Houston, Texas 77025 • (713) 661-8150 • FAX (713) 661-2661

BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 26-FEB-1992

REPORT NUMBER : H92-770-1
REPORT DATE : 11-MAR-1992

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : The western Co. Water Sample
PROJECT : 91037.01/Western--Hobbs
DATE SAMPLED : 21-FEB-1992

TOTAL METALS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Calcium	5 mg/L	382 mg/L
Potassium	0.1 mg/L	4.1 mg/L
Magnesium	1 mg/L	58 mg/L
Sodium	0.01 mg/L	65.0 mg/L

NDRC Laboratories, Inc.

Alan Doughty, Ph.D.
General Manager

NDRC LABORATORIES, INC.

A member of the Inchcape Environmental Group

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 26-FEB-1992

REPORT NUMBER : H92-770-1
REPORT DATE : 11-MAR-1992

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : The western Co. Water Sample
PROJECT : 91037.01/Western--Hobbs
DATE SAMPLED : 21-FEB-1992
ANALYSIS METHOD : EPA 610

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Acenaphthene	1.8 µg/L	< 1.8 µg/L
Acenaphthylene	2.3 µg/L	< 2.3 µg/L
Anthracene	0.66 µg/L	< 0.66 µg/L
Benzo(a)anthracene	0.013 µg/L	< 0.013 µg/L
Benzo(b)fluoranthene	0.018 µg/L	< 0.018 µg/L
Benzo(k)fluoranthene	0.017 µg/L	< 0.017 µg/L
Benzo(g,h,i)perylene	0.076 µg/L	< 0.076 µg/L
Benzo(a)pyrene	0.023 µg/L	< 0.023 µg/L
Chrysene	0.15 µg/L	< 0.15 µg/L
Dibenz(a,h)anthracene	0.030 µg/L	< 0.030 µg/L
Fluoranthene	0.21 µg/L	< 0.21 µg/L
Fluorene	0.21 µg/L	< 0.21 µg/L
Indeno(1,2,3-cd)pyrene	0.043 ug/L	< 0.043 ug/L
Naphthalene	1.8 µg/L	< 1.8 µg/L
Phenanthrene	0.64 µg/L	< 0.64 µg/L
Pyrene	0.27 µg/L	< 0.27 µg/L

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BEAUMONT DALLAS HOUSTON

DATE RECEIVED : 26-FEB-1992

REPORT NUMBER : H92-770-1
REPORT DATE : 11-MAR-1992

SAMPLE SUBMITTED BY : Roberts/Schornick & Associates, Inc.
ADDRESS : 3700 West Robinson, Suite 200
: Norman, OK 73072
ATTENTION : Ms. Debby McElreath

SAMPLE MATRIX : WATER
ID MARKS : The Western Co. Water Sample
PROJECT : 91037.01/Western--Hobbs
DATE SAMPLED : 21-FEB-1992

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS
Bicarbonate	0.1 mg/L CaCO3	209 mg/L CaCO3
Bromide	0.5 mg/L	5.1 mg/L
Carbonate (As CaCO3)	0.1 mg/L CaCO3	< 0.1 mg/L CaCO3
Chloride	10 mg/L	645 mg/L
Fluoride	0.1 mg/L	0.8 mg/L
Ammonia Nitrogen	0.01 mg/L	0.02 mg/L
Nitrate-Nitrogen	0.05 mg/L	1.95 mg/L
Total Phosphate	0.1 mg/L	0.2 mg/L
Boron		.740 mg/L
Sulfate, Total	50 mg/L	210 mg/L

NDRC Laboratories, Inc.

Alan Doughty, Ph.D.
General Manager

NDRC LABORATORIES, INC. Nº 850

Houston - 11155 South Main • Houston, Texas 77025 • (713) 661-8150 • Fax (713) 661-2661

SAMPLE PRESERVATION INFORMATION SHEET

Field Sampling ☐ Incoming Samples ☐

GENERAL

Company: ROBERTS / SCHORNICK Job No: 4243

No. of Cooler(s): 1 Temperature of Cooler(s): 4

PRESERVATION INFORMATION

Sample No.	Temperature of Sample	Sample Container	Volume	Preservation used *	Initial pH	Final pH	Bottles generated	Comments
1	4	Amb	1000	4	< 2		0	TPH
	4	PLAS	1000	1	7.2		0	TDS, pH, Sp. Cond, Cl-
	4	2 VOA	80	1			0	BTEX
2	4	2 VOA	80	1			0	BTEX

PRESERVATION USED *

1 - Cool to 4° C
2 - H_2SO_4 to pH < 2
3 - HNO_3 to pH < 2
4 - HCL to pH < 2
5 - NaOH to pH > 12
6 - $Na_2S_2O_3$ 0.008%
7 - 2 mL Zinc Acetate and NaOH to pH > 12
8 - None required

GR
Preserved by

12-17-91 / 1:37p
Date/Time

B

APPENDIX B

- Boring Logs
- Analytical Results for all Soil Boring Samples

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-1/MW-1 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 7-31-92	Date Finished: 8-6-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2'	Water Depth (feet): ~52.0' below TOG
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" SCHEDULE 40 PVC	
Backfill Material: NA		Slot Size: 0.010	Filter Material: 20-40 Brady Sand
Logged By: J. COOPER	Checked By:	Development Method: bailer	

Depth (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hard pack -- gravel, sand & clay, tan, dry		1			2" Schedule 40 PVC Blank		No Recovery
		Silty clay -- light gray, moist		2				0	Slight hydrocarbon odor
		Clayey silt -- light gray to tan, moist							
		Sand, clay and gravel -- tan							
5		Caliche -- w/ sand, silt and clay -- tan to white and pink		3				0.1	No odor
									Caliche rock and gravel prevented sampling. No odor from drill cuttings.
10		Silt and clay -- tan to white w/ fine calcite crystals, dry to moist; encountering gravel with depth		4		Grout		0	No odor
									Heavy gravel; no sample
15		Clay -- light tan w/ caliche gravel and minor silt, dry, slightly consolidated		5				0	No odor
				6				1.2	No odor
20		Silty fine sand -- tan w/ minor gravel, dry to slightly moist		7				1.0	No odor
		Fine sand -- tan to white, silty with interbedded calcite cementing, dry to moist		8				0.4	No odor
				9				0.6	No odor
25		- no silt - tan							No recovery
				10				2.0	No odor
				11				0	No odor
30		- thin interbedded sandstone and sandstone gravel		12				2.5	No odor

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-1 / MW-1 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 7-31-92	Date Finished: 8-6-92
Drilling Equipment: AIR ROTARY		Completed Depth (feet): 61.2'	Water Depth (feet): ~ 52.0 below TOG
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☐		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010	Filter Material: 20-40 Brady Sand
Logged By: J. COOPER	Checked By:	Development Method: bailer	

Depth (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Fine sand -- tan w/ interbedded sandstone, dry to moist		12			2" Schedule 40 PVC Blank	2.5	No odor
				13				0.4	No odor
35		Sandstone -- tan and white, cemented				Grout			No recovery of sandstone
		Fine sand -- tan, dry		14				1.2	slight hydrocarbon odor
40		- becoming moist		15				4.6	slight hydrocarbon odor
				16		Bentonite		6.4	slight hydrocarbon odor
		- moist		17				9.2	hydrocarbon odor
45				18			2" Schedule 40 0.010" slotted PVC	5.6	hydrocarbon odor
				19		20-40 Brady Sand		34.0	gasoline odor
50		- wet		20				1000+	Strong gasoline odor
				21				1000+	Strong gasoline odor
		T.D. boring at 53.0'							Soil boring was reamed and advanced to ~62.0' to allow for 15.0' of screen (5.0' above and 10.0' below water table).
55									
60							2" Schedule PVC Blank		

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☐ Boring/Well Number: SB-2 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 7-31-92	Date Finished: 7-31-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 53.0'	Water Depth (feet): ~ 51.0' below TOG
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: NA	
Backfill Material: GROUT/Cement		Slot Size: NA	Filter Material: NA
Logged By: J. Cooper	Checked By:	Development Method: NA	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Silty sand -- tan w/ gravel, dry							Split spoon sampler was pushed hydraulically. Where heavy gravel was encountered no sample was obtained.
		Clay -- brown, moist		1				0.6	No odor
				2				0.2	No odor
5		Silty clay -- tan to white w/ caliche and gravel, dry		3				0.3	No odor
		- abundant caliche and gravel							Heavy gravel; no sample
10		- less gravel, dry		4				0.4	No odor
		- abundant caliche and gravel							Heavy gravel; no sample
15		- less gravel, dry		5				1.6	No odor
				6				30.0	No odor
20				7				28.0	No odor
		- abundant caliche and gravel							Heavy gravel; no sample
		Silty fine sand -- tan to white w/ minor gravel, dry		8				56.0	No odor
25				9				60.0	No odor
		- abundant sandstone gravel							Heavy gravel; no sample
				10				10.0	No odor
30				11				22.0	No odor
		Sandstone -- tan and white, cemented							No recovery of sandstone

Brown and Caldwell
Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☐ Boring/Well Number: SB-2 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 7-31-92	Date Finished: 7-31-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 53.0'	Water Depth: (Feet) ~ 51.0' below TOG
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: NA	
Backfill Material: GROUT/Cement		Slot Size: NA	Filter Material: NA
Logged By: J. Cooper	Checked By:	Development Method: NA	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
35		Sandstone -- tan and white, cemented							No recovery of sandstone.
		Fine sand -- tan w/sandstone gravel, dry		12				58.0	No odor
		- sandstone 38-39'							No recovery of sandstone.
40				13				110	Slight odor
				14				80.0	Odor
		- becoming more moist		15				980	Strong odor
45				16				1000+	Strong odor
				17				900	Strong odor
		- very moist							
50		- wet		18				1000+	Strong odor
				19				1000+	Strong odor
		T.D. boring at 53.0'							
55									
60									

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-3 / MW-2 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-1-92	Date Finished: 8-7-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2'	Water Depth (Feet): ~51.0' below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. COOPER	Checked By:	Development Method: bailer	

Depth (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks (Split spoon sampler was pushed hydraulically. Where heavy gravel was encountered no sample was obtained.)
		Hard pack -- gravel, sand & clay, tan, dry							No sample
		Clay -- brown w/ caliche gravel, stiff, slightly moist		1			2" Schedule 40 PVC Blank	0	No odor
5		Caliche -- tan to white and pink w/ abundant clay and gravel, dry				Grout			No odor
10									Unable to sample caliche with split spoon sampler.
15									
		Clay -- tan w/ abundant gravel, dry		2				0	No odor
									Heavy gravel; no sample
				3				0	No odor
20									Heavy gravel; no sample
				4				0	No odor
									Heavy gravel; no sample
				5				0	No odor
25									Heavy gravel; no sample
		Silty sand -- tan w/ sandstone gravel		6				0.4	No odor
									Heavy gravel; no sample
				7				0.2	No odor
30									Heavy gravel; no sample
		Sandstone -- tan to white, cemented							No recovery of sandstone

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-3/MW-2 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-1-92	Date Finished: 8-7-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2'	Water Depth (feet): ~51.0' below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. COOPER	Checked By:	Development Method: bailer	

Depth (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Sandstone -- tan to white, cemented				Grout	2" Schedule 40 PVC blank		No recovery of sandstone.
35		Fine sand -- tan w/sandstone gravel and some calcite, dry		8				1.0	No odor
		– sandstone layer 36-38'							Too much gravel to sample
		– no gravel 38-40'		9				1.0	No odor
40		– gravel		10				2.2	No odor
		– sandstone layer 42.5 to 44'		11		Bentonite		34.0	No odor
		– becoming more moist							No recovery of sandstone
45		– sandstone layer 46-47'		12			2" Schedule 40 0.010" slotted PVC	2.6	Slight odor
		– sandstone layer 47.5-49'							No recovery of sandstone
		– moist to very moist with depth		13		20-40 Brady sand		8.8	Slight odor
50		– wet		14				10.0	No recovery of sandstone
				15				5.0	Slight hydrocarbon odor
		T.D. boring at 53.0'							No odor
55									Soil boring was reamed and advanced to ~62.0' to allow for 15.0' of screen (5.0' above and 10.0' below water table).
60							2" Schedule 40 PVC blank		

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☐ Boring/Well Number: SB-4/MW-3* Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-1-92	Date Finished: 8-7-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2'	Water Depth (feet): ~51.0 below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. COOPER	Checked By:	Development Method: bailer	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hardpack -- gravel, sand & clay, tan, dry					2" Schedule 40 PVC blank		No sample
		Clay -- brown w/some gravel, stiff, slightly moist		1		Grout		0.8	No odor
		Silty clay -- tan w/ caliche and gravel, dry		2				3.0	No odor
5				3				1.8	No odor
				4				0.0	No odor
10				5				1.4	No odor
				6				0	No odor
				7				0	No odor
15		- sandstone gravel		8				3.2	No odor
		- becoming sandy		9				2.4	No odor
20				10				12.0	No odor
		Clayey, silty fine sand -- tan w/ some caliche and sandstone gravel, dry		11				12.0	No odor
		Silty clay -- tan w/ sand, caliche and sandstone gravel, dry		12				11.0	No odor
25		- becoming more sandy		13				11.0	No odor
		Fine sand -- tan w/ sandstone gravel, dry to slightly moist		14				3.0	No odor
30		- moist		15				22.0	No odor

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☐ Boring/Well Number: SB-4/MW-3* Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-1-92	Date Finished: 8-7-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2'	Water Depth (feet): ~51.0 below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. Cooper	Checked By:	Development Method: bailer	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Fine sand -- tan w/sandstone gravel, dry to slightly moist		15		Grout	2" Schedule 40 PVC	22.0	No odor
		Sandstone -- tan to white, cemented							No recovery of sandstone
35		Fine sand -- tan w/sandstone gravel, dry - slightly moist		16				0.6	No odor
				17				8.8	No odor
		- less gravel		18				22.0	No odor
40		- becoming more moist with depth		19		Bentonite		32.0	Slight odor
		- moist		20		20-40 Brady sand		15.0	Slight odor
45				21			2" Schedule 40 0.010" slotted PVC	10.0	Slight odor
				22				78.0	Odor
		- very moist		23				460	Odor
50		- wet		24				1000+	Strong gasoline odor
		T.D. boring at 52.0'					3" Schedule 40 PVC		* SB-4 was plugged immediately after it was completed to prevent diesel spillage from entering the borehole. Another boring, designated SB-4A was installed immediately adjacent to SB-4 and monitor well MW-3 was installed there. Due to the close proximity of the borings to each other, they are considered the same for logging purposes.
55									
60									

Brown and Caldwell Consultants

BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-5 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-2-92	Date Finished: 8-2-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 53.0'	Water Depth (feet): ~50.6' below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☐		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: N/A	
Backfill Material: Grout		Slot Size: NA	Filter Material: NA
Logged By: J. Cooper	Checked By:	Development Method: NA	

Depth (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Concrete							
		Clay -- brown, firm, moist to very moist		1				44.0	No sample Odor
		Sandy clay -- tan w/caliche gravel		2				22.0	Odor
5				3				940	Strong odor (diesel)
				4				1000+	Strong hydrocarbon odor (diesel)
10				5				1000+	Strong hydrocarbon odor (diesel)
				6				1000+	Strong hydrocarbon odor (diesel)
				7				1000+	Strong odor (diesel)
15				8				1000+	Strong odor (diesel)
		Sandstone -- tan to white, cemented							No recovery of sandstone
		Clayey sand -- tan w/some sandstone gravel		9				220	Odor
20		Sand -- tan w/some clay and sandstone gravel - silty 22-24' - becoming more moist		10				260	Odor
				11				42.0	Slight odor
25				12				28.0	Odor
		- sandstone 27.5' – 28'		13				50.0	Odor
		- becoming dark gray, moist		14				10.0	Odor
30		Sandstone -- tan to white, cemented							No recovery of sandstone

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-5 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-2-92	Date Finished: 8-2-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 53.0'	Water Depth: (feet) ~50.6' below TOG
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: NA	
Backfill Material: Grout		Slot Size: NA	Filter Material: NA
Logged By: J. COOPER	Checked By:	Development Method: NA	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Sandstone -- tan to white; cemented							No recovery of sandstone
35		Fine sand -- tan, dry w/ sandstone gravel							No Sample
				15					Slight odor
				16					Slight odor
40				17					Slight odor
				18					Slight odor
		- becoming moist		19					Slight odor
45				20					Slight odor
				21					Strong odor
		- very moist		22					Strong hydrocarbon odor
50		- wet		23					Strong gasoline odor
		T.D. boring at 53.0'							
55									
60									

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☐ Boring/Well Number: SB-6 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-2-92	Date Finished: 8-2-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 53.0'	Water Depth (feet): ~51.0' below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: NA	
Backfill Material: GROUT		Slot Size: NA	Filter Material: NA
Logged By: J. COOPER	Checked By:	Development Method: NA	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hard pack -- gravel, sand & clay, tan, dry							No sample
		Clay -- brown w/ gravel, moist							No sample
5		Sand -- tan w/ clay, caliche and sandstone gravel, dry		1				0.2	No odor
				2				0.2	No odor
				3				1.0	No odor
				4				0.4	No odor
10		Sandy clay -- tan w/ caliche and sandstone gravel, dry		5				0.4	No odor
				6				5.0	No odor
15				7				6.6	No odor
				8				14.0	No odor
				9				4.0	No odor
20				10				10.0	No odor
				11				20.0	No odor
25		Silty sand -- tan w/ sandstone gravel, slightly moist		12				20.0	No odor
				13				10.0	No odor
				14				8.0	No odor
30		Sandstone -- tan to white, cemented							No recovery of sandstone

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☐ Monitoring Well ☐ Boring/Well Number: SB-6 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-2-92	Date Finished: 8-2-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 53.0'	Water Depth (feet): ~51.0 below TOG
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: NA	
Backfill Material: GROUT		Slot Size: NA	Filter Material: NA
Logged By: J. COOPER	Checked By:	Development Method: NA	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Sandstone -- tan to white, cemented							No recovery of sandstone.
35		Fine sand -- tan w/abundant sandstone gravel, slightly moist							No sample
				15				18.0	No odor
				16				1.2	No odor
		- less gravel							
40				17				45.0	Slight odor
				18				5.0	Slight odor
				19				7.2	Slight odor
45		- no gravel							
				20				6.4	Slight odor
				21				20.0	Slight odor
50				22				1000+	Strong gasoline odor
		- very moist							
		- wet		23				1000+	Strong gasoline odor; black staining
		T.D. boring at 53.0'							
55									
60									

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-7/MW-5 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-3-92	Date Finished: 8-6-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2'	Water Depth (Feet): ~ 50.0' below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. Cooper	Checked By:	Development Method: bailer	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hard pack -- gravel, sand & clay, dry					2" Schedule 40 PVC blank		No sample
		Clay -- brown w/ gravel, firm, moist		1		Grout		0.2	No odor
5		Sandy clay -- tan w/ caliche and sandstone gravel, dry		2				0	No odor
				3				0	No odor
				4				0	No odor
10				5				0	No odor
		- slightly moist, less gravel		6				0	No odor
		- more sandy w/ calcite		7				0.4	No odor
15				8				0	No odor
				9				0	No odor
		- more sandstone gravel		10				0.2	No odor
20				11				0	No odor
		Silty sand -- tan w/ sandstone gravel, dry		12				0	No odor
25				13				0	No odor
		- becoming more moist		14					No odor
				15				0.4	No odor
30		Sandstone -- tan to white, cemented							No recovery of sandstone

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-7/MW-5 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-3-92	Date Finished: 8-6-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2'	Water Depth (Feet): ~50.0 below TOG
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. COOPER Checked By:		Development Method: bailer	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Silty sand -- tan w/sandstone gravel, moist				Grout	2" Schedule 40 PVC	0.4	No odor
		Sandstone -- tan to white, cemented							No recovery of sandstone
35		Fine sand -- tan w/abundant sandstone gravel, dry							
				16				0	No odor
				17				0	No odor
40		- less gravel		18				0.8	No odor
						Bentonite			
		- very little gravel, moist		19				0.6	No Odor
45				20		20-40 Brady sand	2" Schedule 40 0.010" slotted PVC	0.4	No odor
		- sandstone 48-49'		21				0.2	No odor
									No sample
50		- wet		22				0.2	No odor
				23				0	No odor
55		T.D. boring at 53.0'							Soil boring was reamed and advanced to a depth of ~62.0' to allow for 15.0' of screen (5.0' above and 10.0' below the water table).
60							2" Schedule 40 PVC blank		

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-8/MW-4 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-4-92	Date Finished: 8-7-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2	Water Depth (feet): ~50.55' below TOC
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. COOPER	Checked By:	Development Method: bailer	

Depth (feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Concrete and hard pack				Grout	2" Schedule 40 PVC		No sample
		Clay -- brown w/gravel, moist		1				9.0	No odor
		Sandy clay -- brown w/gravel, moist							Heavy gravel; no sample
5		- becoming tan in color		2				1.0	No odor
				3				0.6	No odor
		- becoming drier		4				600	Diesel odor
10		- dry		5				100	Hydrocarbon odor
				6				120	Hydrocarbon odor
		- more sandstone gravel and more sandy		7				28.0	Odor
15				8				16.0	Odor
		Clayey sand -- tan, dry		9				25.0	No odor
20		- slightly moist		10				28.0	No odor
		Silty sand -- tan w/sandstone gravel, moist		11				30.0	No odor
25				12				26.0	No odor
				13				22.0	No odor
				14				58.0	Slight odor
30				15				10.0	No odor
		Sandstone -- tan to white, cemented							No recovery of sandstone.

Remarks: split spoon sampler was pushed hydraulically. where heavy gravel was encountered no sample was obtained.

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-8/MW-4 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-4-92	Date Finished: 8-7-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 61.2	Water Depth (feet): ~50.55' below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: 2" Schedule 40 PVC	
Backfill Material: NA		Slot Size: 0.010"	Filter Material: 20-40 Brady sand
Logged By: J. COOPER	Checked By:	Development Method: bailer	

Depth(Feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Silty sand -- tan w/sandstone gravel, moist		15		Grout	2" Schedule 40 PVC	10.0	No odor
		Sandstone -- tan to white, cemented							No recovery of sandstone
35									
									No sample
		Fine sand -- tan w/sandstone gravel, slightly moist		16				20.0	No odor
		- moist		17				100	Odor
40				18		Bentonite		60.0	Odor
				19				36.0	Odor
45				20		20-40 Brady sand	2" Schedule 40 0.010" slotted PVC	54.0	Odor
				21				200	Odor
		- very moist		22				1000+	Strong odor (gasoline)
50		- wet		23				1000+	Strong gasoline odor
		T.D. boring at 52.0'							Soil boring was reamed and advanced to ~62.0' to allow for 15.0' of screen (5.0' above and 10.0' below the water table).
55									
60							2" Schedule 40 PVC		

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☐ Boring/Well Number: SB-9 Sheet 1 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-5-92	Date Finished: 8-5-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 54.0'	Water Depth (feet): ~52.0' below TOC
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: NA	
Backfill Material: Grout		Slot Size: NA	Filter Material: NA
Logged By: J. COOPER	Checked By:	Development Method: NA	

Depth(feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Hard pack -- gravel, sand & clay, dry							No sample
		Clay -- brown and tan w/some gravel, moist, firm							No sample
				1				0	No odor
5		Sandy clay -- tan w/some gravel, moist, firm		2				0	No odor
				3				0	No odor
		- drier		4				1.0	No odor
10		Clayey sand -- tan w/gravel, moist		5				1.0	No odor
				6				0	No odor
		- sandstone gravel abundant		7				0	No odor
15				8				0	No odor
		Silty sand -- tan w/gravel, dry		9				0	No odor
20				10				0	No odor
		- moist, no gravel		11				0	No odor
				12				0	No odor
25				13				0	No odor
				14				0	No odor
30		Fine sand -- tan, moist		15				0.5	No odor

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BORING LOG

Project Name: WCNA-Hobbs, N.M. Facility Project Number: 7032

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-9 Sheet 2 of 2

Boring Location		Elevation and Datum:	
Drilling Contractor: HI-PLAINS DRILLING, INC.		Date Started: 8-5-92	Date Finished: 8-5-92
Drilling Equipment: AIR ROTARY		Completed Depth(feet): 54.0'	Water Depth (Feet): ~52.0' below TOG
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: NONE		Type and Diameter of Well Casing: NA	
Backfill Material: GROUT		Slot Size: NA	Filter Material: NA
Logged By: J. COOPER	Checked By:	Development Method: NA	

Depth(Feet)	USC Soil Type	Description	Blow Counts	Sample No.	Graphic Log: Lithology	Graphic Log: Annulus	Graphic Log: Casing	PID/FID Readings	Remarks
		Fine sand-- tan, moist		15				0.5	No odor
				16				0	No odor
35				17				0	No odor
				18				0.5	No odor
				19				0	No odor
40				20				0	No odor
				21				0	No odor
				22				1.2	No odor
45				23				0	No odor
		- very moist		24				0	No odor
50				25				0	No odor
		- wet							No sample
55		T.D. boring at 54.0'							
60									

SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

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BROWN AND CALDWELL-DFW

Client THE WESTERN COMPANY OF N.A.
515 POST OAK BLVD., SUITE 915
HOUSTON, TEXAS 77027-9407
713/629-2864 FAX 629-2885
Attn: MS. ANGELA HARDY

Client No. 2_9275_00
Report No. 92-08-085
Report Date 08/27/92 15:49

Project 1011-HOBBS, NEW MEXICO

Date Sampled 07/31/92 08/05/92

Sampled By BROWN & CALDWELL

Sample Type SOIL SAMPLES

Transported by FEDEX

P.O. # _____

Date Received 08/06/92

Lab No.	Sample Identification
92-08-085-01	SB-1-20
92-08-085-02	SB-1-21
92-08-085-03	SB-2-16
92-08-085-04	SB-2-18
92-08-085-05	SB-3-11
92-08-085-06	SB-3-14
92-08-085-07	SB-4-23
92-08-085-08	SB-4-24
92-08-085-09	SB-5-8
92-08-085-10	SB-5-22
92-08-085-11	SB-6-22
92-08-085-12	SB-6-23
92-08-085-13	SB-7-18
92-08-085-14	SB-7-21
92-08-085-15	SB-8-22
92-08-085-16	SB-8-23
92-08-085-17	HA-1-1
92-08-085-18	HA-2-2
92-08-085-19	HA-3-2
92-08-085-20	HA-4-2
92-08-085-21	HA-5-1
92-08-085-22	HA-6-1
92-08-085-23	SB-9-22
92-08-085-24	SB-9-24

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P.S.
Reviewed By

CHRIS BARRY

Sample: 01A SB-1-20 Collected: 07/31/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	6.88	mg/kg	0.80	08/07/92	JFG
Toluene	SW846 8020	44.27	mg/kg	0.80		
Ethylbenzene	SW846 8020	36.20	mg/kg	0.80		
Xylenes	SW846 8020	124.82	mg/kg	0.80		
DIESEL - SOLID SAMPLE	SW846/8015	5510	MG/KG	10	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 02A SB-1-21 Collected: 07/31/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	17.95	mg/kg	0.80	08/07/92	JFG
Toluene	SW846 8020	103.32	mg/kg	0.80		
Ethylbenzene	SW846 8020	56.49	mg/kg	0.80		
Xylenes	SW846 8020	177.17	mg/kg	0.80		
DIESEL - SOLID SAMPLE	SW846/8015	2360	MG/KG	10	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 03A SB-2-16 Collected: 07/31/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.80	mg/kg	0.80	08/07/92	JFG
Toluene	SW846 8020	2.17	mg/kg	0.80		
Ethylbenzene	SW846 8020	4.90	mg/kg	0.80		
Xylenes	SW846 8020	19.34	mg/kg	0.80		
DIESEL - SOLID SAMPLE	SW846/8015	347	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

TEST RESULTS BY SAMPLE

Sample: 04A SB-2-18 Collected: 07/31/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.80	mg/kg	0.80	08/07/92	JFG
Toluene	SW846 8020	3.60	mg/kg	0.80		
Ethylbenzene	SW846 8020	5.54	mg/kg	0.80		
Xylenes	SW846 8020	21.75	mg/kg	0.80		
DIESEL - SOLID SAMPLE	SW846/8015	526	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 05A SB-3-11 Collected: 07/31/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.020	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	<0.020	mg/kg	0.020		
Ethylbenzene	SW846 8020	<0.020	mg/kg	0.020		
Xylenes	SW846 8020	<0.020	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	3.8	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 06A SB-3-14 Collected: 07/31/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	0.035	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	<0.020	mg/kg	0.020		
Ethylbenzene	SW846 8020	<0.020	mg/kg	0.020		
Xylenes	SW846 8020	<0.020	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	1.7	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 07A SB-4-23 Collected: 08/01/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	0.063	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	0.186	mg/kg	0.020		
Ethylbenzene	SW846 8020	0.029	mg/kg	0.020		
Xylenes	SW846 8020	0.079	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	9.8	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 08A SB-4-24 Collected: 08/02/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	1.02	mg/kg	0.40	08/07/92	JFG
Toluene	SW846 8020	21.82	mg/kg	0.40		
Ethylbenzene	SW846 8020	16.55	mg/kg	0.40		
Xylenes	SW846 8020	55.73	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	697	MG/KG	10	08/24/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 09A SB-5-8 Collected: 08/02/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	1.34	mg/kg	0.40	08/07/92	JFG
Toluene	SW846 8020	8.68	mg/kg	0.40		
Ethylbenzene	SW846 8020	9.84	mg/kg	0.40		
Xylenes	SW846 8020	34.17	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	1160	MG/KG	10	08/24/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 10A S8-5-22 Collected: 08/02/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.40	mg/kg	0.40	08/08/92	JFG
Toluene	SW846 8020	8.01	mg/kg	0.40		
Ethylbenzene	SW846 8020	6.81	mg/kg	0.40		
Xylenes	SW846 8020	23.99	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	733	MG/KG	10	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 11A S8-6-22 Collected: 08/02/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	5.61	mg/kg	0.40	08/07/92	JFG
Toluene	SW846 8020	32.53	mg/kg	0.40		
Ethylbenzene	SW846 8020	20.91	mg/kg	0.40		
Xylenes	SW846 8020	68.26	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	2510	MG/KG	10	08/24/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/13/92	DATE		08/13/92	CJG

Sample: 12A S8-6-23 Collected: 08/02/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	9.85	mg/kg	0.80	08/07/92	JFG
Toluene	SW846 8020	65.10	mg/kg	0.80		
Ethylbenzene	SW846 8020	54.80	mg/kg	0.80		
Xylenes	SW846 8020	155.68	mg/kg	0.80		
DIESEL - SOLID SAMPLE	SW846/8015	7610	MG/KG	10	08/24/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/11/92	DATE		08/11/92	CJG

Sample: 13A SB-7-18 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.020	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	<0.020	mg/kg	0.020		
Ethylbenzene	SW846 8020	<0.020	mg/kg	0.020		
Xylenes	SW846 8020	<0.020	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	<1.0	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 14A SB-7-21 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.020	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	<0.020	mg/kg	0.020		
Ethylbenzene	SW846 8020	<0.020	mg/kg	0.020		
Xylenes	SW846 8020	<0.020	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	1.0	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 15A SB-8-22 Collected: 08/04/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	0.63	mg/kg	0.40	08/11/92	JFG
Toluene	SW846 8020	11.46	mg/kg	0.40		
Ethylbenzene	SW846 8020	7.63	mg/kg	0.40		
Xylenes	SW846 8020	25.24	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	28.3	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 16A SB-8-23 Collected: 08/04/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	9.53	mg/kg	0.40	08/07/92	JFG
Toluene	SW846 8020	45.31	mg/kg	0.40		
Ethylbenzene	SW846 8020	27.97	mg/kg	0.40		
Xylenes	SW846 8020	90.52	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	6680	MG/KG	50	08/26/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 17A HA-1-1 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	0.183	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	0.927	mg/kg	0.020		
Ethylbenzene	SW846 8020	0.634	mg/kg	0.020		
Xylenes	SW846 8020	1.983	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	1310	MG/KG	10	08/26/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 18A HA-2-2 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	51.4	mg/kg	8.0	08/11/92	JFG
Toluene	SW846 8020	401.4	mg/kg	8.0		
Ethylbenzene	SW846 8020	328.1	mg/kg	8.0		
Xylenes	SW846 8020	1617.2	mg/kg	8.0		
DIESEL - SOLID SAMPLE	SW846/8015	35100	MG/KG	100	08/25/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 19A HA-3-2 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	6.63	mg/kg	0.80	08/08/92	JFG
Toluene	SW846 8020	39.57	mg/kg	0.80		
Ethylbenzene	SW846 8020	24.61	mg/kg	0.80		
Xylenes	SW846 8020	129.83	mg/kg	0.80		
DIESEL - SOLID SAMPLE	SW846/8015	7930	MG/KG	10	08/24/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 20A HA-4-2 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	1.92	mg/kg	0.40	08/08/92	JFG
Toluene	SW846 8020	18.56	mg/kg	0.40		
Ethylbenzene	SW846 8020	16.25	mg/kg	0.40		
Xylenes	SW846 8020	87.88	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	5860	MG/KG	10	08/24/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 21A HA-5-1 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.40	mg/kg	0.40	08/11/92	JFG
Toluene	SW846 8020	<0.40	mg/kg	0.40		
Ethylbenzene	SW846 8020	<0.40	mg/kg	0.40		
Xylenes	SW846 8020	<0.40	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	16400	MG/KG	100	08/25/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 22A HA-6-1 Collected: 08/03/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.80	mg/kg	0.80	08/08/92	JFG
Toluene	SW846 8020	<0.80	mg/kg	0.80		
Ethylbenzene	SW846 8020	<0.80	mg/kg	0.80		
Xylenes	SW846 8020	<0.80	mg/kg	0.80		
DIESEL - SOLID SAMPLE	SW846/8015	35000	MG/KG	100	08/25/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 23A SB-9-22 Collected: 08/05/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.020	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	<0.020	mg/kg	0.020		
Ethylbenzene	SW846 8020	<0.020	mg/kg	0.020		
Xylenes	SW846 8020	<0.020	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	<1.0	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

Sample: 24A SB-9-24 Collected: 08/05/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.020	mg/kg	0.020	08/07/92	JFG
Toluene	SW846 8020	<0.020	mg/kg	0.020		
Ethylbenzene	SW846 8020	<0.020	mg/kg	0.020		
Xylenes	SW846 8020	<0.020	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	<1.0	MG/KG	1.0	08/21/92	DBS
TOT.PET.HYDROCARBON PREP	FREON EXT	08/12/92	DATE		08/12/92	CJG

1	6.984	18976				
2	10.223	1961466			2	BENZENE
3	11.423	716048	V	R	1	INT STD
4	13.916	1875710	SV		3	TOLUENE
5	15.638	4572	T			
6	17.4	1374215	V		4	ETHYL BEN
7	17.714	1841859	V		5	P-XYLENE
8	17.974	2426543	V		6	M-XYLENE
9	19.753	1739750	SV		7	O-XYLENE

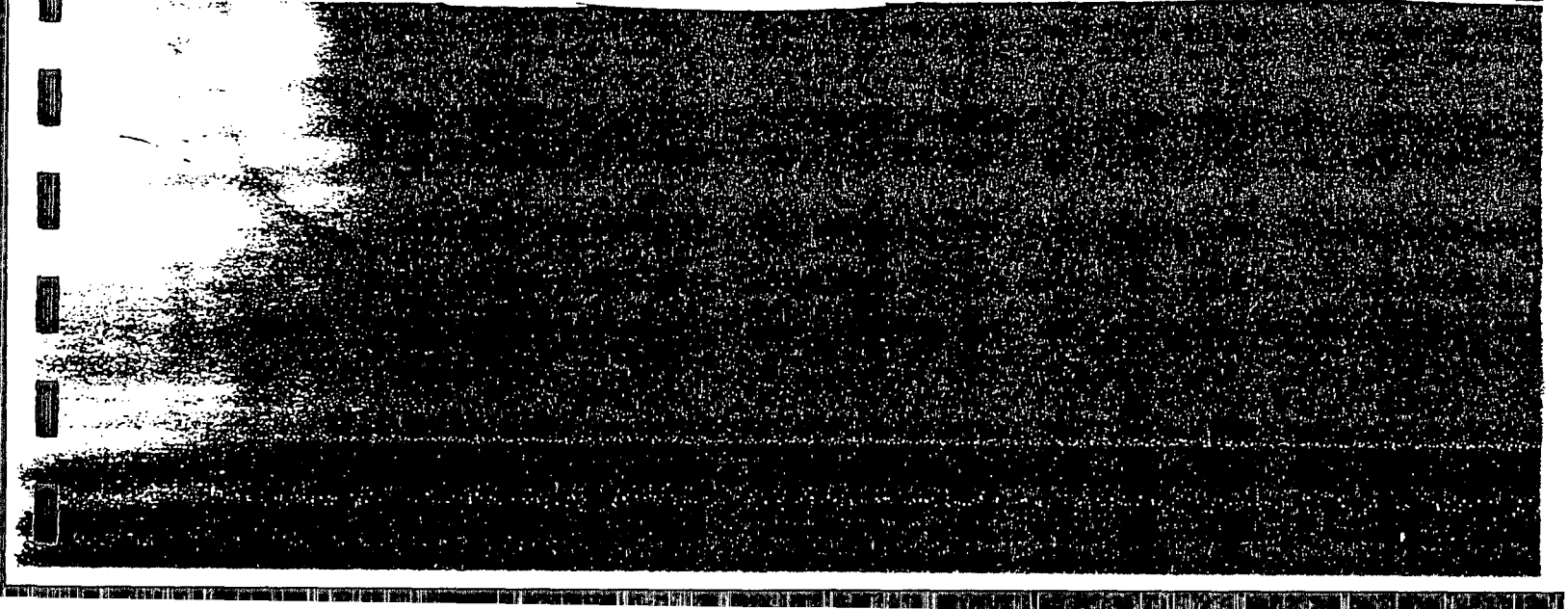
	TOTAL	11959135				

CALIBRATION MADE IN IDENTIFICATION FILE 9
MODE# 93

IDNO	NAME	TIME	BAND	FACTOR	CONC
1	INT STD	11.4	0.3	1	1
2	BENZENE	10.2	0.3	73.0115	200
3	TOLUENE	13.9	0.3	76.3495	200
4	ETHYL BEN	17.4	0.2	104.212	200
5	P-XYLENE	17.7	0.15	77.7528	200
6	M-XYLENE	17.9	0.2	59.0179	200
7	O-XYLENE	19.8	0.3	82.3162	200

DAILY BTEX CALIBRATION 8/7/92 ALS 2032

COMPOUND	AVE RF	RF	%D
BENZENE	60.857	73.01	-20
TOLUENE	70.735	76.34	-8
ETHYL BENZ	101.603	104.21	-2.6
P-XYLENE	75.799	77.75	-2.6
M-XYLENE	55.181	59.01	-7
O-XYLENE	81.609	82.31	-0.9



223-02037-01 911015 ⊕ Shimadzu

7	17.736	6220	V	7	219.5434	O-XYLENE
		---------			----------	
	TOTAL	41839			1305.0655	

CHROMATOPAC
CHANNEL NO 1
SAMPLE NO 0
REPORT NO 218
IS WT 1

FILE 9
METHOD 0403
SAMPLE WT 100
STANDARD 1

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	8.344	6428		2		BENZENE
2	9.544	1873		1		INT STD
3	11.846	6729		3		TOLUENE
4	15.337	5015		4		ETHYL BEN
5	15.653	6095	V	5		P-XYLENE
6	15.92	9479	V	6		M-XYLENE
7	17.736	6220	V	7		O-XYLENE

	TOTAL	41839				

CALIBRATION MADE IN IDENTIFICATION FILE 9
MODE# 93

IDNO	NAME	TIME	BAND	FACTOR	CONC
1	INT STD	9.5	0.15	1	1
2	BENZENE	8.3	0.15	58.2749	200
3	TOLUENE	11.8	0.1	55.6702	200
4	ETHYL BEN	15.3	0.1	74.6974	200
5	P-XYLENE	15.6	0.1	61.464	200
6	M-XYLENE	15.9	0.15	39.519	200
7	O-XYLENE	17.7	0.15	60.2234	200
8	MTBE	4.2	0.1	293.06	200

DAILY BTEX CALIBRATION 8/7/92 ALS 2016

COMPOUND	AVE RF	RF	%D
BENZENE	46.67	58.87	-24.9
TOLUENE	48.75	55.66	-14.2
ETHYL BENZ	66.06	74.69	-13.1
P-XYLENE	53.11	61.46	-15.8
M-XYLENE	35.99	39.51	-9.8
O-XYLENE	56.12	60.22	-7.4

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2	9.492	2202	SV	P	1	INT STD
3	11.796	3187			3	TOLUENE
4	15.291	5837			4	ETHYL BEN
5	15.61	7260	V		5	P-XYLENE
6	15.978	11650	V		6	M-XYLENE
7	17.696	7284			7	O-XYLENE
	TOTAL	51397				

CALIBRATION MADE IN IDENTIFICATION FILE 9
MODE= 93

IDNO	NAME	TIME	BAND	FACTOR	CONC
1	INT STD	9.5	0.15	1	1
2	BENZENE	8.3	0.15	49.6813	200
3	TOLUENE	11.8	0.1	53.9131	200
4	ETHYL BEN	15.3	0.1	75.5822	200
5	P-XYLENE	15.6	0.1	59.8394	200
6	M-XYLENE	15.9	0.15	37.8041	200
7	O-XYLENE	17.7	0.15	60.9619	200
8	MTBE	4.2	0.1	293.06	200

DAILY BTEX CALIBRATION 8/11/92 ALS 2016

COMPOUND	AVE RF	RF	%D
BENZENE	46.67	49.67	-6.5
TOLUENE	48.75	53.91	-10.6
ETHYL BENZ	66.06	75.57	-14.4
P-XYLENE	53.11	59.83	-12.7
M-XYLENE	35.99	37.8	-5.1
O-XYLENE	56.12	60.96	-8.7

SOUTHWESTERN LABORATORIES

Client: Western Co.

File No.:

Report No.: 92-08-085

Report Date: 8/7/92

BTEX ANALYSIS

Matrix: water

Concentration Units, (ppb)

SwL Lab No.	Sample I.D.	Benzene	Toluene	Ethyl Benzene	Total Xylenes
92-08-085	Blank (2016)	< 4	< 4	< 4	< 4

Date Analyzed: 8/7/92 BTEX Method 5030/8020

Analyzed by: V.B.

Method detection limits are 20 ug/kg and 4 ug/l for BETX in soil and water, respectively. Higher detection limits indicate possible matrix interferences.

SOUTHWESTERN LABORATORIES

Client: Western Co.

File No.:

Report No.: 92-08-085

Report Date: 8/7/92

BTEX ANALYSIS

Matrix: water

Concentration Units, (ppb)

SwL Lab No.	Sample I.D.	Benzene	Toluene	Ethyl Benzene	Total Xylenes
92-08-085	Blank (2032)	< 4	< 4	< 4	< 4

Date Analyzed: 8/7/92 BTEX Method 5030/8020

Analyzed by: JDL

Method detection limits are 20 ug/kg and 4 ug/l for BETX in soil and water, respectively. Higher detection limits indicate possible matrix interferences.

MATRIX SPIKE RECOVERY

Client: Western Co.
SwL Lab No.: 92-08-085-13
Sample I.D.: ~~SB-17~~ SB-7-18
Date: 8/7/92
Sample Matrix: soil
Analyst: JFG
Spiking Solution: SwL BTEX Spike
Parameter: BTEX

Spike

Compound	Amount Added (ug/ml)	Sample Conc. (ug/ml)	MS Conc. (ug/ml)	MS % Recovery	QA % Limit
Benzene	200 ug/l	N/D	207	104	39-150
Toluene	200 ug/l		214	107	46-148
Ethyl Benzene	200 ug/l		218	109	32-160
p-Xylene	200 ug/l		206	103	
m-Xylene	200 ug/l		222	111	
o-Xylene	200 ug/l		226	113	

MATRIX SPIKE RECOVERY

Client: Western Co. | SwL Lab No.: 92-08-035-13

Sample I.D.: SB-7-18 | Date: 8/7/92

Sample Matrix: Soil | Analyst: T.F.G.

Spiking Solution: SwL BTEX Spike | Parameter: BTEX

Spike Dup.

Compound	Amount Added (ug/ml)	Sample Conc. (ug/ml)	MS Conc. (ug/ml)	MS % Recovery	QA % Limit
Benzene	200 ug/l	N/D	208	104	39-150
Toluene	200 ug/l		212	106	46-148
Ethyl Benzene	200 ug/l		207	104	32-160
p-Xylene	200 ug/l		196	98	
m-Xylene	200 ug/l		223	112	
o-Xylene	200 ug/l		218	109	

MATRIX SPIKE RECOVERY

Client: Western Co. SwL Lab No.: 92-08-085-5

Sample I.D.: SB-3-11 Date: 8/11/92

Sample Matrix: soil Analyst: I.F.G.

Spiking Solution: SwL BTEX Spike Parameter: BTEX

Spike

Compound	Amount Added (ug/ml)	Sample Conc. (ug/ml)	MS Conc. (ug/ml)	MS % Recovery	QA % Limit
Benzene	200 ug/l	N/D	213	107	39-150
Toluene	200 ug/l		214	107	46-148
Ethyl Benzene	200 ug/l		211	106	32-160
p-Xylene	200 ug/l		211	106	
m-Xylene	200 ug/l		208	104	
o-Xylene	200 ug/l		213	107	

MATRIX SPIKE RECOVERY

Client: Western Co. | SwL Lab No.: 92-08-085-5

Sample I.D.: SB-3-11 | Date: 8/11/92

Sample Matrix: soil | Analyst: T.F-G.

Spiking Solution: SwL BTEX Spike | Parameter: BTEX

Spike Dup.

Compound	Amount Added (ug/ml)	Sample Conc. (ug/ml)	MS Conc. (ug/ml)	MS % Recovery	QA % Limit
Benzene	200 ug/l	N/D	207	104	39-150
Toluene	200 ug/l		212	106	46-148
Ethyl Benzene	200 ug/l		215	108	32-160
o-Xylene	200 ug/l		212	106	
m-Xylene	200 ug/l		207	104	
p-Xylene	200 ug/l	✓	213	107	

MATRIX SPIKE RECOVERY

Client: Western Co.
SwL Lab No.: 92-08-085-24
Sample I.D.: SB-9-24
Date: 8/20/92
Sample Matrix: Soil
Analyst: OBS
Spiking Solution: TPH Spiking Solution
Parameter: TPH by G.C.

Compound	Amount Added (ug/ml)	Sample Conc. (ug/ml)	MS Conc. (ug/ml)	MS % Recovery	(%Recov) QA % Limit
Spike	100	NA	121.0	121.0	
Spike Dup	100	NA	109.3	109.3	

MATRIX SPIKE RECOVERY

Client: Western Co.
SwL Lab No.: 92-08-085-5
Sample I.D.: SB-3-11
Date: 8/20/92
Sample Matrix: Soil
Analyst: DBS
Spiking Solution: TPH Spiking Solution
Parameter: TPH by G.C.

Compound	Amount Added (ug/ml)	Sample Conc. (ug/ml)	MS Conc. (ug/ml)	MS % Recovery	(%Recov) QA % Limit
Spike	100	NA	147.6	147.6	
Spike Dup	100	NA	107.8	107.8	

SwL

SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
222 Cavalcade St. • P.O. Box 8768, Houston, Texas 77249 • 713/692-9151

Analysis Request and Chain of Custody Record

Project no. 1011

Client/Project: Western Co. of North America

Lab ID No.	Field Sample No./Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid Sludge, Etc.)	Preservative	ANALYSIS REQUESTED: BTEX_S, DESL_S, TPH-EX	LABORATORY REMARKS
1	SB-1-20	7-31-92 1050	✓		1-4oz(G)	Soil	4°C	EPA 8020 (Full scan) & mod 8015 (diesel fraction)	Normal TAT
2	SB-1-21	7-31-92 1100	✓		1-4oz(G)	Soil	↓	↓	↓
3	SB-2-16	7-31-92 1630	✓		1-4oz(G)	↓	↓	↓	↓
4	SB-2-18	7-31-92 1700	✓		1-4oz(G)	↓	↓	↓	↓
5	SB-3-11	8-1-92 1025	✓		1-4oz(G)	↓	↓	↓	↓
6	SB-3-14	8-1-92 1055	✓		1-4oz(G)	↓	↓	↓	↓
7	SB-4-23	8-1-92 1630	✓		1-4oz(G)	↓	↓	↓	↓
8	SB-4-24	8-1-92 1645	✓		1-4oz(G)	↓	↓	↓	↓
9	SB-5-8	8-2-92 940	✓		1-4oz(G)	↓	↓	↓	↓
10	SB-5-22	8-2-92 1055	✓		1-4oz(G)	↓	↓	↓	↓

Samplers: *(Print)* Jack Cooper

Affiliation: Brown and Caldwell

Results by: [signature]

Rush Charges Authorized Yes ____ No ____

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Date / Time
[signature]	Date: Time:		Date: Time:
	Date: Time:		Date: Time:
	Date: Time:	Received by Laboratory: *(Signature)* [signature]	Date: 8-6 Time: 1030

COC Seal No.

Intact: [illegible]

Laboratory No. 92-08-085

REMARKS:

Data Results To:
1. Lynn Wright, Brown & Caldwell, 2710 Stemmons Fwy, 400 Tower North, Dallas, Tx 75207
2.

SwL SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

222 Cavalcade St. • P.O. Box 8768, Houston, Texas 77249 • 713/692-9151

Analysis Request and Chain of Custody Record

Project no.: 1011

Client/Project: WESTERN CO. OF NORTH AMERICA

Lab ID No.	Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
11	SB-1-22	8-2-92 1135	✓		1-4oz (G)	soil	4°C	EPA 8020 (Full) & mod 8015 (diesel fraction)	Normal TAT
12	SB-6-23	8-2-92 1640	✓						
13	SB-7-16	8-3-92 1145	✓						
14	SB-7-21	8-3-92 1205	✓						
15	SB-8-22	8-4-92 1200	✓						
16	SB-8-23	8-4-92 1210	✓						
17	HA-1-1	8-3-92 1340		✓					
18	HA-2-2	8-3-92 1405		✓					
19	HA-3-2	8-3-92 1435		✓					
20	HA-4-2	8-3-92 1455		✓					

Samplers: (Print)	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time:	COC Seal No.
Jack Cochran					
Affiliation	Relinquished by: (Signature)	Date: Time:	Received by: (Signature)	Date: Time: 8-6	
Brown and Caldwell	Relinquished by: (Signature)	Date: Time:	Received by Laboratory: (Signature)	Date: 8-6 Time: 1030	Intact: Yes / No / ICE

Results by _____

Rush Charges Authorized

Yes ____ No ____

REMARKS:

Data Results To:

1. See page 1

2.

Laboratory No. 92-08-885

SwL SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

222 Cavalcade St. • P.O. Box 8768, Houston, Texas 77249 • 713/692-9151

Analysis Request and Chain of Custody Record

Project no.: 1011

Client/Project: WESTERN CO. OF NORTH AMERICA

Lab ID No.	Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
21	HA-5-1	8-5-92 1510		✓	1-4oz (G)	soil	4°C	EPA 8020, mod 8015 (diesel fraction)	Normal TAT
22	HA-6-1	8-5-92 1555		✓	1-4oz (G)	soil	4°C	EPA 8020, mod 8015 (diesel fraction)	
23	SB-9-22	8-5-92 1030	✓		↓	↓	↓	↓	
24	SB-9-24	8-5-92 1050	✓		↓	↓	↓	↓	

Samplers: *(Print)*: JACK COOPER

Affiliation: Brown and Caldwell

Relinquished by: *(Signature)* [signature] Date: Time:

Relinquished by: *(Signature)* Date: Time:

Relinquished by: *(Signature)* Date: Time:

Received by: *(Signature)* Date: Time:

Received by: *(Signature)* Date: Time:

Received by Laboratory: *(Signature)* [signature] Date: 8-6 Time: 1030

COC Seal No.

Intact: Yes / No

Laboratory No. 9208-085

Results by _____

Rush Charges Authorized

Yes _____ No _____

REMARKS:

Data Results To:

1. See page 1

2.

C

APPENDIX C

Laboratory Analytical Reports for Groundwater Samples

SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
222 CAVALCADE * P.O. BOX 8768, HOUSTON, TEXAS 77249 * 713 692-9151

RECEIVED
SEP 0 3 1992
BROWN AND CALDWELL-DFW

Client THE WESTERN COMPANY OF N.A.
515 POST OAK BLVD., SUITE 915
HOUSTON, TEXAS 77027-9407
713/629-2864 FAX 629-2885
Attn: MS. ANGELA HARDY

Client No. 2_9275_00
Report No. 92-08-146
Report Date 08/31/92 08:45

Project 1011-WATER ANALYSIS

Date Sampled 08/10/92

Sampled By BROWN & CALDWELL

Sample Type LIQUID SAMPLES

Transported by FEDEX

P.O. # _____

Date Received 08/12/92

Lab No.	Sample Identification
92-08-146-01	MW-5
92-08-146-02	MW-2
92-08-146-03	MW-1
92-08-146-04	MW-3
92-08-146-05	MW-4
92-08-146-06	FRESH WATER WELL

SOUTHWESTERN LABORATORIES

Reviewed By

CHRIS BARRY

TEST RESULTS BY SAMPLE

Sample: 01A MW-5 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
B/N EXTRACTION	EPA_GC	08/13/92	DATE		08/13/92	CAM
BTEX - WATER SAMPLE	SW846_8020					
Benzene	SW846_8020	<0.0040	mg/l	0.0040	08/12/92	JFG
Toluene	SW846_8020	<0.0040	mg/l	0.0040		
Ethylbenzene	SW846_8020	<0.0040	mg/l	0.0040		
Xylenes	SW846_8020	<0.0040	mg/l	0.0040		
POLYNUCLEAR AROMATICS	8100	ENCLOSURE	ug/l	10	08/27/92	DBS

Sample: 01B MW-5 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
ALKALINITY (CACO3)	EPA 310.1			5.0		
HYDROXIDE	EPA 310.1	0	mg/L		08/13/92	JH
CARBONATE	EPA 310.1	0	mg/L		08/13/92	JH
BICARBONATE	EPA 310.1	305	mg/L		08/13/92	JH
CALCIUM	EPA 200.7	91.8	mg/l	0.01	08/18/92	HC
CHLORIDE	EPA 325.3	91	mg/l	0.25	08/14/92	SJ
FLUORIDE	EPA 340.2	0.95	mg/l	0.14	08/12/92	SJ
HARDNESS (CACO3)	SM_2340B	330	mg/l		08/18/92	HC
MAGNESIUM	EPA 200.7	24.4	mg/l	0.007	08/17/92	HC
NITRATE AS N	EPA_353_2	3.12	mg/l	0.05	08/18/92	RC
POTASSIUM	EPA 258.1	7.74	mg/l	0.04	08/18/92	HC
SODIUM	EPA 200.7	116	mg/l	0.03	08/17/92	HC
SULFATE-WATER/WASTEWATER	EPA 375.2	180	mg/l	5.00	08/18/92	JA

Sample: 02A MW-2 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
B/N EXTRACTION	EPA_GC	08/13/92	DATE		08/13/92	CAM
BTEX - WATER SAMPLE	SW846_8020					
Benzene	SW846_8020	0.0149	mg/l	0.0040	08/12/92	JFG
Toluene	SW846_8020	<0.0040	mg/l	0.0040		
Ethylbenzene	SW846_8020	<0.0040	mg/l	0.0040		
Xylenes	SW846_8020	<0.0040	mg/l	0.0040		

TEST RESULTS BY SAMPLE

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
POLYNUCLEAR AROMATICS	8100	ENCLOUSRE	ug/l	10	08/27/92	DBS

Sample: 02B MW-2 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
ALKALINITY (CACO3)	EPA 310.1			5.0		
HYDROXIDE	EPA 310.1	0	mg/L		08/13/92	JH
CARBONATE	EPA 310.1	0	mg/L		08/13/92	JH
BICARBONATE	EPA 310.1	287	mg/L		08/13/92	JH
CALCIUM	EPA 200.7	171	mg/l	0.01	08/18/92	HC
CHLORIDE	EPA 325.3	122	mg/l	0.25	08/14/92	SJ
FLUORIDE	EPA 340.2	0.93	mg/l	0.14	08/12/92	SJ
HARDNESS (CACO3)	SM_2340B	629	mg/l		08/18/92	HC
MAGNESIUM	EPA 200.7	49.1	mg/l	0.007	08/17/92	HC
NITRATE AS N	EPA_353_2	3.75	mg/l	0.05	08/18/92	RC
POTASSIUM	EPA 258.1	7.67	mg/l	0.04	08/18/92	HC
SODIUM	EPA 200.7	90.0	mg/l	0.03	08/17/92	HC
SULFATE-WATER/WASTEWATER	EPA 375.2	174	mg/l	5.00	08/18/92	JA

Sample: 03A MW-1 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
B/N EXTRACTION	EPA_GC	08/13/92	DATE		08/13/92	CAM
BTEX - WATER SAMPLE	SW846_8020					
Benzene	SW846_8020	5.55	mg/l	0.20	08/13/92	JFG
Toluene	SW846_8020	12.09	mg/l	0.20		
Ethylbenzene	SW846_8020	2.16	mg/l	0.20		
Xylenes	SW846_8020	7.37	mg/l	0.20		
POLYNUCLEAR AROMATICS	8100	ENCLOUSRE	ug/l	100	08/27/92	DBS

TEST RESULTS BY SAMPLE

Sample: 03B MW-1 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
ALKALINITY (CACO3)	EPA 310.1			5.0		
HYDROXIDE	EPA 310.1	0	mg/L		08/13/92	JH
CARBONATE	EPA 310.1	0	mg/L		08/13/92	JH
BICARBONATE	EPA 310.1	383	mg/L		08/13/92	JH
CALCIUM	EPA 200.7	133	mg/l	0.01	08/18/92	HC
CHLORIDE	EPA 325.3	163	mg/l	0.25	08/14/92	SJ
FLUORIDE	EPA 340.2	1.18	mg/l	0.14	08/12/92	SJ
HARDNESS (CACO3)	SM_2340B	494	mg/l		08/18/92	HC
MAGNESIUM	EPA 200.7	39.7	mg/l	0.007	08/17/92	HC
NITRATE AS N	EPA_353_2	1.25	mg/l	0.05	08/18/92	RC
POTASSIUM	EPA 258.1	6.14	mg/l	0.04	08/18/92	HC
SODIUM	EPA 200.7	112	mg/l	0.03	08/17/92	HC
SULFATE-WATER/WASTEWATER	EPA 375.2	158	mg/l	5.00	08/18/92	JA

Sample: 04A MW-3 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
B/N EXTRACTION	EPA_GC	08/13/92	DATE		08/13/92	CAM
BTEX - WATER SAMPLE	SW846_8020					
Benzene	SW846_8020	0.304	mg/l	0.020	08/13/92	JFG
Toluene	SW846_8020	2.099	mg/l	0.020		
Ethylbenzene	SW846_8020	0.676	mg/l	0.020		
Xylenes	SW846_8020	1.586	mg/l	0.020		
POLYNUCLEAR AROMATICS	8100	ENCLOUSRE	ug/l	10	08/27/92	DBS

Sample: 04B MW-3 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
ALKALINITY (CACO3)	EPA 310.1			5.0		
HYDROXIDE	EPA 310.1	0	mg/L		08/13/92	JH
CARBONATE	EPA 310.1	0	mg/L		08/13/92	JH
BICARBONATE	EPA 310.1	315	mg/L		08/13/92	JH
CALCIUM	EPA 200.7	149	mg/l	0.01	08/18/92	HC
CHLORIDE	EPA 325.3	19.2	mg/l	0.25	08/14/92	SJ
FLUORIDE	EPA 340.2	1.08	mg/l	0.14	08/12/92	SJ
HARDNESS (CACO3)	SM_2340B	553	mg/l		08/18/92	HC
MAGNESIUM	EPA 200.7	44.2	mg/l	0.007	08/17/92	HC
NITRATE AS N	EPA_353_2	3.03	mg/l	0.05	08/18/92	RC
POTASSIUM	EPA 258.1	5.83	mg/l	0.04	08/18/92	HC
SODIUM	EPA 200.7	93.5	mg/l	0.03	08/17/92	HC
SULFATE-WATER/WASTEWATER	EPA 375.2	209	mg/l	5.00	08/18/92	JA

TEST RESULTS BY SAMPLE

Sample: 05A MW-4 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
B/N EXTRACTION	EPA_GC	08/13/92	DATE		08/13/92	CAM
BTEX - WATER SAMPLE	SW846_8020					
Benzene	SW846_8020	2.59	mg/l	0.20	08/13/92	JFG
Toluene	SW846_8020	10.36	mg/l	0.20		
Ethylbenzene	SW846_8020	2.16	mg/l	0.20		
Xylenes	SW846_8020	6.74	mg/l	0.20		
POLYNUCLEAR AROMATICS	8100	ENCLOSURE	ug/l	20	08/27/92	DBS

Sample: 05B MW-4 Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
ALKALINITY (CACO3)	EPA 310.1			5.0		
HYDROXIDE	EPA 310.1	0	mg/L		08/13/92	JH
CARBONATE	EPA 310.1	0	mg/L		08/13/92	JH
BICARBONATE	EPA 310.1	361	mg/L		08/13/92	JH
CALCIUM	EPA 200.7	138	mg/l	0.01	08/18/92	HC
CHLORIDE	EPA 325.3	26	mg/l	0.25	08/14/92	SJ
FLUORIDE	EPA 340.2	1.06	mg/l	0.14	08/12/92	SJ
HARDNESS (CACO3)	SM_2340B	518	mg/l		08/18/92	HC
MAGNESIUM	EPA 200.7	42.0	mg/l	0.007	08/17/92	HC
NITRATE AS N	EPA_353_2	1.69	mg/l	0.05	08/18/92	RC
POTASSIUM	EPA 258.1	7.15	mg/l	0.04	08/18/92	HC
SODIUM	EPA 200.7	116	mg/l	0.03	08/17/92	HC
SULFATE-WATER/WASTEWATER	EPA 375.2	183	mg/l	5.00	08/18/92	JA

Sample: 06A FRESH WATER WELL Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
B/N EXTRACTION	EPA_GC	08/13/92	DATE		08/13/92	CAM
BTEX - WATER SAMPLE	SW846_8020					
Benzene	SW846_8020	<0.0040	mg/l	0.0040	08/13/92	JFG
Toluene	SW846_8020	<0.0040	mg/l	0.0040		
Ethylbenzene	SW846_8020	<0.0040	mg/l	0.0040		
Xylenes	SW846_8020	<0.0040	mg/l	0.0040		
POLYNUCLEAR AROMATICS	8100	ENCLOUSRE	ug/l	10	08/27/92	DBS

Sample: 06B FRESH WATER WELL Collected: 08/10/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
ALKALINITY (CACO3)	EPA 310.1			5.0		
HYDROXIDE	EPA 310.1	0	mg/L		08/13/92	JH
CARBONATE	EPA 310.1	0	mg/L		08/13/92	JH
BICARBONATE	EPA 310.1	216	mg/L		08/13/92	JH
CALCIUM	EPA 200.7	366	mg/l	0.01	08/18/92	HC
CHLORIDE	EPA 325.3	621	mg/l	0.25	08/14/92	SJ
FLUORIDE	EPA 340.2	0.83	mg/l	0.14	08/12/92	SJ
HARDNESS (CACO3)	SM_2340B	1147	mg/l		08/18/92	HC
MAGNESIUM	EPA 200.7	56.4	mg/l	0.007	08/17/92	HC
NITRATE AS N	EPA_353_2	2.32	mg/l	0.05	08/18/92	RC
POTASSIUM	EPA 258.1	4.70	mg/l	0.04	08/18/92	HC
SODIUM	EPA 200.7	101	mg/l	0.03	08/17/92	HC
SULFATE-WATER/WASTEWATER	EPA 375.2	251	mg/l	5.00	08/18/92	JA

SOUTHWESTERN LABORATORIES

Client: The Western Co. of N.A.

File No.: 2-9275-00

Sample I.D.: MW-5

Report No.: 92-08-146-1

Data File: ---

Report Date: 8/31/92

POLYNUCLEAR AROMATICS (PNA)

Matrix: water

Method: Soil/Waste - EPA SW846; 3550/8100
Water - EPA 610

Technique: SepF

Compound	Concentration Units: ug/l
naphthalene	<10
acenaphthylene	<10
acenaphthene	<10
fluorene	<10
phenanthrene	<10
anthracene	<10
fluoranthene	<10
pyrene	<10
chrysene	<10
benzo(a)anthracene	<10
benzo(k)fluoranthene	<10
benzo(b)fluoranthene	<10
benzo(a)pyrene	<10
ideno(1,2,3-c,d)pyrene	<10
dibenzo(a,h)anthracene	<10
benzo(g,h,i)perylene	<10

SOUTHWESTERN LABORATORIES

Client: The Western Co. of N.A.

File No.: 2-9275-00

Sample I.D.: MW-2

Report No.: 92-08-146-2

Data File: ---

Report Date: 8/31/92

POLYNUCLEAR AROMATICS (PNA)

Matrix: water

Method: Soil/Waste - EPA SW846; 3550/8100
Water - EPA 610

Technique: SepF

Compound	Concentration Units: ug/l
naphthalene	<10
acenaphthylene	<10
acenaphthene	<10
fluorene	<10
phenanthrene	<10
anthracene	<10
fluoranthene	<10
pyrene	<10
chrysene	<10
benzo(a)anthracene	<10
benzo(k)fluoranthene	<10
benzo(b)fluoranthene	<10
benzo(a)pyrene	<10
ideno(1,2,3-c,d)pyrene	<10
dibenzo(a,h)anthracene	<10
benzo(g,h,i)perylene	<10

SOUTHWESTERN LABORATORIES

Client: The Western Co. of N.A. **File No.:** 2-9275-00

Sample I.D.: MW-1 **Report No.:** 92-08-146-3

Data File: --- **Report Date:** 8/31/92

POLYNUCLEAR AROMATICS (PNA)

Matrix: water **Method:** Soil/Waste - EPA SW846; 3550/8100
Water - EPA 610

Technique: SepF

Compound	Concentration Units: ug/l
naphthalene	<100
acenaphthylene	<100
acenaphthene	<100
fluorene	<100
phenanthrene	<100
anthracene	<100
fluoranthene	<100
pyrene	<100
chrysene	<100
benzo(a)anthracene	<100
benzo(k)fluoranthene	<100
benzo(b)fluoranthene	<100
benzo(a)pyrene	<100
ideno(1,2,3-c,d)pyrene	<100
dibenzo(a,h)anthracene	<100
benzo(g,h,i)perylene	<100

SOUTHWESTERN LABORATORIES

Client: The Western Co. of N.A.

File No.: 2-9275-00

Sample I.D.: MW-3

Report No.: 92-08-146-4

Data File: ---

Report Date: 8/31/92

POLYNUCLEAR AROMATICS (PNA)

Matrix: water

Method: Soil/Waste - EPA SW846; 3550/8100
Water - EPA 610

Technique: SepF

Compound	Concentration Units: ug/l
naphthalene	<10
acenaphthylene	<10
acenaphthene	<10
fluorene	<10
phenanthrene	<10
anthracene	<10
fluoranthene	<10
pyrene	<10
chrysene	<10
benzo(a)anthracene	<10
benzo(k)fluoranthene	<10
benzo(b)fluoranthene	<10
benzo(a)pyrene	<10
ideno(1,2,3-c,d)pyrene	<10
dibenzo(a,h)anthracene	<10
benzo(g,h,i)perylene	<10

SOUTHWESTERN LABORATORIES

Client: The Western Co. of N.A.

File No.: 2-9275-00

Sample I.D.: MW-4

Report No.: 92-08-146-5

Data File: ---

Report Date: 8/31/92

POLYNUCLEAR AROMATICS (PNA)

Matrix: water

Method: Soil/Waste - EPA SW846; 3550/8100
Water - EPA 610

Technique: SepF

Compound	Concentration Units: ug/l
naphthalene	<20
acenaphthylene	<20
acenaphthene	<20
fluorene	<20
phenanthrene	<20
anthracene	<20
fluoranthene	<20
pyrene	<20
chrysene	<20
benzo(a)anthracene	<20
benzo(k)fluoranthene	<20
benzo(b)fluoranthene	<20
benzo(a)pyrene	<20
ideno(1,2,3-c,d)pyrene	<20
dibenzo(a,h)anthracene	<20
benzo(g,h,i)perylene	<20

SOUTHWESTERN LABORATORIES

Client: The Western Co. of N.A.

File No.: 2-9275-00

Sample I.D.: Fresh Water Well

Report No.: 92-08-146-6

Data File: ---

Report Date: 8/31/92

POLYNUCLEAR AROMATICS (PNA)

Matrix: water

Method: Soil/Waste - EPA SW846; 3550/8100
Water - EPA 610

Technique: SepF

Compound	Concentration Units: ug/l
naphthalene	<10
acenaphthylene	<10
acenaphthene	<10
fluorene	<10
phenanthrene	<10
anthracene	<10
fluoranthene	<10
pyrene	<10
chrysene	<10
benzo(a)anthracene	<10
benzo(k)fluoranthene	<10
benzo(b)fluoranthene	<10
benzo(a)pyrene	<10
ideno(1,2,3-c,d)pyrene	<10
dibenzo(a,h)anthracene	<10
benzo(g,h,i)perylene	<10

SwL **SOUTHWESTERN LABORATORIES**
Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
222 Cavalcade St. • P.O. Box 8768, Houston, Texas 77249 • 713/692-9151

Analysis Request and Chain of Custody Record

Project no. 1011

Client/Project: WESTERN Co. of NORTH AMERICA

Lab ID No.	Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid Sludge, Etc.)	Preser-vative	ANALYSIS REQUESTED	LABORATORY REMARKS
1	MW-5	945/955 8-10-92	✓		1-1/2 gal pl, 1-32oz pl, 1-1/4 gal pl, 2-40ml GL	water	Var	BTEX, PNA's, Major cat's & an's	Normal TAT BTEX-W; PNA, BN-[illegible] GWM_2
2	MW-2	1005/1015 8-10-92	✓		↓	↓	↓	↓	↓
3	MW-1	1045/1055 8-10-92	✓		↓	↓	↓	↓	↓
4	MW-3	1110/1120 8-10-92	✓		↓	↓	↓	↓	↓

Samplers: (Print) Jack Cooper

Affiliation: Brown & Caldwell

Relinquished by: (Signature) Jack Cooper — Date: 8-10-92 Time: 6:00 pm

Received by: (Signature) Fed Ex — Date: Time:

Relinquished by: (Signature) — Date: Time:

Received by: (Signature) — Date: Time:

Relinquished by: (Signature) — Date: Time:

Received by Laboratory: (Signature) K Bursnall — Date: 8-12-92 Time: 8:30

COC Seal No.

Intact: Yes

Laboratory No. 92-08-146

Results by ______

Rush Charges Authorized Yes ___ No ___

REMARKS:

Data Results to: Brown & Caldwell
1. 2710 Stemmons Fwy
1100 Tower North
2. Dallas Tx 75207

SwL **SOUTHWESTERN LABORATORIES**

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

222 Cavalcade St. • P.O. Box 8768, Houston, Texas 77249 • 713/692-9151

Analysis Request and Chain of Custody Record

Project no.: 1011

Client/Project: Western Co. of North America

Lab ID No.	Field Sample No./ Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
5	MW-4	1130/1140 8-10-92	✓		1-½ gal pl 1-32oz pl 1-16oz pl 2-40ml vol	water	ice	BTEX, PNA's, Major cat's & an's	Normal TAT
6	Fresh Water Well	1200 8-10-92	✓		↓	↓	↓	↓	BTEX_W, PNA, BN_Qi GWM_2

Samplers: (Print): Jack Cooper

Affiliation: Brown & Caldwell

Relinquished by: (Signature) Jack Cooper — Date: 8-10-92 Time: 6:00pm

Relinquished by: (Signature) — Date: Time:

Relinquished by: (Signature) — Date: Time:

Received by: (Signature) Fed Ex — Date: Time:

Received by: (Signature) — Date: Time:

Received by Laboratory: (Signature) K Burnett — Date: 8-12-92 Time: 8:30

COC Seal No.

Intact: Yes

Laboratory No. 92-08-146

Results by: _____

Rush Charges Authorized

Yes ____ No ____

REMARKS:

Data Results To: Brown & Caldwell
Lynn Wright
1. 2710 Stemmons Fwy
1100 Tower North
2. Dallas, Tx 75207

ROBERTS SCHORNICK
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Environmental Consultants

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TECHNICAL WORK PLAN

SOIL AND GROUNDWATER INVESTIGATION

The Western Company of North America

Hobbs, New Mexico

Prepared by

Roberts/Schornick and Associates, Inc.

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Norman, Oklahoma

(405) 321-3895

September 5, 1991

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THE WESTERN COMPANY OF NORTH AMERICA
HOBBS, NEW MEXICO
SEPTEMBER 5, 1991

1.0 BACKGROUND

1.1 Introduction

The Western Company of North America (Western) is responding to a suspected fuel release at its Hobbs, New Mexico facility (Facility), shown in Figure 1. The response is in accordance with the findings of a site inspection by the Oil Conservation Division (OCD) of the New Mexico Energy, Minerals and Natural Resources Department. During inspection of the Facility, OCD personnel observed that soils next to the fueling island showed evidence of fuel spills and leaks. Additionally, a sample collected from the Facility's fresh water well indicated elevated levels of benzene, toluene, ethylbenzene, and xylenes (BTEX).

The investigation described in this Work Plan will determine the extent of soil impact from fueling island spills and leaks, as well as investigate the sources and extent of groundwater impact at the Facility.

1.2 Facility Description

The Hobbs, New Mexico Facility operates as an oil and gas servicing company providing oil and gas well fracturing, acidizing, and cementing services to oil and gas producing

clients. Pertinent regulatory identification information is as follows:

1. Owner Address: The Western Company of North America
   P. O. Box 56006
   Houston, Texas 77256

2. Owner Representative: Mr. Ron McKeel, Director, Real Estate and Facilities Construction

3. Owner Telephone No.: 713/629-2861

4. Facility Address: The Western Company of North America
   2708 W. County Road
   Hobbs, New Mexico

5. Facility Representative: Mr. Sherman Walters, Environmental Coordinator

6. Facility Telephone No.: 505/392-5556

The Western Facility maintains a fueling operation on the north side of the Facility service yard (Figure 2). The fuel island dispenses unleaded gasoline and diesel fuel to service vehicles. The diesel fuel is stored in a 22,500 gallon above ground storage tank (AST), while the unleaded gasoline is stored in a 5,500 gallon AST. Fuel is transferred from the unleaded gasoline and diesel fuel ASTs to above ground dispenser pumps via underground fuel lines. The underground fuel lines are buried approximately two (2) to three (3) feet below grade.

1.3 Communication with the OCD

On February 7, 1991, the OCD conducted an on-site inspection at the Hobbs Facility. During this inspection, OCD personnel observed that soil near the fueling island showed signs of spill and leaks. Also, a sample collected from the Facility's fresh water well had elevated levels of BTEX. As a result of these findings, in an August 6, 1991 letter, OCD requested Western to submit an investigation Work Plan by September 6, 1991.

Conversations with OCD personnel indicated that Western's adjacent (and likely upgradient) neighbor recently completed a remediation project addressing soils which exhibited total petroleum hydrocarbon (TPH) and BTEX impacts. Therefore, this Work Plan is designed to evaluate the extent of soil or groundwater impacts from off-site sources, as well as on-site sources, if any.

2.0 HYDROGEOLOGICAL INVESTIGATION TECHNICAL WORK PLAN

2.1 Background Review

A literature review will be made to gather the following information:

1. Brief history of land use at the site and chronology of pertinent events leading up to the investigation.
2. Pertinent inventory records and description of inventory methodology. These must be reconciled to show loss or excess.
3. Any photos of damaged tanks or lines.
4. Results of any tank or line integrity tests including descriptions of test procedures.
5. Detailed plans of any petroleum vapor surveys on soil samples or in nearby basements, sewers, manholes, etc.
6. Relevant geotechnical reports conducted previously at the Site.
7. Record of any subsurface utility lines present at the Facility.
8. Pertinent OCD files, especially results of soil and/or groundwater investigations conducted by adjacent land owners.
9. Review of industry activity (including oil/gas drilling) in the immediate area.
10. A review of regional/site specific literature and water well records.

2.2 Water Well Analysis

Before any site investigation activities begin, the fresh water well at the Facility will be resampled and analyzed to confirm the results of the February 11, 1991 analysis. Parameters analyzed will be BTEX, TPH, total dissolved solids (TDS), specific conductance, pH, and chloride. If the results from the analysis confirm groundwater impacts, investigation activities will be conducted as described in this Work Plan.

2.3 Soil Borings

Western will drill approximately twelve (12) soil borings at the Facility for the purposes of evaluating the subsurface stratigraphy/hydrogeology and to delineate the horizontal and vertical extent of hydrocarbon impacts to soils/groundwater. One (1) boring will be located near an underground storage tank (Figure 2) to determine if there are any related soil/groundwater impacts. Also, concern for groundwater impacts from off-site sources may require the alteration of soil boring placement or the installation of additional monitor wells. Placement of monitor wells will allow a static shallow groundwater level to be established and the general shallow groundwater flow direction to be determined. The proposed boring locations are shown on Figure 3. The actual number and locations of borings and monitoring wells may vary according to the site geology. Air rotary or hollow stem auger drilling methods will be utilized, depending upon the

lithology encountered. Approximately 3 to 5 of these borings may become groundwater monitoring wells if impact to the uppermost groundwater system is indicated from the soil investigation or the results of the water well analysis. If no impact is indicated to the water supply well or from the soil boring program, then the need for monitor wells will be evaluated further. All borings will be drilled to a depth of approximately 65 feet and into the shallow or uppermost groundwater system beneath the Facility.

Soil samples will be collected from the borings at 2-foot increments. Lithological descriptions of the soil samples will be visually made according to the Unified Soil Classification System (ASTM D-2487). Soil boring logs will be generated for each boring. Selected soil samples will be collected and analyzed for TPH.

The air rotary or hollow stem auger drilling equipment and all downhole sampling equipment will be decontaminated prior to use in each boring utilizing a high temperature/pressure washer. All other sampling equipment will also be washed between each sampling event.

All boreholes not completed as monitor wells will be backfilled to approximately 1-foot from ground surface with a cement-bentonite grout mix. The grout slurry consists of

mixing 6.5 gallons of water with 3 to 5 pounds of powdered bentonite and 94 pounds of portland cement. All boreholes will be rechecked the day after grout placement and those boreholes where the grout has subsided will be "topped off" to the 1-foot depth. The remaining one foot of the borehole will be backfilled with a high-strength concrete.

2.4 Soil Headspace Gas Survey

A soil headspace gas survey typically is the measurement of relative or specific volatile hydrocarbon concentrations in soil pores in the unsaturated and saturated zone at various points, distributed vertically and horizontally. In the unsaturated zone, hydrocarbons can exist in the vapor phase in soil pores, adsorbed onto soil particles, and as free hydrocarbon liquid in soil pores. Hydrocarbons in the saturated zone are typically adsorbed onto soil particles over the zone of groundwater fluctuations or may exist as free liquid in the soil pores. By obtaining soil headspace gas data at vertically and horizontally distributed points, the extent of subsurface hydrocarbon impact can be defined.

The ambient temperature headspace (ATH) method (Van Zyl, 1987) consists of collecting discreet (or composite) soil samples from a borehole and placing the soil in a glass container, leaving a vacant headspace in the glass container. The headspace gas in each glass sample container is then analyzed

for organic vapors using a portable organic vapor monitor (OVM) photoionization detector.

Soil samples will be collected using a 4-inch hand auger at about seven (7) sample sites located within the retaining wall surrounding the above ground fuel tanks. Soil borings will be advanced to five (5) feet below grade or until auger refusal is encountered.

Soil boring samples will be collected at 2-foot increments and placed in glass jars (the jars are filled to 3/4 full). A layer of aluminum foil will be placed over the top of the jar and the cap screwed in place, sealing the jar. After waiting a period of time (samples are stored at ambient air temperatures), the OVM photoionization detector probe will be used to pierce the aluminum foil and an organic vapor headspace reading will be obtained. The resulting OVM headspace gas readings are in parts per million (ppm) of total ionizable hydrocarbon based upon a isobutylene standard. The OVM photoionization detector is calibrated to a known isobutylene gas standard prior to the headspace gas readings. The OVM detector has a limit of detection of 100 parts per billion of total ionizable hydrocarbon. Results of the OVM ambient temperature headspace gas readings are recorded (and presented in graphical form) on the soil boring logs. The OVM soil gas readings provide an important insight into both the

vertical and areal extent of hydrocarbon occurrence in the subsurface soils/groundwater in the Facility area.

Also, as part of the investigation, OVM soil gas readings will be made on all boreholes upon borehole completion. These readings are made by lowering the OVM photoionization chamber into the open borehole to a depth of approximately six (6) inches and recording the OVM borehole vapor readings on the soil boring logs. Soil samples will be collected from the boreholes based the OVM soil gas analyses and tested for TPH and BTEX.

2.5 Monitor Well Installation

If the soil investigation indicates impacts to the uppermost groundwater system, approximately 3 to 5 of the drilled boreholes may be completed as groundwater monitoring wells in order to monitor shallow groundwater quality beneath the Facility, test the aquifer physical properties, and measure groundwater elevations for hydraulic gradient/flow direction and seasonal water-level fluctuations. All appropriate OCD permits will be obtained prior to installing monitoring wells.

All monitor wells will be constructed with pre-cleaned, 2-inch, screw-coupled, tri-lock, PVC casing and 0.010-inch slot, 10 to 20-foot long, PVC screens. Screen placement will be chosen by centering the screen across and above the

groundwater level observed at the time of drilling. Placing the screen at this level in the zone of saturation allows for the monitoring of potential immiscible layers or lighter-than-water organics on the groundwater surface. The entire screen length annulus is surrounded with a clean 8-20 silica sand filter pack. A 0.75-foot long fines-catchment sump is placed below the screen interval and the bottom of the sump is fitted with a PVC screw plug. The sand filter pack extends from the bottom of the well to approximately 2.0 feet above the top of the screen. A 2-foot thick sodium bentonite seal is placed above the top of the sand pack. The well annulus from the top of the bentonite seal to approximately one (1) foot feet below ground level will be filled with a cement/bentonite grout mix. All completion materials (screen, sump, riser, plugs, protectors and caps) will be thoroughly cleaned with a high temperature/high pressure water wash before entering the borehole. The remaining one (1) foot of the borehole and well casing is covered with a watertight, steel, flush grade, protector placed over the PVC casing and anchored in concrete or a 4-inch abovegrade steel protector anchored in concrete. A watertight cap will also be placed over the monitor well for all below grade completions. Well completion diagrams will be generated for each well installed.

The monitor wells will be developed using a 1.67-inch diameter teflon bailer, bladder pump, or Brainard-Kilman hand pump. The wells will be purged until the water visibly clears of fine-grained sediment and the pH, temperature, and specific conductance of the developed groundwater stabilizes.

The monitor wells will determine the following:

1. Depth to groundwater,
2. The groundwater gradient and flow direction,
3. Recharge/discharge zones,
4. Seasonal fluctuations in groundwater levels,
5. Site geology,
6. Horizontal and vertical extent of impact, if any, and
7. Thickness and type of free petroleum product layer, if any.

2.6 Groundwater Sampling

Groundwater will be sampled for the purpose of characterizing the chemical quality of the shallow groundwater upgradient and downgradient from the any identified hydrocarbon release area(s).

Prior to sampling, all wells will be measured to determine static groundwater levels and well depth. In addition, the groundwater surface will be inspected to determine if any floating immiscible liquids are present. Following these

measurements, the wells will be purged of at least three casing/sand pack volumes of groundwater in order to eliminate stagnant fluids within the well casing and sand filter pack. Purging will be accomplished by bailing with precleaned, dedicated, teflon bailers. All bailers are fitted with clean monofilament line. All fluids purged from the wells will be collected in 55 gallon drums and retained on-site until disposal is arranged.

Groundwater samples will be collected with precleaned teflon bailers. The groundwater samples are carefully poured from the bailer directly into the appropriate sample bottles. Special care is exercised during sampling to avoid excess aeration of the sample. All sample bottles will be appropriately pre-cleaned by the analytical laboratory. The appropriate sample bottles are prepared with pre-measured acid preservatives by the analytical laboratory. All samples are packed in ice immediately after being collected, then shipped under chain-of-custody control by overnight air express to the laboratory for analysis.

The groundwater will be laboratory analyzed for BTEX, TPH, chloride, pH, specific conductance, and TDS. During well sampling, the pH, temperature, TDS, and specific conductivity of all groundwater samples are also tested. BTEX and TPH are indicator parameters for gasoline and diesel fuel releases to

groundwater. The remaining parameters act as indicators of inorganic impacts to the groundwater.

2.7 Schedule

Western will initiate the hydrogeological investigation within 30 working days following approval of the Technical Work Plan by the New Mexico OCD. The investigation results along with a Corrective Action Plan, if required, will be submitted to the OCD following completion of the investigation.

AFTER U.S.G.S. 7.5 MIN, TOPO. QUAD., HOBBS, NEW MEXICO, REVISED 1971

SCALE

0 1/2 1 MILE

LOCATION MAP

Figure Title: SITE LOCATION AND TOPOGRAPHIC MAP	Client: THE WESTERN COMPANY OF NORTH AMERICA
Document Title: HYDROLOGICAL INVESTIGATION	Location: HOBBS, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
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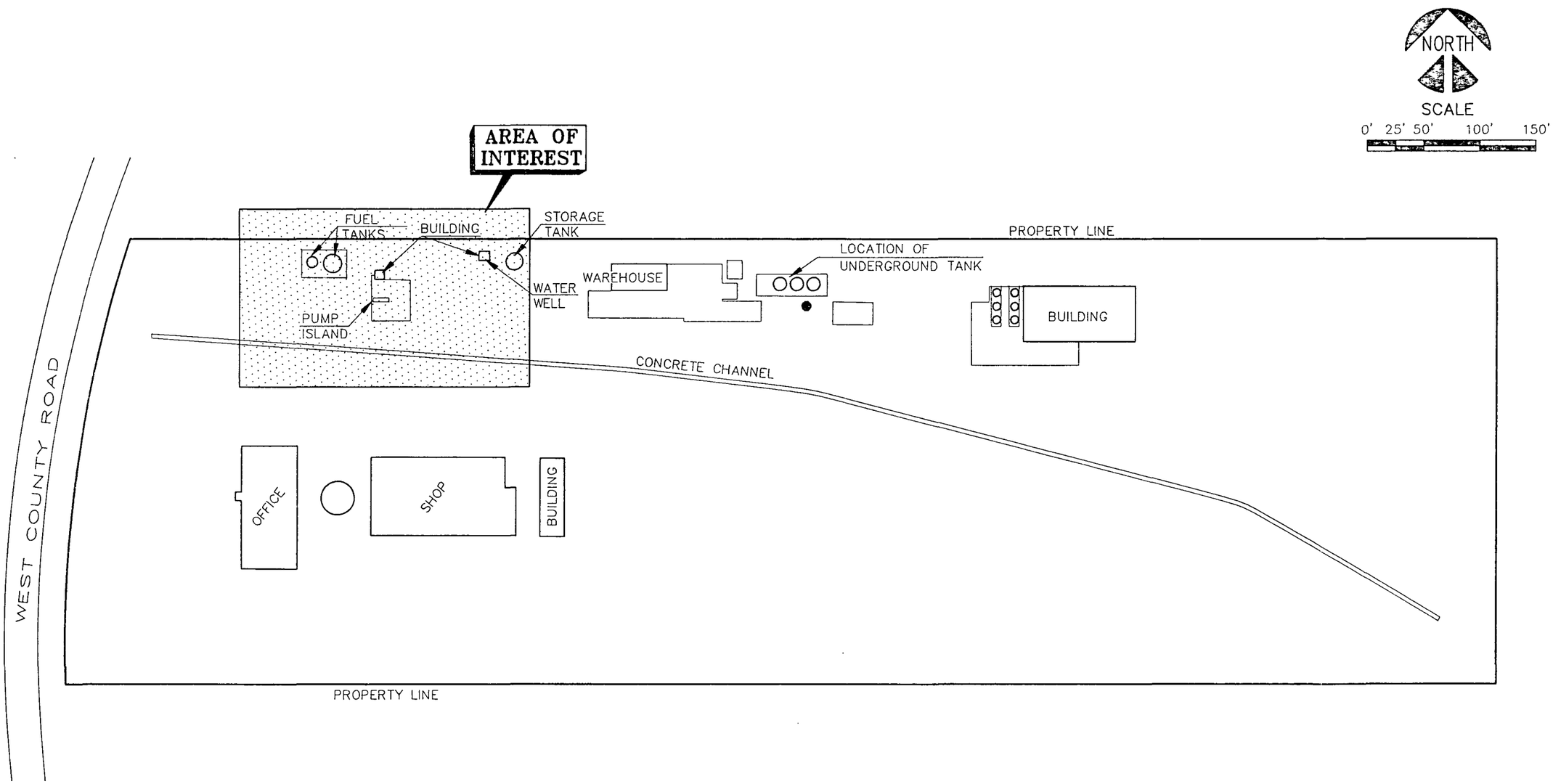
DATE: 8/27/91	PREPARED BY: J.M.B.
	CHECKED BY: B.J.S.
SCALE: AS SHOWN	DRAFTED BY: B.D.R.
PROJECT NO: 91037.01	FIGURE NO.: 1



LEGEND

● TENTATIVE SOIL BORING LOCATION

Figure Title: FACILITY LAYOUT	Client: THE WESTERN COMPANY OF NORTH AMERICA
Document Title: HYDROGEOLOGICAL INVESTIGATION	Location: HOBBS, NEW MEXICO

ROBERTS/SCHORNICK & ASSOCIATES, INC.
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DATE: 9/29/91	PREPARED BY: B.D.
SCALE: 1"=100'	CHECKED BY: B.J.S.
PROJECT NO: 91037 M01	DRAFTED BY: RML
	FIGURE NO.: 2

NORTH

SCALE

0' 10' 20' 30' 40'

PROPERTY LINE

BUILDING

WATER WELL

STORAGE TANK

FUEL TANK

FUEL TANK

BUILDING

PUMP ISLAND

ADDITIONAL TENTATIVE SOIL BORING LOCATION SHOWN ON FIGURE 2.

CONCRETE CHANNEL

LEGEND

- TENTATIVE HAND AUGER BORING LOCATION
- TENTATIVE SOIL BORING LOCATION
- TENTATIVE MONITOR WELL LOCATION
- EXPECTED GROUNDWATER FLOW DIRECTION

Figure Title: PROPOSED LOCATIONS OF SOIL BORINGS AND MONITOR WELLS		Client: THE WESTERN COMPANY OF NORTH AMERICA	
Document Title: HYDROGEOLOGICAL INVESTIGATION		Location: HOBBS, NEW MEXICO	
ROBERTS/SCHORNICK & ASSOCIATES, INC. Environmental Consultants 3700 West Robinson, Suite 200 Norman, Oklahoma 73072 (405) 321-3895		DATE: 9/29/91	PREPARED BY: D.B.
			CHECKED BY: B.J.S.
		SCALE: 1"=20'	DRAFTED BY: RML
		PROJECT NO: 91037 M02	FIGURE NO.: 3

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