GW - 190

REPORTS

YEAR(S):

1996 - 1993

FINAL
SITE ASSESSMENT REPORT
NORTHEAST SEPTIC SYSTEM

ARTESIA, NEW MEXICO

BJ SERVICES COMPANY, U.S.A.

July 9, 1996

FINAL
SITE ASSESSMENT REPORT
NORTHEAST SEPTIC SYSTEM
ARTESIA, NEW MEXICO FACILITY

Prepared for:

BJ Services Company, U.S.A.
8701 New Trials Drive
The Woodlands, Texas 77381

BC Project Number: 2988-25

Timothy Jenkins
Associate Engineer

July 9, 1996

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

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CONTENTS

1.0 INTRODUCTION

Brown and Caldwell, under the authority of BJ Services Company, U.S.A., conducted a site assessment for the closure of the northeast septic system on November 14, 1995. Site assessment activities were conducted in accordance with the site-specific "Closure Plan for the Septic System" (Closure Plan), and the conditions for approval of same set forth by the New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division (OCD) on November 1, 1995. The Closure Plan and OCD approval notice are found as Appendices A and B, respectively. BJ Services Artesia District facility is located in Eddy County, in the SE/4, Section 32, Township 16 South, Range 26 East. The facility address is 2401 Sivley, Artesia, New Mexico, 88210. A site location map and site plan are included as Figures 1 and 2, respectively.

The northeast septic system, located in the northeast corner of the facility, consists of an eight-inch sanitary line, a holding tank, and a septic field approximately 100 ft. square. The septic system received wastewater from the floor drains in the truck maintenance area, and from sanitary wastewater sources such as sinks, showers and restrooms from the main offices and maintenance area. The maintenance area floor drain sources are no longer tied into the northeast septic system. The facility continues to receive water from the main building sanitary sources.

The following sections summarize the site activities, site assessment and scoring, closure verification methods utilized, and the results of both field and laboratory analyses. As stated in Section 3.0, BJ Services requests OCD approval for closure of the northeast septic system, as used for receipt of wastewater from the truck maintenance and truck wash areas.

2.0 SITE ASSESSMENT

BJ Services performed the site assessment to determine the potential that site soils/groundwater may have been impacted by the operation of the northeast septic system. The results of the site assessment were used for evaluating the need for remediation and the type of closure best suited for the site.

2.1 General Site Characteristics

BJ Services determined the depth to groundwater to be approximately 20 to 25 feet below the ground surface based on previous groundwater investigations conducted at the site.

Depth to Groundwater	Ranking Score
< 50 feet	Yes - 20

Brown and Caldwell personnel conducted a water well search at the State Engineer's office in Roswell, New Mexico on February 21, 1993. This search determined that no water wells were identified within a one-half mile radius of the facility.

Wellhead Protection Area	Ranking Score
< 1000 feet from a water source, or	No - 0
< 200 feet from a private domestic water source:	No - 0

The distance from the site to the Pecos River (nearest downgradient surface water body) was determined to be more than 1,000 feet by reviewing a USGS topographic map for the area. A tributary of the Pecos River (Eagle Creek) is the nearest surface water body, and is located approximately 7,000 ft. south of site.

Distance to Surface Water Body	Ranking Score
> 1,000 feet	Yes - 0

2.2 Site Scoring

Groundwater is present at a depth of less than 50 feet below grade. Flow direction is east-southeast, as determined from wells previously installed at the facility. Therefore, the site scoring procedure outlined above calls for a depth to groundwater Ranking Score of 20. No water wells were identified within a 2,000 ft. radius of the site. Therefore, the wellhead protection Ranking Score is 0. A review of a USGS map indicates the nearest water body (Eagle Creek) is approximately 7,000 ft. south of the site. The Pecos River is several miles from the facility. Therefore, the distance to surface water body Ranking Score is 0.

The site ranking score of 20 is greater than 19. This determination was made based on physical site characteristics as described above. According to the OCD guidance documents, a total ranking score of greater than 19 yields action levels as outlined in Table 2.

2.3 Field Investigation Activities

BJ Services tested the soils/wastes within and beneath the northeast septic system drain field to evaluate the nature and extent of impacted soil. Testing was accomplished by drilling soil borings at the locations indicated in Figure 3. The two borings located outside of the northeast septic system boundary are downgradient, based on historical groundwater flow in the east-southeast direction. Brown and Caldwell personnel confirmed groundwater flow direction by measuring water levels in existing wells on-site. A water table elevation map is shown in Figure 4.

Samples from each boring were collected continuously for the first six feet and then every five feet in two foot sample intervals, starting at the surface and ending five feet below the deepest depth at which impacted soil was detected (0-2 ft, 2-4 ft, 4-6 ft, 8-10 ft, 13-15 ft, etc.). Since there was no evident staining, and non-detect PID readings, sampling was terminated at a depth of

21 ft., 20 ft., and 32 ft. for borings B-1, B-2, and B-3, respectively. Boring B-3 was drilled to a depth of 32 ft. at a downgradient location to determine the lateral and vertical extent of impact. Although this boring was drilled below the water table, the boring was not completed as a monitor well since there was no "reasonable probability of ground water contamination based upon the level of contaminants in the soils" (See Appendix C, Unlined Surface Impoundment Closure Guidelines, NMOCD, 2/93; page 4).

Soil borings were drilled to a depth of at least 5 feet below the deepest depth at which contamination was detected by visual observations (staining) and headspace analysis for organic vapors using a photoionization device (PID). Headspace analysis was performed in accordance with the procedures outlined in the OCD guidance document. Table 1 shows the PID readings, as reflected in the boring logs in Appendix D. No PID reading was above 5.0 ppm. Visual staining was not observed in any of the soil borings. According to the OCD guidance document, these observations indicate that highly contaminated/saturated or unsaturated contaminated soils were not present in the borings.

2.4 Sampling Locations and Methodology

Three samples from each boring were sent to an off-site laboratory for analysis. Due to the lack of evident staining and low PID detections, soil samples were not selected according to screening criteria as described in the Closure Plan. Instead, samples from the three borings were collected from depths corresponding to:

1. Depth to the top of the septic system (B-1, B-2);
2. Depth to the bottom of the septic system (B-1, B-2, B-3);
3. Depth to the vadose zone, immediately above groundwater (B-1, B-2, B-3); and/or;
4. Depth to ten feet below groundwater (B-3).

Soil samples were analyzed for BTEX by EPA Method 8020 and TPH by EPA Method 418.1. A single sample from the boring B-1 drilled within the northeast septic system drain field boundary was also analyzed for RCRA metals, volatiles, and semivolatiles, using the toxicity characteristic leaching procedure (TCLP). This RCRA sample, collected from the 13-15 ft. interval from this boring based on its organic vapor reading (PID = 3.5 ppm), was also analyzed for Reactivity, Corrosivity, and Ignitability (RCI). Analytical results are summarized in Tables 2 and 3. Laboratory analytical reports are included as Appendix E.

All samples were collected with decontaminated sampling equipment, placed in labeled jars, and shipped on ice overnight using chain of custody procedures to the off-site laboratory. Decontamination fluid (soapy water) was collected and decanted into the truck washbay oil/water separator for subsequent disposal in the truck wash drain system. Decontamination solids and drill cuttings were placed near the northeast septic system on plastic and covered. As a precautionary measure, drill cuttings were disposed of at an OCD approved facility along with TPH impacted soils generated during other on-site activities.

Upon completion of sampling activities, all boreholes were grouted to the surface with a cement slurry containing 5% bentonite. Boring B-3, which had been drilled below the water table, was grouted in the saturated zone using bentonite chips, and was then grouted to the surface with a 5% bentonite/cement slurry.

TPH compounds detected in the laboratory analysis were of the heavier, non-volatile fraction hydrocarbons, and therefore were not detected by headspace analysis using the PID. The OCD action level for TPH is 100 ppm for this site, as determined by the site scoring in the previous section. The TPH concentration of 150 mg/kg in the 20-22 ft. interval sample for boring B-3 does not sufficiently warrant further investigation or remedial activity for the following reasons:

- Samples taken above and below the 20-22 ft. interval do not exceed the OCD action level for TPH;
- Benzene and total BTEX concentrations are below the OCD action levels;

- Heavy, non-volatile fractions of TPH do not pose a significant threat to groundwater quality, especially with the same sample showing non-detectable levels of benzene, and low total BTEX;
- Boring B-1 taken from within the septic system drain field did not indicate sufficient concentrations of TPH in the soil to be considered the source of the TPH; and
- Visual field observations and PID readings did not indicate significant hydrocarbon levels in the soil for boring B-3.

DISTRIBUTION

Final
Site Assessment Report
Northeast Septic System
Artesia, New Mexico Facility

July 9, 1996

1 copy to: New Mexico Energy, Minerals, and Natural Resources Department
Oil Conservation Division
2040 South Pacheco
Santa Fe, New Mexico 87505

Attention: Mr. Mark Ashley

1 copy to: New Mexico Energy, Minerals, and Natural Resources Department
Oil Conservation Division
811 South 1st Street
Artesia, New Mexico 88210

Attention: Mr. Tim Gumm

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

Attention: Ms. Jo Ann Cobb

1 copy to: Brown and Caldwell
File

QUALITY CONTROL REVIEWER:

Robert N. Jennings, P.E.
Vice President

RNJ:elg

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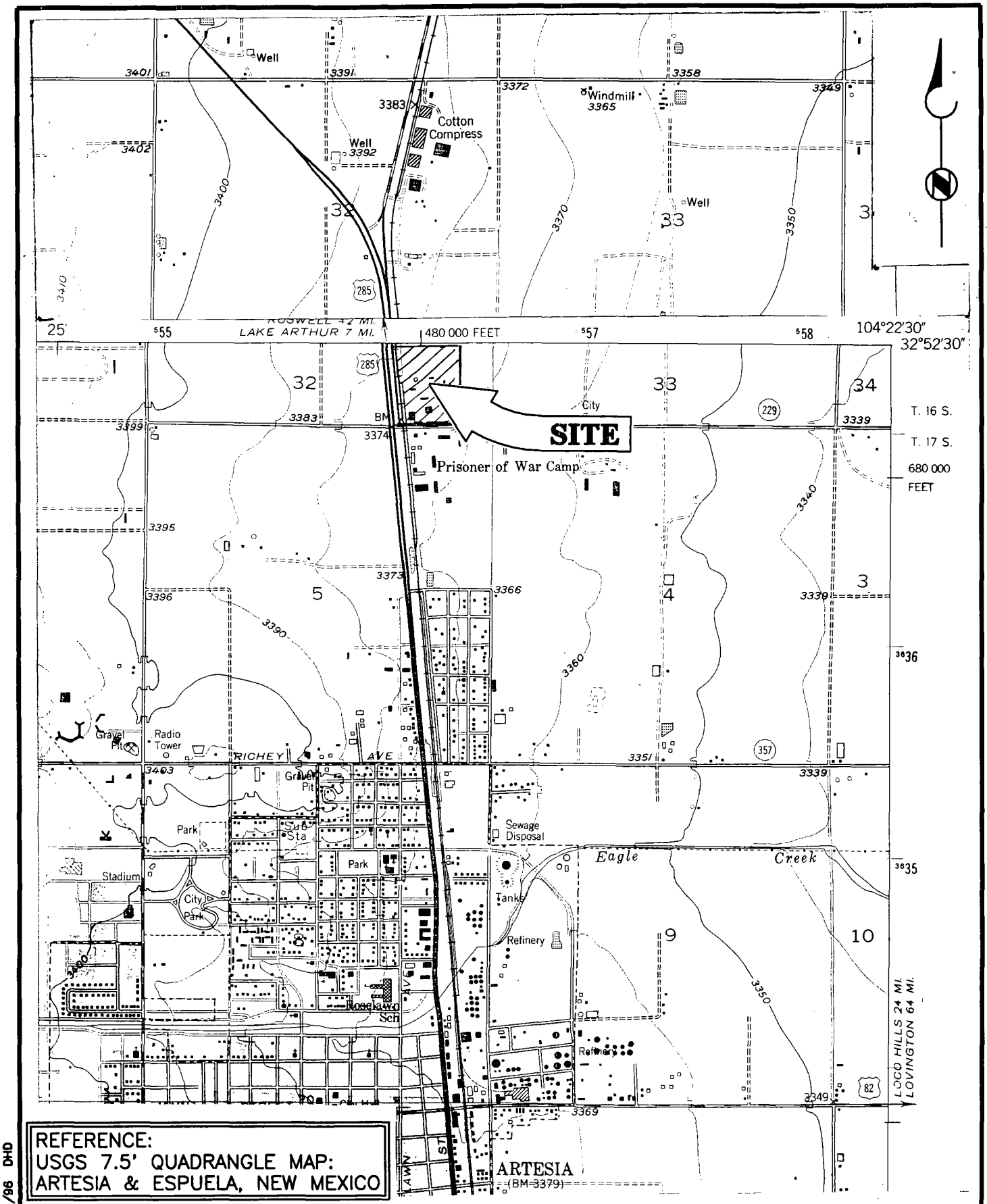
FIGURES



REFERENCE:
USGS 7.5' QUADRANGLE MAP:
ARTESIA & ESPUELA, NEW MEXICO

BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 1000 2000
SCALE: 1" = 2000'
DRAWN BY: DHD DATE 1/25
CHK'D BY: ____ DATE ____
APPROVED: ____ DATE ____

TITLE: SITE LOCATION MAP
DATE: 1/26/96
CLIENT: BJ SERVICES COMPANY, U.S.A.
PROJECT NUMBER: 2988-06
SITE LOCATION: ARTESIA, NEW MEXICO
FIGURE NUMBER: 1

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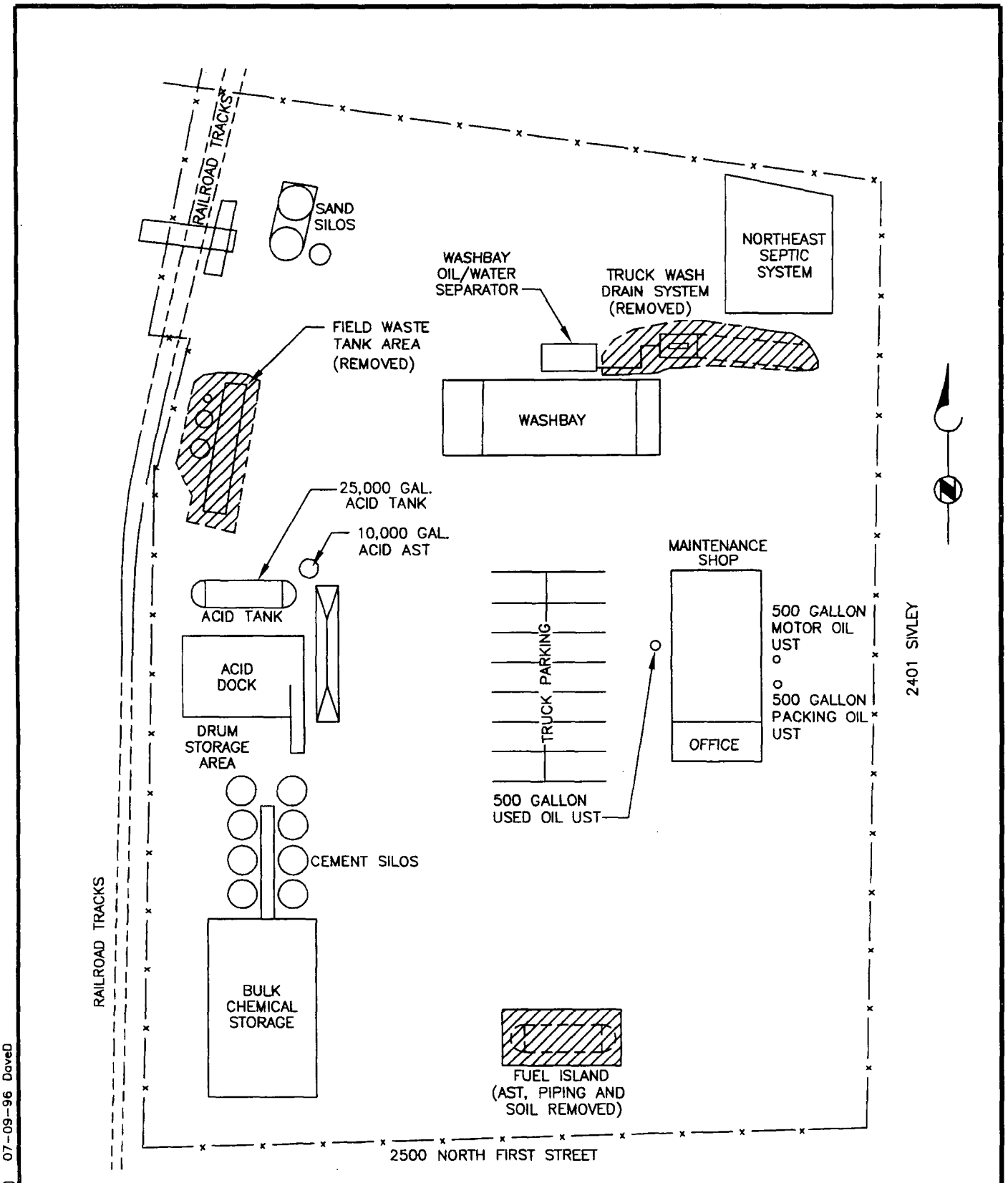

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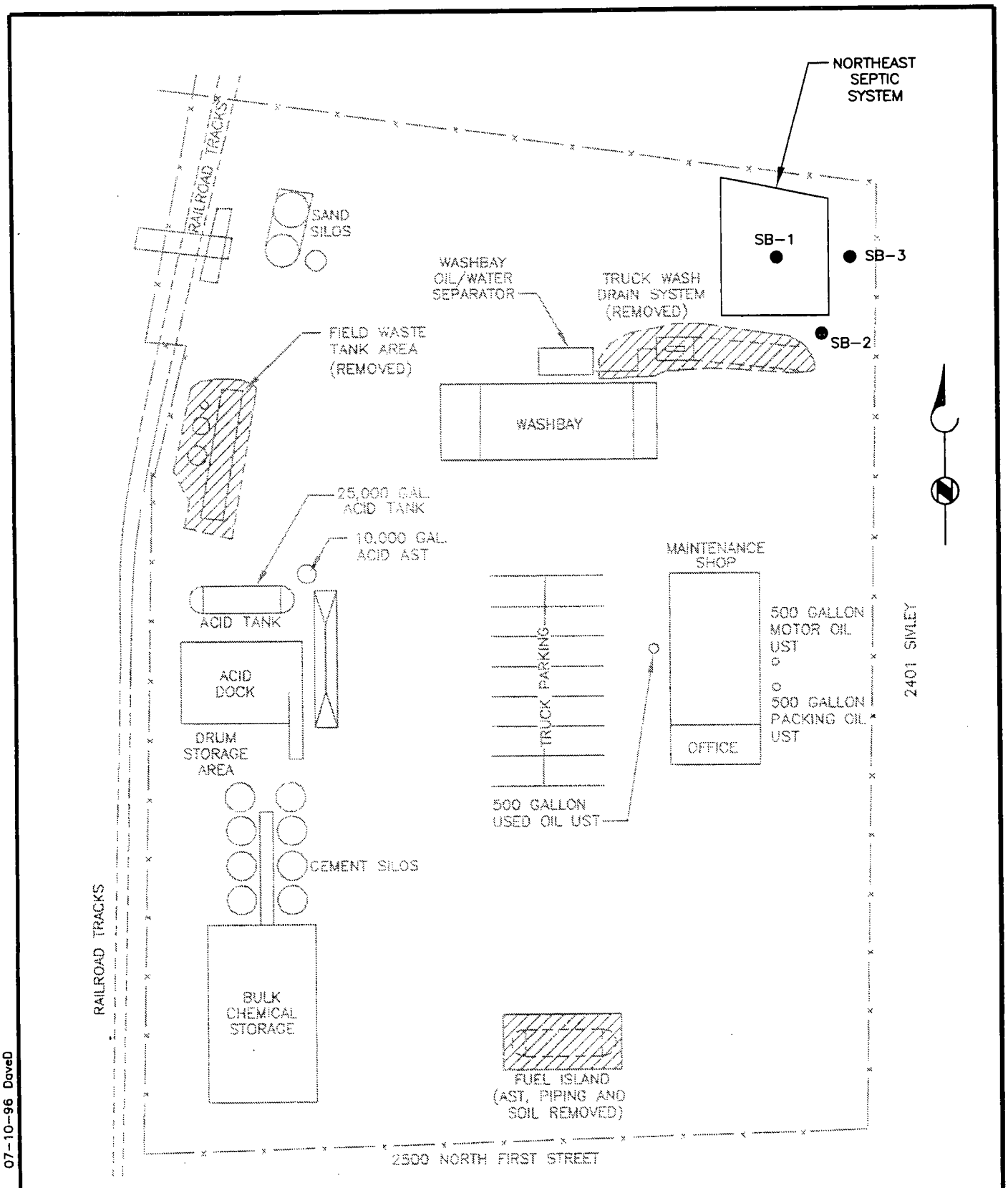
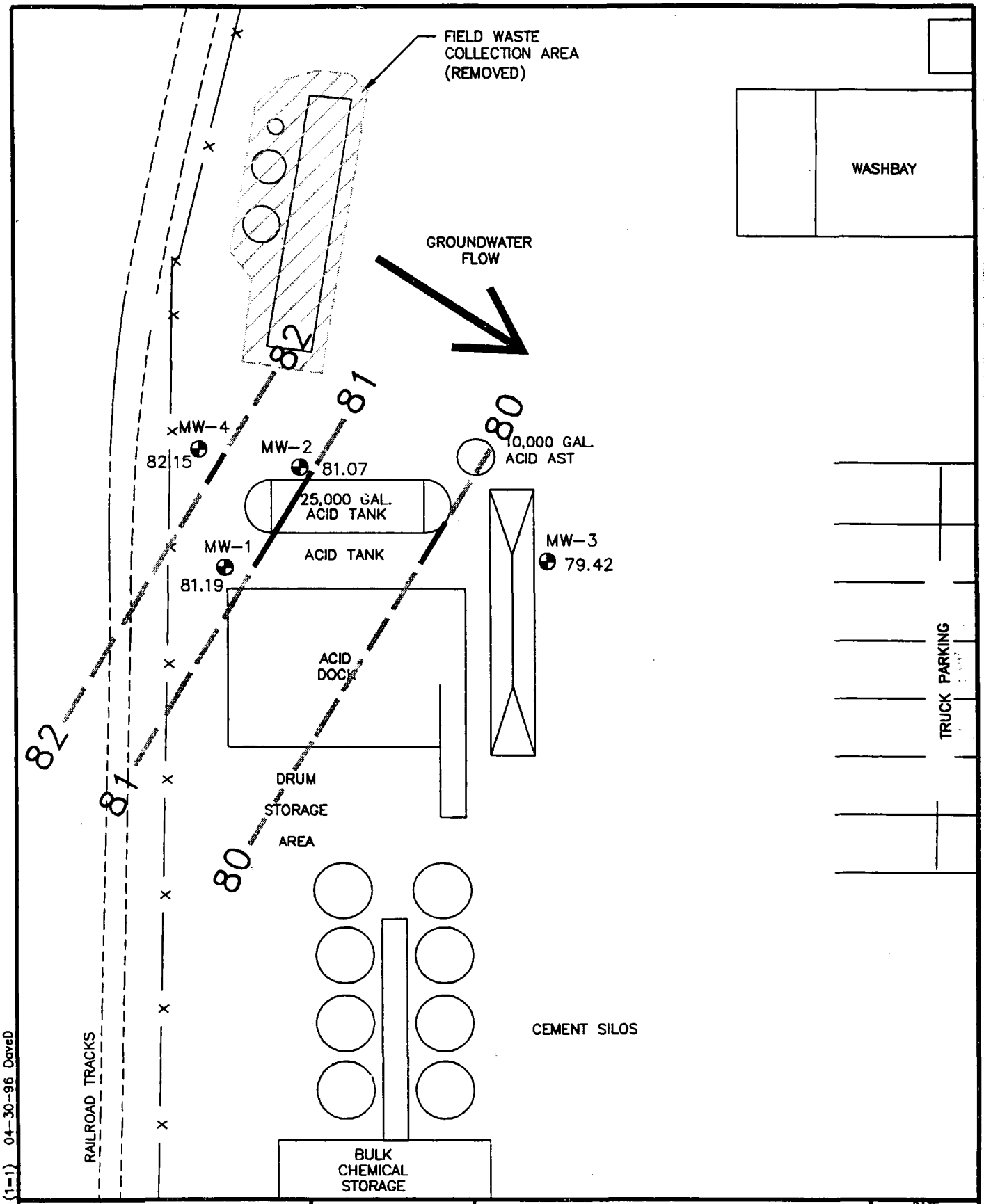


T:\2988\EXCAVNEW (1=1) 07-10-96 DaveD

BROWN AND CALDWELL HOUSTON, TEXAS SUBMITTED: _____ DATE: _____ PROJECT MANAGER APPROVED: _____ DATE: _____ BROWN AND CALDWELL	0 0 0 NOT TO SCALE DRAWN BY: DTD DATE 10/25 CHK'D BY: ____ DATE ____ APPROVED: ____ DATE ____	TITLE: SITE PLAN WITH BORING LOCATIONS CLIENT: BJ SERVICES COMPANY, U.S.A. SITE LOCATION: ARTESIA, NEW MEXICO	DATE: 7/10/96 PROJECT NUMBER: 2988-25 FIGURE NUMBER: 3



BROWN AND CALDWELL HOUSTON, TEXAS SUBMITTED: ____ DATE: ____ PROJECT MANAGER APPROVED: ____ DATE: ____ BROWN AND CALDWELL	0 0 0 NOT TO SCALE DRAWN BY: DJD DATE 4/29 CHK'D BY: ____ DATE ____ APPROVED: ____ DATE ____	TITLE: WATER TABLE ELEVATION MAP CLIENT: BJ SERVICES COMPANY, U.S.A. SITE LOCATION: ARTESIA, NEW MEXICO	DATE: 4/29/96 PROJECT NUMBER: 2988-25 FIGURE NUMBER: 4

T:\2988\GWELEV (1=1) 04-30-96 DaveD

TABLES

TABLE 1

Field PID Readings

Boring	Interval	PID Reading (ppm)
B-1	0-2 ft.	0.0
	2-4 ft.	0.0
	4-6 ft.	0.0
	8-10 ft.	0.0
	13-15 ft.	3.5
	18-20 ft.	2.4
	20-21 ft.	0.5
B-2	0-2 ft.	0.0
	2-4 ft.	0.0
	4-6 ft.	0.0
	8-10 ft.	0.0
	13-15 ft.	0.0
	18-20 ft.	0.0
B-3	0-2 ft.	0.0
	2-4 ft.	0.0
	4-6 ft.	0.0
	10-12 ft.	0.0
	15-17 ft.	0.0
	20-22 ft.	0.0
	25-27 ft.	0.0
	30-32 ft.	0.0

TABLE 2

TPH and BTEX Results

		TPH (mg/kg)	Total BTEX (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylene (mg/kg)
OCD Action Level		**100**	**50**	**10**			
Boring	**Interval**						
B-1	8-10 ft.	17	ND	< 0.010	< 0.010	< 0.010	< 0.030
	13-15 ft.	< 10	ND	< 0.010	< 0.010	< 0.010	< 0.030
	20-21 ft.	87	ND	< 0.010	< 0.010	< 0.010	< 0.030
B-2	8-10 ft.	37	ND	< 0.010	< 0.010	< 0.010	< 0.030
	13-15 ft.	26	ND	< 0.010	< 0.010	< 0.010	< 0.030
	18-20 ft.	15	ND	< 0.010	< 0.010	< 0.010	< 0.030
B-3	15-17 ft.	60	ND	< 0.010	< 0.010	< 0.010	< 0.030
	20-22 ft.	150	ND	< 0.010	< 0.010	< 0.010	< 0.030
	30-32 ft.	46	0.149	< 0.010	< 0.010	0.026	0.123

ND = Concentrations not detected above the method detection limit.

TABLE 3
RCRA Analytical Results - Boring B-1 (13'-15' Interval)

Parameter	Observed Concentration	Units	Regulatory Limits
RCI			
Flashpoint	Not Ignitable	°C	< 60
pH	7.8	std. units	2.0≤pH≤12.5
Cyanides	< 1.0	mg/kg	≤ 250
Sulfides	< 4.0	mg/kg	≤ 500
TCLP Metals			
Arsenic	< 0.20	mg/L	< 5.0
Barium	0.44	mg/L	< 100.0
Cadmium	< 0.04	mg/L	< 1.0
Chromium	< 0.05	mg/L	< 5.0
Lead	< 0.10	mg/L	< 5.0
Mercury	< 0.004	mg/L	< 0.2
Selenium	< 0.15	mg/L	< 1.0
Silver	< 0.07	mg/L	< 5.0
TCLP Volatiles			
Benzene	< 0.003	mg/L	< 0.5
Carbon Tetrachloride	< 0.003	mg/L	< 0.5
Chlorobenzene	< 0.003	mg/L	< 100.0
Chloroform	< 0.003	mg/L	< 6.0
1,4-Dichlorobenzene	< 0.003	mg/L	< 7.5
1,2-Dichloroethane	< 0.003	mg/L	< 0.5
1,1-Dichloroethylene	< 0.003	mg/L	< 0.7
Methyl ethyl ketone	< 0.010	mg/L	< 200.0
Tetrachloroethylene	< 0.003	mg/L	< 0.7
Trichloroethylene	< 0.003	mg/L	< 0.5
Vinyl Chloride	< 0.005	mg/L	< 0.2
TCLP Semivolatiles			
2,4-Dinitrotoluene	< 0.003	mg/L	< 0.13
o-Cresol	< 0.003	mg/L	< 200.0
m-Cresol	< 0.003	mg/L	< 200.0
p-Cresol	< 0.003	mg/L	< 200.0
Cresol	< 0.003	mg/L	< 200.0
Hexachlorobenzene	< 0.003	mg/L	< 0.13
Hexachlorobutadiene	< 0.003	mg/L	< 0.5
Hexachloroethane	< 0.003	mg/L	< 3.0
Nitrobenzene	< 0.003	mg/L	< 2.0
Pentachlorophenol	< 0.003	mg/L	< 100.0
Pyridine	< 0.003	mg/L	< 5.0
2,4,5-Trichlorophenol	< 0.003	mg/L	< 400.0
2,4,6-Trichlorophenol	< 0.003	mg/L	< 2.0

APPENDIX A

CLOSURE PLAN FOR THE SEPTIC SYSTEM

CLOSURE PLAN
FOR
THE SEPTIC SYSTEM

BJ SERVICES
ARTESIA, NEW MEXICO FACILITY

Prepared by

Brown and Caldwell

September 8, 1995

Table of Contents

CLOSURE PLAN FOR THE SEPTIC SYSTEM
BJ SERVICES FACILITY IN ARTESIA, NEW MEXICO

INTRODUCTION

In accordance with the requirements of discharge plan GW-190 for the BJ Services Facility in Artesia, New Mexico, BJ Services has developed this closure plan for the existing septic system for OCD approval. The Artesia facility is located in Eddy County, in the SE/4 SE/4, Section 32, Township 16 South, Range 26 East. The facility address is 2401 Sivley, Artesia, New Mexico, 88210. A site location and plan map are attached as Figures 1 and 2, respectively.

The septic system received wastewater from the floor drains in the truck maintenance area, an oil/water separator at the truck wash area and from sanitary wastewater sources such as sinks, showers and restrooms. BJ Services plans to keep the septic system in service only for the above-mentioned sanitary wastewater sources, pending the results of the closure activities.

This closure plan is prepared in accordance with a guidance document prepared by the OCD entitled Unlined Surface Impoundment Closure Guidelines (February 1993). In accordance with that guidance document, this closure plan contains the following elements:

- The procedures that will be used to conduct a soil and groundwater assessment and the circumstances under which a groundwater assessment will be conducted.
- The procedures that will be used to manage, remediate, or dispose of contaminated soil and groundwater.
- Reporting procedures that will be used to document the closure activities and obtain approval for final closure from the OCD.

SITE ASSESSMENT

BJ Services will perform a site assessment to determine the extent to which site soils/groundwater may have been impacted by operation of the septic system. The results of the site assessment will be used for evaluating the need for remediation and the type of closure best suited for the site. The site assessment will determine general site characteristics, soil/waste characteristics and groundwater quality.

General Site Characteristics

BJ Services will determine the depth to groundwater, defined as the vertical distance from the lowermost contaminants to the seasonal high water elevation of the groundwater. Depth to groundwater will be determined by reviewing reports of previous groundwater investigations at the site and regional and local groundwater reports published by state and federal agencies such as the USGS and the New Mexico Bureau of Mines and Mineral Resources. Information on groundwater quality will also be researched through local and state agencies. The depth of the lowermost contaminants will be determined from soil borings drilled as part of the site assessment.

BJ Services will determine the proximity of drinking water sources by performing a search of water wells within a one mile radius of the facility. The search will provide information (as available) such as the distance from the site to each well, well depth, water quality data and the purpose of the well. BJ Services will locate other drinking water sources such as lakes, springs or rivers by contacting the city water department of nearby municipalities.

The distance to nearby downgradient surface water bodies will be determined by review of a USGS topographic map for the area. Surface water bodies include rivers, creeks, ponds, lakes, irrigation canals and ditches. Site drainage patterns and off-site receptors of surface drainage will be determined from field observations and discussions with site personnel.

Soil/Waste Characteristics

BJ Services will test the soils/wastes within and beneath the septic system to evaluate the nature and extent of contamination. BJ Services will drill soil borings at the locations indicated in Figure 3. Groundwater flow direction is east-southeast, determined from wells previously installed at the site. The two borings located outside of the septic system boundary are downgradient. BJ Services may confirm groundwater flow direction prior to drilling by measuring water levels in the existing wells. The boring locations may be slightly field adjusted based on the measured flow direction.

Soil borings will be drilled to a depth of 5 feet below the deepest depth at which contamination is detected by observations (staining) and headspace analysis for organic

vapors by a photoionization or flame ionization device. Headspace analysis will be performed in accordance with the procedures outlined in the OCD guidance document. If signs of contamination are evident in the borings indicated in Figure 3, additional borings may be drilled, upon approval of BJ Services, by stepping out from these locations. The number and locations of the additional borings will be based on field observations and discussions with BJ Services personnel.

Soil samples will be visually classified according to the OCD guidance document as highly contaminated/saturated soils or unsaturated contaminated soils. Highly contaminated/saturated soils contain observable free petroleum hydrocarbons or immiscible phases and gross staining. The immiscible phase may range from a free hydrocarbon to a sheen on any associated aqueous phase. Unsaturated contaminated soils are those that are not highly contaminated as described above, but contain measurable concentrations of contaminants.

Samples from each boring will be collected continuously for the first six feet and then every five feet in two foot sample intervals, starting at the surface and ending five feet below the deepest depth at which contamination is detected (0-2 ft, 2-4 ft, 4-6 ft, 8-10 ft, 13-15 ft, etc.). Three samples from each boring will be sent to an off-site laboratory for analysis: the depth at which the highest organic vapor concentration is measured, the deepest location at which organic vapors are detected above background concentration, and from five feet below the deepest sample in which organic vapors are detected. All borings will be grouted to the surface upon completion with a cement/bentonite slurry.

All samples will be collected with decontaminated sampling equipment, placed in labeled jars, and shipped on ice overnight using chain of custody procedures to the off-site laboratory. Decontamination fluids (non-toxic degreasers and water) will be collected and decanted into the washbay oil/water separator for subsequent disposal in the septic system. Decontamination solids and drill cuttings will be placed near the septic system on plastic and covered, pending the results of sample analysis. Final disposal of the solids will be determined as part of the remedial evaluation included in the site assessment report.

The samples will be analyzed for BTEX by EPA Method 8020 and TPH by EPA Method 418.1. Also, a sample from the boring drilled within the septic system boundary will be analyzed for RCRA hazardous waste characteristics (TCLP analysis for pesticides and herbicides will not be performed as these chemicals were not used at the site). This RCRA sample will be chosen based on visual staining and the highest organic vapor measurements.

Groundwater Quality

A groundwater sample will be collected if the borings are drilled into saturated soil. The groundwater samples will be collected from the boring by inserting a section of screened PVC pipe into the hollow stem auger used to drill the boring and placing sand between

the screen and the auger. The auger will then be lifted above the bottom of the boring to allow water to collect in the screened pipe. The boring will be purged by bailing and discarding the water in the screened pipe three times. A sample will then be collected from inside the screened PVC pipe with a disposable bailer.

Groundwater wells will be installed as a second phase of the investigation only if the analysis of the groundwater samples indicated contamination, or if free product is observed in the groundwater sample. If required, BJ Services will include a plan for installing the wells and performing additional groundwater investigation in the site assessment report prepared after receiving analytical results of the initial soil/groundwater investigation.

The groundwater samples, if any, will be analyzed for BTEX by EPA Method 8020, TPH by EPA 418.1, and total dissolved solids by EPA Method 160.1.

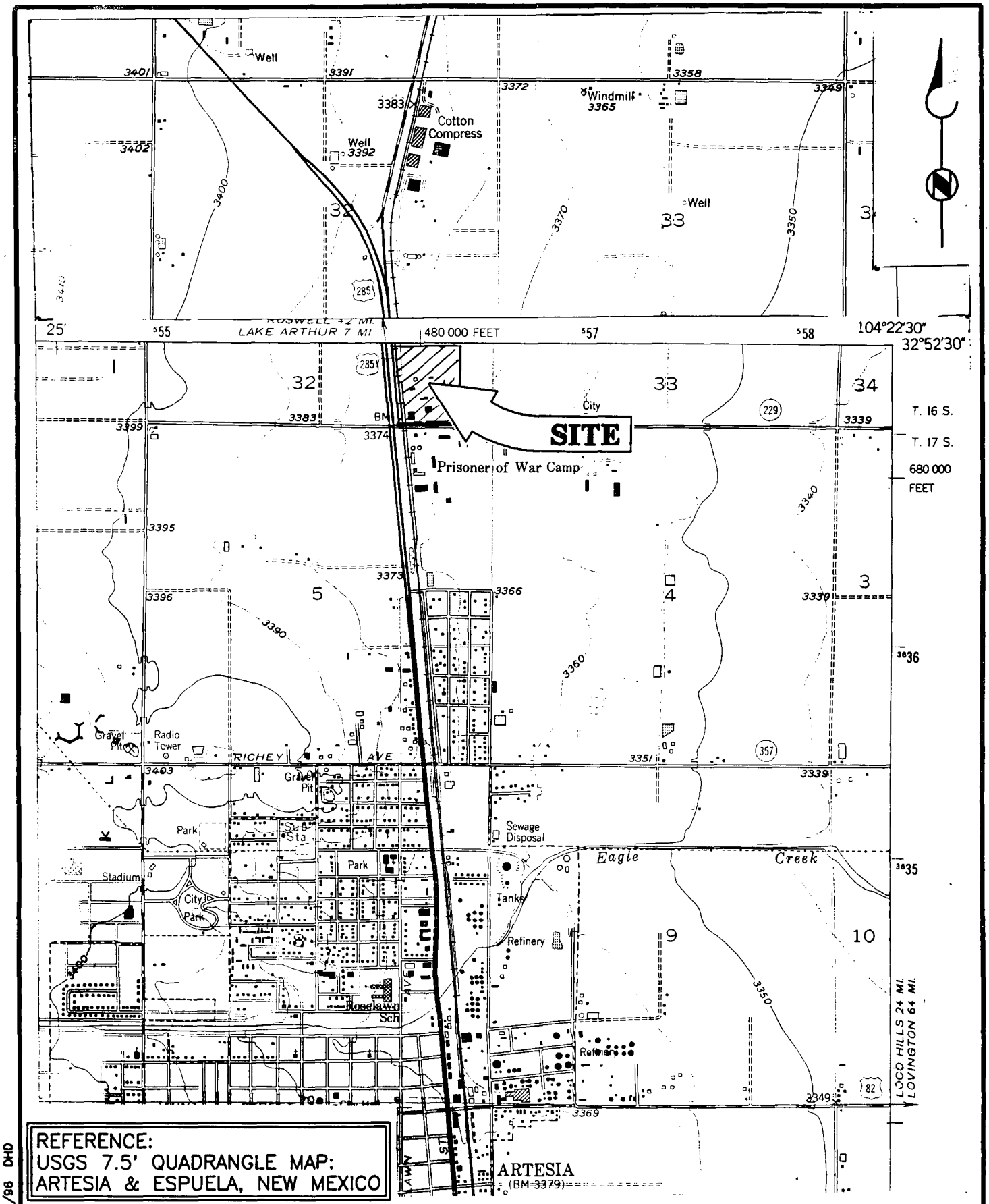
SITE ASSESSMENT REPORT

The field procedures and analytical results will be presented in a site assessment report to the OCD within 30 days of receiving analytical results. The sample results will be used to determine a ranking score, according to the OCD closure guidance document. BJ Services will present the ranking score in the site assessment report and propose further activities, such as additional investigation of groundwater or soil remediation, if needed.

The ranking score will establish the OCD recommended cleanup level for TPH in soil (100-5000 ppm). Benzene concentrations in soil exceeding 10 ppm and total BTEX concentrations in soil exceeding 50 ppm may require remediation. If the site assessment indicates additional investigation or remediation is not necessary, the report will propose no further action and BJ Services will request approval for final closure of the site.
BJ Services may propose alternate cleanup levels for OCD approval or propose no further action by conducting a risk-based evaluation of the site assessment data.

If remediation is necessary, feasible cleanup alternatives will be presented in the site assessment report. Alternatives include excavation and off-site disposal, landfarming or other in-situ treatment such as vapor sparging or bioremediation. BJ Services will not commence remediation until the OCD has reviewed and approved the recommended cleanup alternatives. A final closure report documenting closure activities and remediated soil contaminant concentrations would be prepared for OCD approval following any required site remediation.

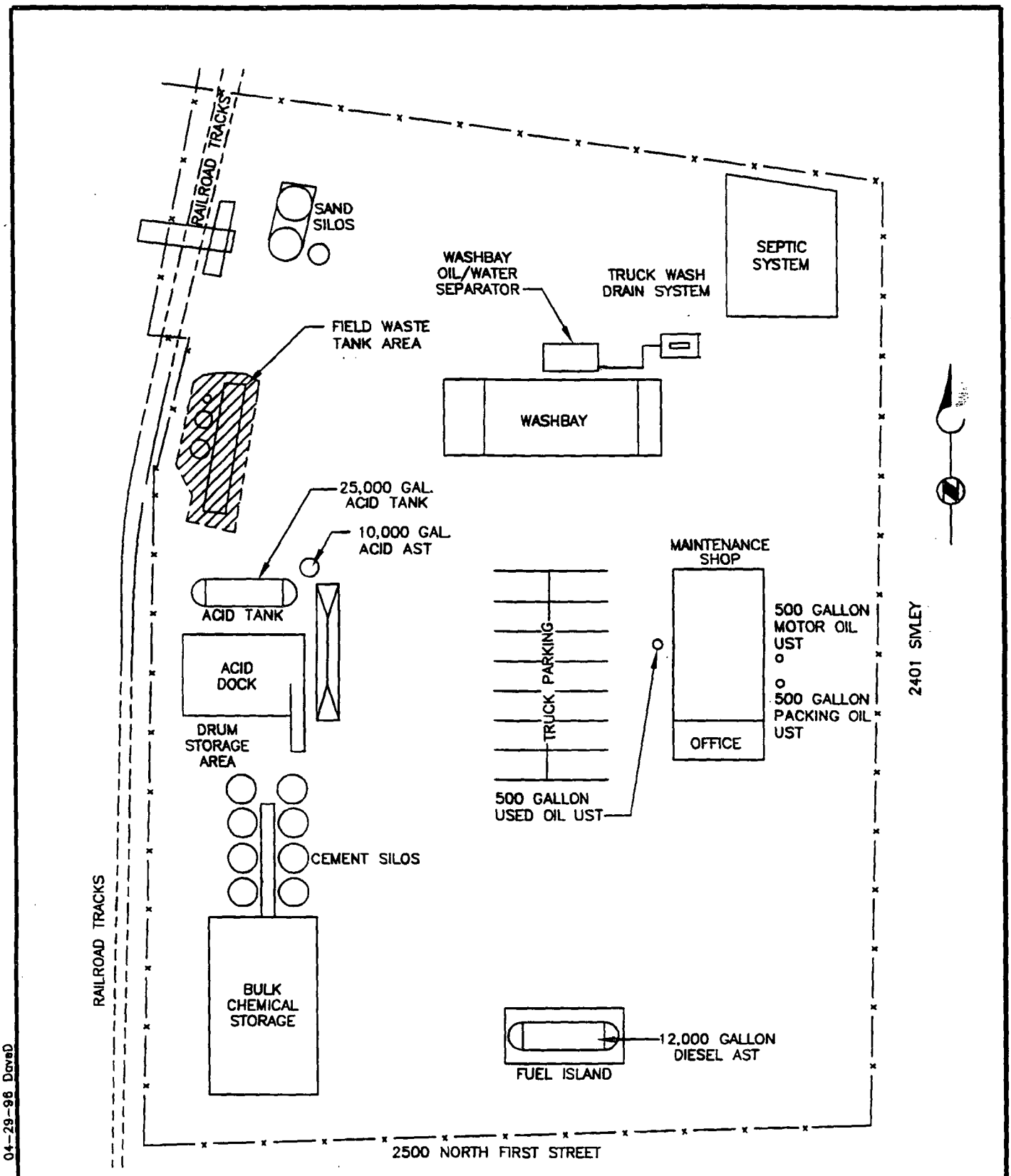
FIGURES



REFERENCE:
USGS 7.5' QUADRANGLE MAP:
ARTESIA & ESPUELA, NEW MEXICO

T:\2830\5MCIN 1/25/96 DHD

BROWN AND CALDWELL HOUSTON, TEXAS SUBMITTED: PROJECT MANAGER DATE: APPROVED: BROWN AND CALDWELL DATE:	0 1000 2000 SCALE: 1" = 2000' DRAWN BY: DHD DATE 1/25 CHK'D BY: DATE APPROVED: DATE	TITLE: SITE LOCATION MAP CLIENT: BJ SERVICES COMPANY, U.S.A. SITE LOCATION: ARTESIA, NEW MEXICO	DATE: 1/26/96 PROJECT NUMBER: 2988-06 FIGURE NUMBER: 1



BROWN AND CALDWELL
HOUSTON, TEXAS

SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

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NOT TO SCALE

DRAWN BY: DMD DATE 10/25

CHK'D BY: _____ DATE _____

APPROVED: _____ DATE _____

TITLE: SITE PLAN	DATE: 9/ 8/95
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 2988- 5
SITE LOCATION: ARTESIA, NEW MEXICO	FIGURE NUMBER: 2

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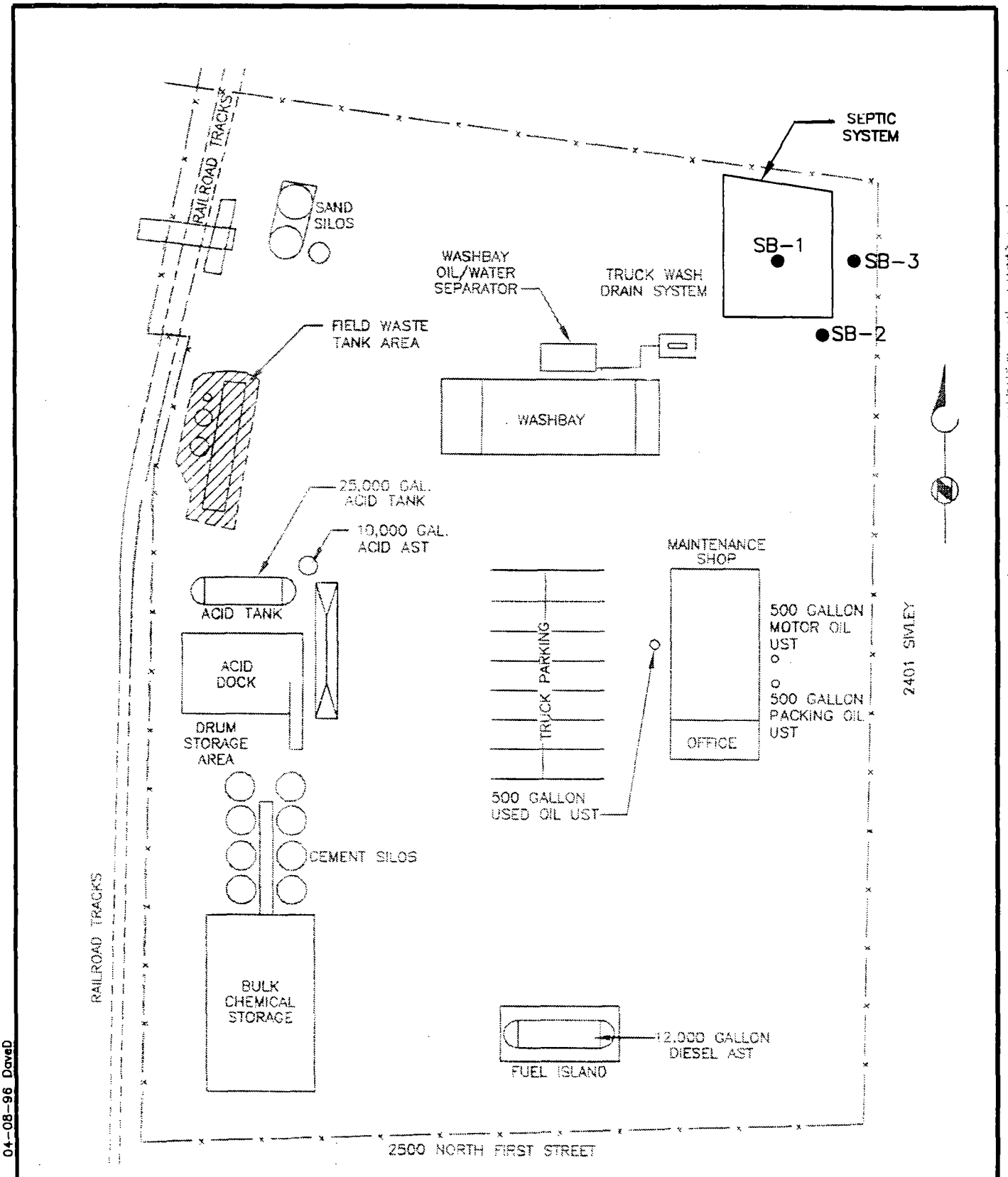


T:\2988\EXCAVLOC (1=1) 04-08-96 DaveD

BROWN AND CALDWELL HOUSTON, TEXAS SUBMITTED: PROJECT MANAGER DATE: APPROVED: BROWN AND CALDWELL DATE:	0 0 0 NOT TO SCALE DRAWN BY: DMD DATE 10/25 CHK'D BY: DATE APPROVED: DATE	TITLE: SITE PLAN WITH BORING LOCATIONS CLIENT: BJ SERVICES COMPANY, U.S.A. SITE LOCATION: ARTESIA, NEW MEXICO	DATE: 9/8/95 PROJECT NUMBER: 2988-25 FIGURE NUMBER: 3

APPENDIX B

CLOSURE PLAN APPROVAL NOTICE

NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

November 1, 1995

CERTIFIED MAIL
RETURN RECEIPT NO. Z-765-962-891

Mr. C.L. Smith
BJ Services Company, U.S.A.
8701 New Trails Drive
The Woodlands, Texas 77381

RECEIVED
NOV 06 1995
SAFETY & ENVIRONMENTAL

RE: Septic System Closure Plan
Artesia Facility
Eddy County, New Mexico

Dear Mr. Smith:

The New Mexico Oil Conservation Division (OCD) has completed a review of BJ Services' (BJ) September 11, 1995 "Closure Plan for the Septic System BJ Services Artesia, New Mexico Facility." This document contains BJ's work plan to determine the extent of potential soil and ground water contamination related to the operation of the wastewater/septic system.

The above referenced work plan is approved with the following conditions:

1. All borings which encounter ground water will be completed as monitor wells. All monitor wells will be completed as follows:

   a. A minimum of fifteen feet of well screen will be installed, with at least five feet of well screen above the water table and ten feet of well screen below the water table.

   b. An appropriately sized gravel pack will be set around the well screen from the bottom of the hole to 2-3 feet above the top of the well screen.

   c. A 2-3 foot bentonite plug will be placed above the gravel pack.

   d. The remainder of the hole will be grouted to the surface with cement containing 5 % bentonite.

2. All boreholes will be plugged upon completion with cement containing 5 % bentonite.

3. All wastes generated will be disposed of at an OCD approved facility.

4. Ground water from the monitor wells will be sampled and analyzed for concentrations of major cations and anions, heavy metals, polynuclear aromatic hydrocarbons, and aromatic and halogenated organics using EPA approved methods.

5. BJ will submit a report on the investigation to the OCD by January 12, 1996. The report will contain:

   a. A description of all activities which occurred during the investigation, conclusions and recommendations.

   b. A summary of the laboratory analytic results of soil and water quality sampling of the monitor wells and boreholes.

   c. A water table elevation map using the water table elevation of the ground water in all monitor wells.

   d. A geologic log for each borehole or monitor well and as built well completion diagrams for each monitor well.

6. All documents submitted for approval will be submitted to the OCD Santa Fe Office with copies provided to the OCD Artesia District Office.

Please be advised that OCD approval does not relieve BJ of liability if contamination exists which is beyond the scope of the work plan or if the activities fail to adequately determine the extent of contamination related to BJ's activities. In addition, OCD approval does not relieve BJ of responsibility for compliance with any other federal, state or local laws and/or regulations.

If you have any questions, please call me at (505) 827-7155.

Sincerely,

Mark Ashley
Geologist

xc: OCD Artesia Office

APPENDIX C

UNLINED SURFACE IMPOUNDMENT CLOSURE GUIDELINES - OIL CONSERVATION DIVISION

UNLINED

SURFACE IMPOUNDMENT

CLOSURE

GUIDELINES

(FEBRUARY 1993)

New Mexico Oil Conservation Division
State Land Office Building
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

TABLE OF CONTENTS

PREFACE

The following document does not require that currently operating or permitted unlined surface impoundments be closed. This document is to be used only as a guide when closing unlined surface impoundments used for the containment of exploration, production, processing and storage wastes regulated by the New Mexico Oil Conservation Division (OCD).

OCD requires submission and approval of plans and procedures for closure prior to the actual closure of any unlined surface impoundment. Procedures may deviate from the following guidelines if it can be shown that the proposed procedure will remove or isolate contaminants in such a manner that fresh waters, public health and the environment will not be impacted by remaining contaminants. Specific constituents and/or requirements for soil and ground water analysis and/or remediation may vary depending on site specific conditions.

If a number of unlined impoundments are to be closed by a single company, the company may submit one area-wide plan stating the specific location of each unlined impoundment to be closed, along with the procedures to be used during closure. Deviations from approved plans will require OCD notification and approval.

INTRODUCTION

These guidelines are intended to provide guidance for closure of unlined surface impoundments in a manner that assures protection of fresh waters, public health and the environment.

The New Mexico State Engineer has designated fresh waters as all surface waters and ground waters of the state containing 10,000 milligrams per liter or less of total dissolved solids (TDS) for which there is a present or reasonably foreseeable beneficial use. As stated in New Mexico Oil Conservation Commission (OCC) Order No. R-3221-D, "reasonably foreseeable" generally has been taken to mean a time period of not less than 200 years into the future. An unlined surface impoundment is defined as any unlined below grade feature which receives anything other than fresh water. The term "unlined surface impoundment" includes but is not limited to the following types of unlined features: produced water pits, dehydrator pits, blowdown pits, tank drain pits, pipeline drip collector pits, compressor scrubber pits, flare pits, and all other unlined pits which receive exploration, production and processing wastes regulated by the OCD. Excluded from this definition are pits constructed exclusively for drill cuttings and drilling fluids which are regulated under OCD Rule 105.

Prior to commencing closure of an unlined surface impoundment, a closure plan must be submitted to and approved by OCD. A closure plan may apply to more than one unlined impoundment. At a minimum, a closure plan should include the following elements:

1. The locations of all pits to be closed by township, range, section, unit letter and footages or other OCD approved methods.

2. The procedures which will be used to conduct the soil and ground water assessments and the circumstances under which an assessment of ground water will be conducted.

3. The procedures which will be used to manage, remediate, or dispose of contaminated soil and ground water.

I. SITE ASSESSMENT

Prior to final closure (Section VI), the party responsible for an unlined surface impoundment should perform an assessment to determine the extent to which soils and/or ground water may have been impacted by the operation of the impoundment. Assessment results will form the basis of any required remediation. The sites will be assessed for the severity of contamination and potential environmental and public health threats using a risk based ranking system.

The following characteristics must be determined in order to evaluate a sites potential risks, the need for remedial action and, if necessary, the level of cleanup required at the site:

A. GENERAL SITE CHARACTERISTICS

1. Depth To Ground Water

The operator should determine the depth to ground water at each site. The depth to ground water is defined as the vertical distance from the lowermost contaminants to the seasonal high water elevation of the ground water. If the exact depth to ground water is unknown, the ground water depth can be estimated using either local water well information, published regional ground water information, data on file with the New Mexico State Engineer Office or the vertical distance from adjacent ground water or surface water.

2. Wellhead Protection Area

The operator should determine the horizontal distance from all water sources and private, domestic water sources. A water source shall mean wells, springs or other sources of fresh water extraction. Private, domestic water sources shall mean those water sources used by less than five households for domestic or stock purposes.

3. Distance To Nearest Surface Water Body

The operator should determine the horizontal distance to all downgradient surface water bodies. Surface water bodies are defined as perennial rivers, streams, creeks, irrigation canals and ditches, lakes and ponds.

B. SOIL/WASTE CHARACTERISTICS

Soils/wastes within and beneath the unlined surface impoundment should be evaluated to determine the type and extent of contamination at the site. In order to assess the level of contamination at the unlined impoundment, observations should be made of the soils at the surface and a

sample of the potentially impacted soils should be taken from the interval at least 3 feet into the undisturbed native soils beneath the bottom of the pit. Samples should be obtained according to the sampling procedures in Sections III.A. and III.B. This may be accomplished using a backhoe, drill rig, hand auger, shovel or other means.

Initial assessment of soil contaminant levels is not required if an operator proposes to determine the final soil contaminant concentrations after a soil removal or remediation pursuant to section IV.A.

Varying degrees of contamination described below may co-exist at an individual site. The following sections describe the degrees of contamination that should be documented during the assessment of the level of soil contamination:

1. **Highly Contaminated/Saturated Soils**

   Highly contaminated/saturated soils are defined as those soils which contain a free liquid hydrocarbon phase or exhibits gross hydrocarbon staining.

2. **Unsaturated Contaminated Soils**

   Unsaturated contaminated soils are those soils which are not highly contaminated or saturated, as described above, but contain measurable concentrations of benzene, toluene, ethylbenzene and xylenes (BTEX) and total petroleum hydrocarbons (TPH). Sampling and analytical methods for determining contaminant concentrations are described in detail in Section III.A. and III.B.

   (NOTE: The above definitions apply only to oilfield contaminated soils which are exempt from federal RCRA Subtitle C hazardous waste provisions. Unlined impoundments receiving non-exempt wastes are subject to evaluation for RCRA hazardous waste characteristics.)

C. GROUND WATER QUALITY

If ground water is encountered during the soil/waste characterization of the impacted soils, a sample should be obtained to assess potential impacts on ground water quality. Ground water samples should be obtained using the sampling procedures in Section III.C. If there is a reasonable probability of ground water contamination based upon the level of contaminants in the soils directly beneath the pit or the extent of soil contamination defined during remedial activities, monitor wells may be required to assess potential impacts on ground water and the extent of ground water contamination.

II. SOIL AND WATER REMEDIATION LEVELS

A. SOILS

1. Highly Contaminated/Saturated Soils

Highly contaminated/saturated soils should be remediated insitu or excavated to the maximum extent practicable and remediated using techniques described in Section IV.A.

2. Unsaturated Contaminated Soils

The general site characteristics obtained during the site assessment (Section I.A.) will be used to determine the appropriate soil remediation levels using a risk based approach. Soils which are contaminated by petroleum constituents will be scored according to the ranking criteria below to determine their relative threat to public health, fresh waters and the environment.

a. Ranking Criteria

Depth To Ground Water	Ranking Score
<50 feet	20
50 - 99	10
>100	0

Wellhead Protection Area

<1000 feet from a water source, or;
<200 feet from private domestic water source

Yes	20
No	0

Distance To Surface Water Body

<200 horizontal feet	20
200 - 1000 horizontal feet	10
>1000 horizontal feet	0

b. Recommended Remediation Level

The total ranking score determines the level of remediation that may be required at any given site. The total ranking score is the sum of all four individual ranking criteria listed in Section II.A.2.a. The table below lists the remediation level that may be required for the appropriate total ranking score.

(NOTE: The OCD retains the right to require remediation to more stringent levels than those proposed below if warranted by site specific conditions (ie. native soil type, location relative to population centers and future use of the site or other appropriate site specific conditions.)

	Total Ranking Score		
	>19	10 - 19	0 - 9
Benzene(ppm)*	10	10	10
BTEX(ppm)*	50	50	50
TPH(ppm)**	100	1000	5000

* A field soil vapor headspace measurement (Section III.B.1) of 100 ppm may be substituted for a laboratory analysis of the Benzene and BTEX concentration limits.

** The contaminant concentration for TPH is the concentration above background levels.

B. **GROUND WATER**

Contaminated ground water is fresh ground water which contains free phase products, measurable concentrations of dissolved phase volatile organic constituents or other dissolved constituents in excess of the natural background water quality. Ground water contaminated in excess of the New Mexico Water Quality Control Commission (WQCC) ground water standards or natural background water quality will require remediation.

III. SOIL AND WATER SAMPLING PROCEDURES

Below are the sampling procedures for soil and ground water contaminant investigations of unlined surface impoundments that have received RCRA Subtitle C exempt oil field exploration and

production wastes. Unlined surface impoundments that have received non-exempt RCRA wastes will be required to be tested to demonstrate that the wastes are not characteristically hazardous according to RCRA regulations.

A. HIGHLY CONTAMINATED OR SATURATED SOILS

The following method is used to determine if soils are highly contaminated or saturated:

1. Physical Observations

Study a representative sample of the soil for observable free petroleum hydrocarbons or immiscible phases and gross staining. The immiscible phase may range from a free hydrocarbon to a sheen on any associated aqueous phase. A soil exhibiting any of these characteristics is considered highly contaminated or saturated.

B. UNSATURATED CONTAMINATED SOILS

The following methods may be used for determining the magnitude of contamination in unsaturated soils:

1. Soil Sampling Procedures for Headspace Analysis

A headspace analysis may be used to determine the total volatile organic vapor concentrations in soils (ie. in lieu of a laboratory analysis for benzene and BTEX but not in lieu of a TPH analysis). Headspace analysis procedures should be conducted according to OCD approved industry standards or other OCD-approved procedures. Accepted OCD procedures are as follows:

a) Fill a 0.5 liter or larger jar half full of sample and seal the top tightly with aluminum foil or fill a one quart zip-lock bag one-half full of sample and seal the top of the bag leaving the remainder of the bag filled with air.

b) Ensure that the sample temperature is between 15 to 25 degrees Celsius (59-77 degrees Fahrenheit).

c) Allow aromatic hydrocarbon vapors to develop within the headspace of the sample jar or bag for 5 to 10 minutes. During this period, the sample jar should be shaken vigorously for 1 minute or the contents of the bag should be gently massaged to break up soil clods.

d) If using a jar, pierce the aluminum foil seal with the probe of either a PID or FID organic vapor meter (OVM), and then record the highest (peak) measurement. If using a bag, carefully open one end of the bag and insert the probe of the OVM into

the bag and re-seal the bag around the probe as much as possible to prevent vapors from escaping. Record the peak measurement. The OVM must be calibrated to assume a benzene response factor.

2. Soil Sampling Procedures For Laboratory Analysis

a. Sampling Procedures

Soil sampling for laboratory analysis should be conducted according to OCD approved industry standards or other OCD-approved procedures. Information on specific industry standards may be obtained from the OCD. Accepted OCD soil sampling procedures and laboratory analytical methods are as follows:

i) Collect samples in clean, air-tight glass jars supplied by the laboratory which will conduct the analysis or from a reliable laboratory equipment supplier.

ii) Label the samples with a unique code for each sample.

iii) Cool and store samples with cold packs or on ice.

iv) Promptly ship sample to the lab for analysis following chain of custody procedures.

v) All samples must be analyzed within the holding times for the laboratory analytical method specified by EPA.

b. Analytical Methods

All soil samples must be analyzed using EPA methods, or by other OCD approved methods and must be analyzed within the holding time specified by the method. Below are laboratory analytical methods commonly accepted by OCD for analysis of soil samples analyzed for petroleum related constituents. Additional analyses may be required if the impoundment has been used for anything other than petroleum based fluids or produced water.

i) Benzene, toluene, ethylbenzene and xylene

- EPA Method 602/8020

ii) Total Petroleum Hydrocarbons

- EPA Method 418.1, or;
- EPA Method Modified 8015

C. GROUND WATER SAMPLING

If an investigation of ground water quality is deemed necessary, it should be conducted according to OCD approved industry standards or other OCD-approved procedures. Information concerning specific industry standards may be obtained from the OCD. The following methods are standard accepted OCD methods which can be used to sample and analyze ground water at RCRA exempt sites (Note: The installation of monitor wells is not required if the OCD approves of an alternate ground water investigation or sampling technique):

1. Monitor Well Installation/Location

One monitor well should be installed adjacent to and hydrologically down-gradient from the unlined surface impoundment to determine if protectable fresh water has been impacted by the disposal activities. Additional monitor wells, located up-gradient and down-gradient of the impoundment, may be required to delineate the full extent of ground water contamination if ground water near the pit has been found to be contaminated.

2. Monitor Well Construction

a) Monitor well construction materials should be:

   i) selected according to industry standards;

   ii) chemically resistant to the contaminants to be monitored; and

   iii) able to be installed without the use of glues or adhesives.

b) Monitor wells should be constructed according to OCD approved industry standards to prevent migration of contaminants along the well casing, and with a minimum of five feet of well screen above the water table to accommodate seasonal fluctuations in the static water table.

3. Monitor Well Development

When ground water is collected for analysis from monitoring wells, the wells should be developed prior to sampling. The objective of monitor well development is to repair damage done to the formation by the drilling operation so that the natural hydraulic properties of the formation are restored and to remove any fluids introduced into the formation that could compromise the integrity of the sample. Monitoring well development is accomplished by purging fluid from the well until the pH and specific conductivity have stabilized and turbidity has been reduced to the greatest extent possible.

4. Sampling Procedures

Ground water should be sampled according to OCD accepted standards or other OCD approved methods. Samples should be collected in clean containers supplied by the laboratory which will conduct the analysis or from a reliable laboratory equipment supplier. Samples for different analyses require specific types of containers. The OCD or the laboratory can provide information on the types of containers required for sample collection. The following procedures are accepted by OCD as standard sampling procedures:

a) Monitor wells should be purged of a minimum of three well volumes of ground water using a clean bailer prior to sampling to ensure that the sample represents the quality of the ground water in the formation and not stagnant water in the well bore.

b) Collect samples in appropriate sample containers containing the appropriate preservative for the analysis required. No bubbles or headspace should remain in the sample container.

c) Label the sample containers with a unique code for each sample.

d) Cool and store samples with cold packs or on ice.

e) Promptly ship sample to the lab for analysis following chain of custody procedures.

f) All samples must be analyzed within the holding times for the laboratory analytical method specified by EPA.

5. Ground Water Laboratory Analysis

Samples should be analyzed for potential ground water contaminants contained in the waste stream, as defined by the New Mexico Water Quality Control Commission (WQCC). All ground water samples must be analyzed using EPA methods, or by other OCD approved methods and must be analyzed within the holding time specified by the method. Below are OCD accepted laboratory analytical methods for analysis of ground water samples analyzed for petroleum related constituents. Additional analyses may be required if the impoundment has been used for anything other than petroleum based fluids or produced water.

a. <u>Analytical Methods</u>

i.) Benzene, Toluene, Ethylbenzene and Xylene

- EPA Method 602/8020

ii.) Major Cations and Anions

- Various EPA or standard methods

iii.) Heavy Metals

- EPA Method 6010, or;
- Various EPA 7000 series methods

iv.) Polynuclear Aromatic Hydrocarbons

- EPA Method 8100

IV. REMEDIATION

The following discussion summarizes alternatives for remediation of contaminated soil and ground water as defined in Section II.A. and II.B. All procedures used are to be approved by OCD prior to commencement of remediation activities. Separate OCD-approval for remediation is not required if OCD has approved a closure plan which includes the site remediation technique for a particular site. All procedures which deviate from the closure plan, however, must be approved by OCD prior to commencement of remediation activities.

In lieu of remediation, OCD may accept an evaluation of risk which demonstrates that the remaining contaminants will not pose a threat to present or foreseeable beneficial use of fresh waters, public health and the environment.

A. SOIL REMEDIATION

When RCRA exempt or RCRA nonhazardous petroleum contaminated soil requires remediation, it should be remediated and managed according to the criteria described below or by other OCD approved procedures which will remove, treat, or isolate contaminants in order to protect fresh waters, public health and the environment.

1. Contaminated Soils

Highly contaminated/saturated soils and unsaturated contaminated soils exceeding the standards described in Section II.A.2.b. should be either:

a) Excavated from the ground until a representative sample from the walls and bottom of the excavation is below the contaminant specific remediation level listed in Section II.A.2.b or an alternate OCD approved remediation level, or;

b) Excavated to the maximum depth and horizontal extent practicable. Upon reaching this limit a sample should be taken from the walls and bottom of

the excavation to determine the remaining levels of soil contaminants, or;

c) Treated in place, as described in Section IV.A.2.b.ii. - Treatment of Soil in Place, until a representative sample is below the contaminant specific remediation level listed in Section II.A.2.b, or an alternate OCD approved remediation level, or;

d) Managed according to an OCD-approved alternate method.

2. Soil Management Options

All soil management options must be submitted to and approved by OCD prior to commencement of remediation activities. The following is a list of options for either on-site treatment and off-site treatment and/or disposal of contaminated soils:

a. Disposal

Excavated soils may be disposed of at an off-site OCD-approved facility.

b. Soil Treatment and Remediation Techniques

i. Landfarming

Onetime applications of contaminated soils may be landfarmed on location by spreading the soil in an approximately six inch lift within a bermed area. Only soils which do not contain free liquids can be landfarmed. The soils should be disced regularly to enhance biodegradation of the contaminants. If necessary, upon approval by OCD, moisture and nutrients may be added to the soil to enhance aerobic biodegradation.

In some high risk areas an impermeable liner may be required to prevent leaching of contaminants into the underlying soil.

Landfarming sites that will receive soils from more than one location are considered centralized sites and must be approved separately by OCD prior to operation.

ii. Insitu Soil Treatment

Insitu treatment may be accomplished using vapor venting, bioremediation or other OCD approved treatment systems.

iii. Alternate Methods

The OCD encourages alternate methods of soil remediation including, but not limited to, active soil aeration, composting, bioremediation, solidification, and thermal treatment. Use of alternate methods must be approved by OCD prior to implementation.

B. GROUND WATER REMEDIATION

1. Remediation Requirements

Ground water remediation activities will be reviewed and approved by OCD on a case by case basis prior to commencement of remedial activities. When contaminated ground water exceeds WQCC ground water standards, it should be remediated according to the criteria described below.

a. Free Phase Contamination

Free phase floating product should be removed from ground water through the use of skimming devices, total-fluid type pumps, or other OCD-approved methods.

b. Dissolved Phase Contamination

Ground water contaminated with dissolved phase constituents in excess of WQCC ground water standards can be remediated by either removing and treating the ground water, or treating the ground water in place. If treated waters are to be disposed of onto or below the ground surface, a discharge plan must be submitted and approved by OCD.

c. Alternate Methods

The OCD encourages other methods of ground water remediation including, but not limited to, air sparging and bioremediation. Use of alternate methods must be approved OCD prior to implementation.

V. TERMINATION OF REMEDIAL ACTION

Remedial action may be terminated when the criteria described below have been met:

A. SOIL

Contaminated soils requiring remediation should be remediated so that residual contaminant concentrations meet the recommended soil remediation level for a particular site as specified in Section II.A.2.b. Termination of remedial action will be approved by OCD upon a demonstration of completion of remediation as described above.

If soil action levels cannot practicably be attained, an evaluation of risk may be performed and provided to OCD for approval showing that the remaining contaminants will not pose a threat to present or foreseeable beneficial use of fresh water, public health and the environment.

B. GROUND WATER

A ground water remedial action may be terminated if all recoverable free phase product has been removed, and the concentration of the remaining dissolved phase contaminants in the ground water does not exceed New Mexico WQCC water quality standards or background levels. Termination of remedial action will be approved by OCD upon a demonstration of completion of remediation as described in above.

If the water quality standards cannot practicably be attained, an evaluation of risk may be performed and provided to OCD for approval showing that the remaining contaminants will not pose a threat to present or foreseeable beneficial use of fresh waters, human health and the environment.

VI. FINAL CLOSURE

Upon termination of any required soil remedial actions (Section V.) an unlined surface impoundment may be closed by backfilling, contouring to provide drainage away from the site and revegetating the site.

VII. CLOSURE REPORTS

Closure plans should provide a schedule for reporting the results of all closure activities.

District I
P.O. Box 1980, Hobbs, NM
District II
Drawer DD, Artesia, NM 88211
District III
1000 Rio Brazos Rd, Aztec, NM 87410

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

SUBMIT 1 COPY TO APPROPRIATE DISTRICT OFFICE AND 1 COPY TO SANTA FE OFFICE

(Revised 3/9/94)

PIT REMEDIATION AND CLOSURE REPORT

Operator: _____ **Telephone:** _____

Address: _____

Facility Or: Well Name _____

Location: Unit or Qtr/Qtr Sec_____ Sec___ T___ R____ County_____

Pit Type: Separator___ Dehydrator___ Other_____

Land Type: BLM___, State ___, Fee ___, Other_____

Pit Location: (Attach diagram)
Pit dimensions: length_____, width _____, depth _____
Reference: wellhead___, other _____
Footage from reference: _____
Direction from reference: _____ Degrees ___ East North ___ of ___ West South ___

Depth To Ground Water: (Vertical distance from contaminants to seasonal high water elevation of ground water)	Less than 50 feet 50 feet to 99 feet Greater than 100 feet	(20 points) (10 points) (0 Points) ____
Wellhead Protection Area: (Less than 200 feet from a private domestic water source, or; less than 1000 feet from all other water sources)	Yes No	(20 points) (0 points) ____
Distance To Surface Water: (Horizontal distance to perennial lakes, ponds, rivers, streams, creeks, irrigation canals and ditches)	Less than 200 feet 200 feet to 1000 feet Greater than 1000 feet	(20 points) (10 points) (0 points) ____
	RANKING SCORE (TOTAL POINTS):	____

Date Remediation Started: _____ **Date Completed:** _____

Remediation Method: (Check all appropriate sections)
Excavation ___ Approx. cubic yards _____
Landfarmed ___ Insitu Bioremediation ___
Other _____

Remediation Location: (ie. landfarmed onsite, name and location of offsite facility)
Onsite___ Offsite _____

General Description Of Remedial Action: _____

Ground Water Encountered: No ___ Yes ___ Depth _____

Final Pit:
Closure Sampling: (if multiple samples, attach sample results and diagram of sample locations and depths)
Sample location _____
Sample depth _____
Sample date _____ Sample time _____
Sample Results
Benzene(ppm) _____
Total BTEX(ppm) _____
Field headspace(ppm) _____
TPH _____

Ground Water Sample: Yes ___ No ___ (If yes, attach sample results)

I HEREBY CERTIFY THAT THE INFORMATION ABOVE IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF

DATE

SIGNATURE PRINTED NAME AND TITLE

APPENDIX D

BORING LOGS

BROWN AND CALDWELL

Soil Boring: B-1

Project Name: BJ-Artesia/NE Septic System Project Number: 2988-25 Sheet 1 of 1

Project Location: Artesia, New Mexico		Logged By: T. Jenkins	Approved: T. Jenkins
Drilling Contractor: Harrison Drilling		Date Started: 11/14/95	Date Finished: 11/14/95
Drilling Equipment: NA	Driller: Harrison Drilling	Total Boring Depth: (feet) 21.0	Depth to Static Water: (feet)
Drilling Method: Hollow Stem Auger	Borehole Diameter: 3.25"	TOC Elevation:	Ground Elevation: NA
Sampling Method: Split Spoon		Diameter and Type of Well Casing: NA	
Comments: Center of septic system drain field.		Slot Size: NA	Filter Material: NA
		Development Method: NA	

Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description	PID Readings	Sampled Interval	Recovery (feet)	Sample ID	Soil Boring Remarks
		GC		FILL-brown sandy clay w/ small gravel(GC)	0.0		2	1	
2					0.0		2	2	dry; no odor; no staining
4		GM		SILTY CLAY-some sand & small gravel(GM) white to tan	0.0		2	3	slightly moist; no odor; no staining
6							2		
8					0.0		2	4	
10							2		
12					3.5		2	5	moist; no odor; no staining
14							2		
16		CL		CLAY-interbedded white silty clay(CL)			2		
18					2.4		2	6	moist; very slight odor; strange spotted staing
20				-gravel layer	0.5		1	7	moist; silty clay; no staining
				End of boring at 21.0 feet.					

BROWN AND CALDWELL

Soil Boring: B-2

Project Name: **BJ-Artesia/NE Septic System** Project Number: **2988-25** Sheet **1** of **1**

Project Location: **Artesia, New Mexico**		Logged By: **T. Jenkins**	Approved: **T. Jenkins**
Drilling Contractor: **Harrison Drilling**		Date Started: **11/14/95**	Date Finished: **11/14/95**
Drilling Equipment: **NA**	Driller: **Harrison Drilling**	Total Boring Depth: (feet) **20.0**	Depth to Static Water: (feet)
Drilling Method: **Hollow Stem Auger**	Borehole Diameter: **3.25"**	TOC Elevation: **NA**	Ground Elevation: **NA**
Sampling Method: **Split Spoon**		Diameter and Type of Well Casing: **NA**	
Comments: **10' South of drain field boundary.**		Slot Size: **NA**	Filter Material: **NA**
		Development Method: **NA**	

Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description	PID Readings	Sampled Interval	Recovery (feet)	Sample ID	Soil Boring Remarks
		SW		FILL 1-sand w/ small gravel(GW)	0.0		2	1	
2		GC		FILL 2-sandy clay w/ small gravel(GC)	0.0		2	2	dry; no odor; no staining
4					0.0		2	3	
		CL		SILTY CLAY-w/ silt(CL)			2		
6									
8					0.0		2	4	
10							2		
12					0.0		2	5	
14							2		slightly moist; no odor; no staining
16		SC		SANDY CLAY- w/ silt(SC)			2		
18					0.0		2	6	moist; no odor; no staing
20				End of boring at 20.0 feet.					

BROWN AND CALDWELL

Soil Boring: B-3

Project Name: BJ-Artesia/NE Septic System Project Number: 2988-25 Sheet 1 of 1

Project Location: **Artesia, New Mexico**		Logged By: **T. Jenkins**	Approved: **T. Jenkins**
Drilling Contractor: **Harrison Drilling**		Date Started: **11/14/95**	Date Finished: **11/14/95**
Drilling Equipment: **NA**	Driller: **Harrison Drilling**	Total Boring Depth: (feet) **32.0**	Depth to Static Water: (feet) **25.0**
Drilling Method: **Hollow Stem Auger**	Borehole Diameter: **3.25"**	TOC Elevation: **NA**	Ground Elevation: **NA**
Sampling Method: **Split Spoon**		Diameter and Type of Well Casing: **NA**	
Comments: **East of septic system drain field.**		Slot Size: **NA**	Filter Material: **NA**
		Development Method: **NA**	

Depth (feet)	Depth to Water	USC Soil Type	Lithology	Description	PID Readings	Sampled Interval	Recovery (feet)	Sample ID	Soil Boring Remarks
0		GC		FILL-brown sandy clay w/ small gravel(GC)	0.0		2	1	
2					0.0		2	2	dry; no odor; no staining
4		GM		SANDY/SILTY CLAY-w/ small gravel(GC)	0.0		2	3	
6							2		
8							2		
10					0.0		2	4	
12							2		slightly moist; no odor; no staining
14					0.0		2	5	
16		CL		SILTY CLAY(CL) -reddishish in color, w/ some sand			2		slightly moist; no odor; no staining
18							2		
20					0.0		2	6	
22	▽			-Approximate GW level measured after augers were removed			2		moist; no odor; no staining
24	▼				0.0		2	7	
26							2		moist; no odor; no staining
28							2		
30					0.0		2	8	
32				End of boring at 32.0 feet.					moist; no odor; no staining

APPENDIX E

ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

November 21, 1995

REPORT OF: Soil Analysis

REPORT TO: Mr. Tim Jenkins
Brown & Caldwell
1415 Louisiana St., Suite 2500
Houston, Texas 77002

PROJECT NAME: BJ Services - Artesia Septic
2401 Sivley
Artesia, NM

PROJECT NUMBER: 2988-06

SAMPLE I.D.: See Below

SAMPLE DATE: November 14, 1995
SAMPLE TIME: See Below
SAMPLE RECEIVED: November 17, 1995
TIME RECEIVED: 9:30AM
SAMPLE COLLECTED BY: Tim Jenkins - Customer

SAMPLE NUMBER: See Below

RESULTS:

Sample Number	Sample I.D.	Sample Time	TPH (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl Benzene (mg/kg)	Xylene (mg/kg)
54046	B -3; 15-17'	8:30AM	60	<0.010	<0.010	<0.010	<0.030
Detection Limits			**10**	**0.010**	**0.010**	**0.010**	**0.030**
54047	B -3; 20-22'	9:00AM	150	<0.010	<0.010	<0.010	<0.030
Detection Limits			**20**	**0.010**	**0.010**	**0.010**	**0.030**
54048	B -3; 30-32'	9:30AM	46	<0.010	<0.010	0.026	0.123
54049	B -1; 8-10'	11:25AM	17	<0.010	<0.010	<0.010	<0.030
54050	B -1; 13-15'	11:35AM	<10	<0.010	<0.010	<0.010	<0.030
54051	B -1; 20-21'	12:05PM	87	<0.010	<0.010	<0.010	<0.030
54052	B -2; 8-10'	2:45PM	37	<0.010	<0.010	<0.010	<0.030
54053	B -2; 13-15'	2:55PM	26	<0.010	<0.010	<0.010	<0.030
54054	B -2; 18-20'	3:10PM	15	<0.010	<0.010	<0.010	<0.030
Detection Limits			**10**	**0.010**	**0.010**	**0.010**	**0.030**

Quality Control Information

Parameter	Sample Preservation	EPA Method	C.V.%		Standard Deviation	Spike Recovery %	Date of Analyses	Analyst
TPH Extraction		3550					11/17/95	M. McGaugh
TPH	Cool to 4°C	418.1	2.7	±	4.95	92	11/20/95	S. Freeman

Local: (214) 727-1123 Long Distance: (800) 228-ERMI FAX: (214) 727-1175

SAMPLE NUMBERS: 54046-54054

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%		Standard Deviation	Spike Recovery %	Date of Analyses	Analyst
Sample Numbers:	**54046**							
Benzene	Cool to 4°C	8020	1.0	±	0.0004	130	11/18/95	K. Richmond
Toluene	Cool to 4°C	8020	0.3	±	0.0001	108	11/18/95	K. Richmond
Ethyl Benzene	Cool to 4°C	8020	1.7	±	0.0006	117	11/18/95	K. Richmond
Xylene	Cool to 4°C	8020	5.6	±	0.0022	128	11/18/95	K. Richmond
Sample Numbers:	**54047-54050**							
Benzene	Cool to 4°C	8020	5.0	±	0.0020	129	11/18/95	K. Richmond
Toluene	Cool to 4°C	8020	2.2	±	0.0007	108	11/18/95	K. Richmond
Ethyl Benzene	Cool to 4°C	8020	1.8	±	0.0006	109	11/18/95	K. Richmond
Xylene	Cool to 4°C	8020	4.5	±	0.0016	122	11/18/95	K. Richmond
Sample Numbers:	**54051-54054**							
Benzene	Cool to 4°C	8020	0.3	±	0.0001	119	11/20/95	K. Richmond
Toluene	Cool to 4°C	8020	1.5	±	0.0005	111	11/20/95	K. Richmond
Ethyl Benzene	Cool to 4°C	8020	1.0	±	0.0004	114	11/20/95	K. Richmond
Xylene	Cool to 4°C	8020	2.1	±	0.0008	119	11/20/95	K. Richmond
Sample Number:	**54046**							
Surrogates:								
Bromofluorobenzene			N/A		N/A	98		
Sample Number:	**54047**							
Surrogates:								
Bromofluorobenzene			N/A		N/A	97		
Sample Number:	**54048**							
Surrogates:								
Bromofluorobenzene			N/A		N/A	125		
Sample Number:	**54049**							
Surrogates:								
Bromofluorobenzene			N/A		N/A	82		
Sample Number:	**54050**							
Surrogates:								
Bromofluorobenzene			N/A		N/A	94		
Sample Number:	**54051**							
Surrogates:								
Bromofluorobenzene			N/A		N/A	86		
Sample Number:	**54052**							
Surrogates:								
Bromofluorobenzene			N/A		N/A	85		

SAMPLE NUMBERS: 54046-54054

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA Method	C.V.%	Standard Deviation	Spike Recovery %	Date of Analyses	Analyst
Sample Number:	**54053**						
Surrogates:							
Bromofluorobenzene			N/A	N/A	94		
Sample Number:	**54054**						
Surrogates:							
Bromofluorobenzene			N/A	N/A	105		

Respectfully submitted,

Kendall K. Brown

Kendall K. Brown
President

Prepared By Shelly Pope SP
Reviewed By Shelly Weems

Chain-of-Custody

001286

Page 1 of 1

ERMI
Bethany Tech Center
400 W. Bethany, Suite 190
Allen, Texas 75002
214- 727-1123 (Local) * 800- 228- ERMI (Long Distance)
214- 727-1175 (Fax)

Company Name: BROWN AND CALDWELL ❶			Comments:
Contact: TIM JENKINS			
Address: 1415 LOUISIANA ST., SUITE 2500			
City: HOUSTON	State: TX	Zip Code: 77002	TAT: Normal ☒ Expedite ☐ (Call for Pricing)
Telephone: (713) 759-0999		Fax Number: (713) 759-0952	
Billing Name: BROWN AND CALDWELL ❷			
Billing Address (if different): SAME			
City:	State:	Zip Code:	
Telephone:		Fax Number:	
Purchase Order Number: ❸			
Project Name: BJ SERVICES-ARTESIA SEPTIC ❹		Project Number: 2988-06 ❺	
Address: 2401 SIVLEY			
City: ARTESIA	State: NM	Zip Code:	
Sampler: TLJ	Signature:	❻	

ERMI Use Only	Field Sample I.D.	Sample Date ❽	Sample Time ❾	Matrix	# of Bottles	Preservative	Sample Type Comp.	Sample Type Grab	REQUESTED ANALYSES ❼ BTEX – 8020	TPH – 418.1	RCRA TCLP (NO PESTICIDES, HERBICIDES) Complete 11/21/95 @0830 per Jim Nunn TCLP					
54046	B-3; 15-17'	11/14/95	0830	SOIL	1	<4°C	✓		✓	✓						
54047	B-3; 20-22'		0900		1	<4°C	✓		✓	✓						
54048	B-3; 30-32'		0930		1	<4°C	✓		✓	✓						
54049	B-1; 8-10'		1125		1				✓	✓						
54050	B-1; 13-15'		1135		2				✓	✓	✓					
54051	B-1; 20-21'		1205		1				✓	✓						
54052	B-2; 8-10'		1445						✓	✓						
54053	B-2; 13-15'		1455						✓	✓						
54054	B-2; 18-20		1510						✓	✓						

Relinquished By: ❿	Date: 11/16/95	Time: 15:00	Received By: FED EX	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Method of Shipment:	Date:		Received for ERMI By:	Date: 11/17	Time: 0930

See Reverse for Terms and Conditions

Revised 05/17/95

WHITE: Original to be returned with Report; YELLOW: ERMI copy; PINK, Customer Copy

Environmental Laboratories
Bethany Tech Center • Suite 190
400 W. Bethany Rd. • Allen, Texas 75013

December 4, 1995

REPORT OF: Soil Analysis

REPORT TO: Mr. Tim Jenkins
Brown & Caldwell
1415 Louisiana St., Suite 2500
Houston, Texas 77002

PROJECT NAME: BJ Services - Artesia Septic
2401 Sivley
Artesia, NM

PROJECT NUMBER: 2988-06

SAMPLE I.D.: B-1; 13-15'*

SAMPLE DATE: November 14, 1995
SAMPLE TIME: 11:35AM
SAMPLE RECEIVED: November 17, 1995
TIME RECEIVED: 9:30AM
SAMPLE COLLECTED BY: Tim Jenkins - Customer

SAMPLE NUMBER: 54050

RESULTS:

Parameter	Regulatory Limits	Detection Limits	Observed Concentration
IGNITABILITY			
Flashpoint	>60°C (140°F)	0.5°C	**
CORROSIVITY			
pH	pH ≥ 2.0 pH units pH ≤12.5 pH units	0.1 units	7.8 units
REACTIVITY			
Cyanides, mg/kg	≤250	1.0	<1.0 (1)
Sulfides, mg/kg	≤500	4.0	<4.0
TCLP METALS			
Arsenic, mg/l	<5.0	0.20	<0.20
Barium, mg/l	<100.0	0.05	0.44
Cadmium, mg/l	<1.0	0.04	<0.04
Chromium, mg/l	<5.0	0.05	<0.05
Lead, mg/l	<5.0	0.10	<0.10
Mercury, mg/l	<0.2	0.004	<0.004
Selenium, mg/l	<1.0	0.15	<0.15
Silver, mg/l	<5.0	0.07	<0.07

SAMPLE NUMBER: 54050

Parameter	Regulatory Limits	Detection Limits	Observed Concentration
TCLP VOLATILE ORGANICS			
Benzene, mg/l	<0.5	0.003	<0.003
Carbon tetrachloride, mg/l	<0.5	0.003	<0.003
Chlorobenzene, mg/l	<100.0	0.003	<0.003
Chloroform, mg/l	<6.0	0.003	<0.003
1,4-Dichlorobenzene, mg/l	<7.5	0.003	<0.003
1,2-Dichloroethane, mg/l	<0.5	0.003	<0.003
1,1-Dichloroethylene, mg/l	<0.7	0.003	<0.003
Methyl ethyl ketone, mg/l	<200.0	0.010	<0.010
Tetrachloroethylene, mg/l	<0.7	0.003	<0.003
Trichloroethylene, mg/l	<0.5	0.003	<0.003
Vinyl chloride, mg/l	<0.2	0.005	<0.005
TCLP SEMIVOLATILES			
2,4-Dinitrotoluene, mg/l	<0.13	0.003	<0.003
o-Cresol, mg/l	<200.0	0.003	<0.003
m-Cresol, mg/l	<200.0	0.003	<0.003
p-Cresol, mg/l	<200.0	0.003	<0.003
Cresol, mg/l	<200.0	0.003	<0.003
Hexachlorobenzene, mg/l	<0.13	0.003	<0.003
Hexachlorobutadiene, mg/l	<0.5	0.003	<0.003
Hexachloroethane, mg/l	<3.0	0.003	<0.003
Nitrobenzene, mg/l	<2.0	0.003	<0.003
Pentachlorophenol, mg/l	<100.0	0.003	<0.003
Pyridine, mg/l	<5.0	0.003	<0.003
2,4,5-Trichlorophenol, mg/l	<400.0	0.003	<0.003
2,4,6-Trichlorophenol, mg/l	<2.0	0.003	<0.003

Quality Control Information

Parameter	Sample Preservation	EPA (2) Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
Ignitability	None Required	7.1.2.2	N/A	N/A	N/A	11/27/95	3:00PM	M. McGaugh
Corrosivity	None Required	9045	0.0	± 0.00	N/A	11/27/95	3:30PM	M. McGaugh
Reactivity								
Cyanides	None Required	7.3.3.2	0.0	± 0.00	24	11/27/95	11:00AM	S. Freeman
Sulfides	None Required	7.3.4.2	0.0	± 0.00	97	11/27/95	11:00AM	S. Freeman

SAMPLE NUMBER: 54050

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA (2) Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
TCLP Metals								
Extraction		1311				11/21/95	1:30PM	D. Bernhard
Metals Digestion - ICP		3010				11/22/95	10:00AM	J. Marconi
Metals Digestion - Mercury		7470				11/22/95	10:00AM	D. Bernhard
Arsenic	Cool to 4°C	6010	1.5	± 0.01	97	11/22/95	2:57PM	D. Bernhard
Barium	Cool to 4°C	6010	0.4	± 0.004	90	11/22/95	2:57PM	D. Bernhard
Cadmium	Cool to 4°C	6010	0.5	± 0.005	91	11/22/95	2:57PM	D. Bernhard
Chromium	Cool to 4°C	6010	0.1	± 0.001	93	11/22/95	2:57PM	D. Bernhard
Lead	Cool to 4°C	6010	0.5	± 0.005	98	11/22/95	2:57PM	D. Bernhard
Mercury	Cool to 4°C	7470	0.4	± 0.0004	99	11/22/95	3:18PM	D. Bernhard
Selenium	Cool to 4°C	6010	2.3	± 0.02	95	11/22/95	2:57PM	D. Bernhard
Silver	Cool to 4°C	6010	0.6	± 0.002	94	11/22/95	2:57PM	D. Bernhard
TCLP Volatiles	Cool to 4°C	8260				11/22/95	12:26PM	K. Richmond
ZHE Extraction		1311				11/21/95	2:10PM	K. Richmond
Matrix Spikes:								
Benzene			2.84	± 0.643	113			
Carbon Tetrachloride			0.48	± 0.106	111			
Chlorobenzene			1.67	± 0.368	110			
Chloroform			0.49	± 0.099	102			
1,4-Dichlorobenzene			3.41	± 0.672	99			
1,2-Dichloroethane			0.52	± 0.120	115			
1,1-Dichloroethylene			1.24	± 0.290	117			
Methyl ethyl ketone			2.84	± 0.580	102			
Tetrachloroethylene			0.28	± 0.057	101			
Trichloroethylene			0.30	± 0.064	107			
Vinyl chloride			15.21	± 2.920	96			
Surrogates:								
Fluorobenzene			N/A	N/A	98			
Toluene-d_8			N/A	N/A	110			
Bromofluorobenzene			N/A	N/A	103			
TCLP SemiVolatiles	Cool to 4°C	8270				12/02/95	1:07AM	Y. Li
Extraction		1311				11/21/95	1:30PM	D. Bernhard
Liquid-Liquid Extraction		3510				11/22/95	11:50AM	E. Boateng

SAMPLE NUMBER: 54050

Quality Control Information (Continued)

Parameter	Sample Preservation	EPA (2) Method	C.V.%	Standard Deviation	Spike Recovery%	Date of Analyses	Time of Analyses	Analyst
TCLP								
SemiVolatiles	Cool to 4°C	8270				12/02/95	1:07AM	Y.Li
Matrix Spikes:								
o-Cresol			17.7	± 15.91	112			
m-Cresol & p-Cresol			18.3	± 22.30	93			
2,4,5-Trichlorophenol			32.1	± 26.23	92			
2,4,6-Trichlorophenol			26.8	± 26.94	127			
Pentachlorophenol			18.4	± 22.63	83			
1,4-Dichlorobenzene			5.6	± 6.51	70			
2,4,-Dinitrotoluene			5.8	± 6.22	89			
Hexachlorobenzene			5.6	± 7.92	66			
Hexachlorobutadiene			1.4	± 1.63	71			
Hexachloroethane			4.0	± 4.41	66			
Nitrobenzene			3.0	± 3.55	115			
Pyridine			14.2	± 7.52	98			
Surrogates:								
2-Fluorophenol			N/A	N/A	59			
Phenol-d_5			N/A	N/A	32			
Nitrobenzene-d_5			N/A	N/A	36			
2-Fluorobiphenyl			N/A	N/A	52			
2,4,6-Tribromophenol			N/A	N/A	54			
Terphenyl-d_{14}			N/A	N/A	63			

* Using the criteria of Ignitability, Reactivity, Corrosivity, Metals, Volatile and Semivolatile Toxicity characteristics, this sample of waste is not hazardous.

** Not ignitable using the criteria applied for not a liquid sample. (Section 7.1.2.2)

SAMPLE NUMBER: 54050

(1) < = Less than Detection Limit.

(2) EPA. 1986. Test Methods for Evaluating Solid Waste. SW-846, 3rd Edition.

Respectfully submitted,

Kendall K. Brown

Kendall K. Brown
President

Prepared By Shelly Weems
Reviewed By Shelly Pope

Chain-of-Custody 001286 Page 1 of 1

ERMI
Bethany Tech Center
400 W. Bethany, Suite 190
Allen, Texas 75002
214- 727-1123 (Local) * 800- 228- ERMI (Long Distance)
214- 727-1175 (Fax)

Company Name:	BROWN AND CALDWELL	❶	Comments:	
Contact:	TIM JENKINS			
Address:	1415 LOUISIANA ST., SUITE 2500			
City:	HOUSTON	State: TX	Zip Code: 77002	
Telephone:	(713) 759-0999		Fax Number: (713) 759-0952	

TAT: Normal ☒ Expedite ☐ (Call for Pricing)

Billing Name:	BROWN AND CALDWELL	❷	
Billing Address (if different):	SAME		
City:		State:	Zip Code:
Telephone:			Fax Number:
Purchase Order Number:		❸	

Project Name:	BJ SERVICES-ARTESIA SEPTIC ❹	Project Number: 2988-06	❺
Address:	2401 SIVLEY		
City:	ARTESIA	State: NM	Zip Code:
Sampler:	TWJ	Signature:	❻

REQUESTED ANALYSES ❼

ERMI Use Only	Field Sample I.D.	Sample Date ❽	Sample Time ❾	Matrix	# of Bottles	Preservative	Sample Type Comp.	Sample Type Grab	BTEX – 8020	TPH – 418.1	RCRA TCLP (NO PESTICIDES, HERBICIDES)	11/21/95 @0830					
54046	B-3; 15-17'	11/14/95	0830	SOIL	1	<4°C	✓		✓	✓							
54047	B-3; 20-22'		0900		1	<4°C	✓		✓	✓							
54048	B-3; 30-32'		0930		1	<4°C	✓		✓	✓							
54049	B-1; 8-10'		1125		1				✓	✓							
54050	B-1; 13-15'		1135		2				✓	✓	✓						
54051	B-1; 20-21'		1205		1				✓	✓							
54052	B-2; 8-10'		1445						✓	✓							
54053	B-2; 13-15'		1455						✓	✓							
54054	B-2; 18-20		1510						✓	✓							

Relinquished By:	❿	Date: 11/16/95	Time: 15:00	Received By: FED EX		Date:	Time:
Relinquished By:		Date:	Time:	Received By:		Date:	Time:
Relinquished By:		Date:	Time:	Received By:		Date:	Time:
Method of Shipment:		Date:		Received for ERMI By:		Date: 11/17	Time:

See Reverse for Terms and Conditions

Revised 05/17/95

WHITE: Original to be returned with Report; YELLOW: ERMI copy; PINK: Customer Copy

C. L. SMITH
Manager, Safety & Environmental

Tel 713-363-7525
Fax 713-363-7595

September 11, 1995

Mark Ashley
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
2040 S. Pacheco
Santa Fe, NM 87505

Re: Closure Plan for the Septic System
BJ Services Facility, Artesia, NM

Dear Mr. Ashley:

Enclosed for your review and approval is the closure plan for the septic system at the referenced facility, required by the OCD as part of BJ Services discharge plan GW-190.

If you have any questions concerning the plan, please call me at 713-363-7500.

Sincerely,

C L Smith

C. L. Smith

RB/mkd

Enclosure

CLOSURE PLAN
FOR
THE SEPTIC SYSTEM

BJ SERVICES
ARTESIA, NEW MEXICO FACILITY

Prepared by

Brown and Caldwell

September 8, 1995

Table of Contents

CLOSURE PLAN FOR THE SEPTIC SYSTEM
BJ SERVICES FACILITY IN ARTESIA, NEW MEXICO

INTRODUCTION

In accordance with the requirements of discharge plan GW-190 for the BJ Services Facility in Artesia, New Mexico, BJ Services has developed this closure plan for the existing septic system for OCD approval. The Artesia facility is located in Eddy County, in the SE/4 SE/4, Section 32, Township 16 South, Range 26 East. The facility address is 2401 Sivley, Artesia, New Mexico, 88210. A site location and plan map are attached as Figures 1 and 2, respectively.

The septic system received wastewater from the floor drains in the truck maintenance area, an oil/water separator at the truck wash area and from sanitary wastewater sources such as sinks, showers and restrooms. BJ Services plans to keep the septic system in service only for the above-mentioned sanitary wastewater sources, pending the results of the closure activities.

This closure plan is prepared in accordance with a guidance document prepared by the OCD entitled Unlined Surface Impoundment Closure Guidelines (February 1993). In accordance with that guidance document, this closure plan contains the following elements:

- The procedures that will be used to conduct a soil and groundwater assessment and the circumstances under which a groundwater assessment will be conducted.
- The procedures that will be used to manage, remediate, or dispose of contaminated soil and groundwater.
- Reporting procedures that will be used to document the closure activities and obtain approval for final closure from the OCD.

SITE ASSESSMENT

BJ Services will perform a site assessment to determine the extent to which site soils/groundwater may have been impacted by operation of the septic system. The results of the site assessment will be used for evaluating the need for remediation and the type of closure best suited for the site. The site assessment will determine general site characteristics, soil/waste characteristics and groundwater quality.

General Site Characteristics

BJ Services will determine the depth to groundwater, defined as the vertical distance from the lowermost contaminants to the seasonal high water elevation of the groundwater. Depth to groundwater will be determined by reviewing reports of previous groundwater investigations at the site and regional and local groundwater reports published by state and federal agencies such as the USGS and the New Mexico Bureau of Mines and Mineral Resources. Information on groundwater quality will also be researched through local and state agencies. The depth of the lowermost contaminants will be determined from soil borings drilled as part of the site assessment.

BJ Services will determine the proximity of drinking water sources by performing a search of water wells within a one mile radius of the facility. The search will provide information (as available) such as the distance from the site to each well, well depth, water quality data and the purpose of the well. BJ Services will locate other drinking water sources such as lakes, springs or rivers by contacting the city water department of nearby municipalities.

The distance to nearby downgradient surface water bodies will be determined by review of a USGS topographic map for the area. Surface water bodies include rivers, creeks, ponds, lakes, irrigation canals and ditches. Site drainage patterns and off-site receptors of surface drainage will be determined from field observations and discussions with site personnel.

Soil/Waste Characteristics

BJ Services will test the soils/wastes within and beneath the septic system to evaluate the nature and extent of contamination. BJ Services will drill soil borings at the locations indicated in Figure 3. Groundwater flow direction is east-southeast, determined from wells previously installed at the site. The two borings located outside of the septic system boundary are downgradient. BJ Services may confirm groundwater flow direction prior to drilling by measuring water levels in the existing wells. The boring locations may be slightly field adjusted based on the measured flow direction.

Soil borings will be drilled to a depth of 5 feet below the deepest depth at which contamination is detected by observations (staining) and headspace analysis for organic

vapors by a photoionization or flame ionization device. Headspace analysis will be performed in accordance with the procedures outlined in the OCD guidance document. If signs of contamination are evident in the borings indicated in Figure 3, additional borings may be drilled, upon approval of BJ Services, by stepping out from these locations. The number and locations of the additional borings will be based on field observations and discussions with BJ Services personnel.

Soil samples will be visually classified according to the OCD guidance document as highly contaminated/saturated soils or unsaturated contaminated soils. Highly contaminated/saturated soils contain observable free petroleum hydrocarbons or immiscible phases and gross staining. The immiscible phase may range from a free hydrocarbon to a sheen on any associated aqueous phase. Unsaturated contaminated soils are those that are not highly contaminated as described above, but contain measurable concentrations of contaminants.

Samples from each boring will be collected continuously for the first six feet and then every five feet in two foot sample intervals, starting at the surface and ending five feet below the deepest depth at which contamination is detected (0-2 ft, 2-4 ft, 4-6 ft, 8-10 ft, 13-15 ft, etc.). Three samples from each boring will be sent to an off-site laboratory for analysis: the depth at which the highest organic vapor concentration is measured, the deepest location at which organic vapors are detected above background concentration, and from five feet below the deepest sample in which organic vapors are detected. All borings will be grouted to the surface upon completion with a cement/bentonite slurry.

All samples will be collected with decontaminated sampling equipment, placed in labeled jars, and shipped on ice overnight using chain of custody procedures to the off-site laboratory. Decontamination fluids (non-toxic degreasers and water) will be collected and decanted into the washbay oil/water separator for subsequent disposal in the septic system. Decontamination solids and drill cuttings will be placed near the septic system on plastic and covered, pending the results of sample analysis. Final disposal of the solids will be determined as part of the remedial evaluation included in the site assessment report.

The samples will be analyzed for BTEX by EPA Method 8020 and TPH by EPA Method 418.1. Also, a sample from the boring drilled within the septic system boundary will be analyzed for RCRA hazardous waste characteristics (TCLP analysis for pesticides and herbicides will not be performed as these chemicals were not used at the site). This RCRA sample will be chosen based on visual staining and the highest organic vapor measurements.

Groundwater Quality

A groundwater sample will be collected if the borings are drilled into saturated soil. The groundwater samples will be collected from the boring by inserting a section of screened PVC pipe into the hollow stem auger used to drill the boring and placing sand between

the screen and the auger. The auger will then be lifted above the bottom of the boring to allow water to collect in the screened pipe. The boring will be purged by bailing and discarding the water in the screened pipe three times. A sample will then be collected from inside the screened PVC pipe with a disposable bailer.

Groundwater wells will be installed as a second phase of the investigation only if the analysis of the groundwater samples indicated contamination, or if free product is observed in the groundwater sample. If required, BJ Services will include a plan for installing the wells and performing additional groundwater investigation in the site assessment report prepared after receiving analytical results of the initial soil/groundwater investigation.

The groundwater samples, if any, will be analyzed for BTEX by EPA Method 8020, TPH by EPA 418.1, and total dissolved solids by EPA Method 160.1.

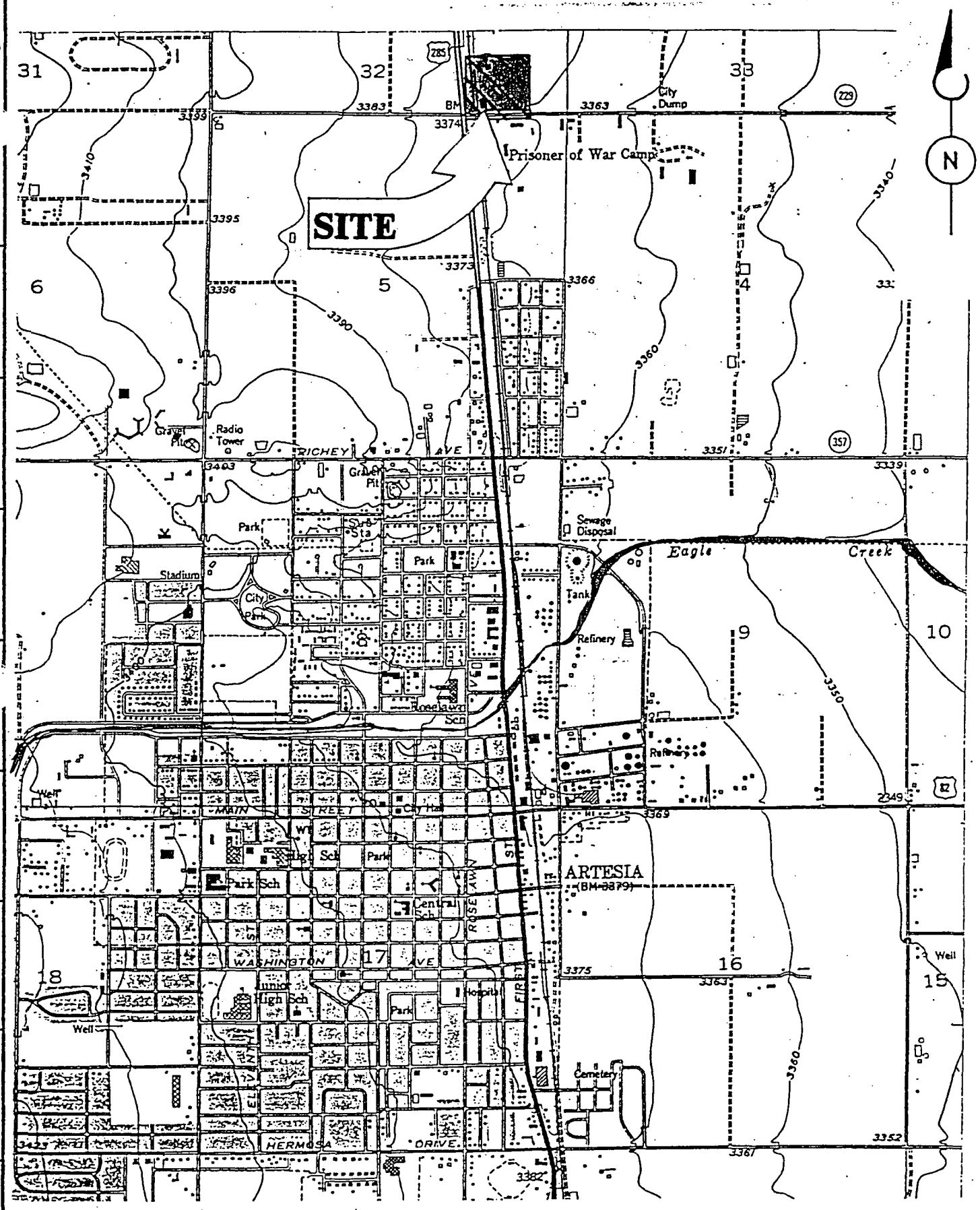
SITE ASSESSMENT REPORT

The field procedures and analytical results will be presented in a site assessment report to the OCD within 30 days of receiving analytical results. The sample results will be used to determine a ranking score, according to the OCD closure guidance document. BJ Services will present the ranking score in the site assessment report and propose further activities, such as additional investigation of groundwater or soil remediation, if needed.

The ranking score will establish the OCD recommended cleanup level for TPH in soil (100-5000 ppm). Benzene concentrations in soil exceeding 10 ppm and total BTEX concentrations in soil exceeding 50 ppm may require remediation. If the site assessment indicates additional investigation or remediation is not necessary, the report will propose no further action and BJ Services will request approval for final closure of the site.
BJ Services may propose alternate cleanup levels for OCD approval or propose no further action by conducting a risk-based evaluation of the site assessment data.

If remediation is necessary, feasible cleanup alternatives will be presented in the site assessment report. Alternatives include excavation and off-site disposal, landfarming or other in-situ treatment such as vapor sparging or bioremediation. BJ Services will not commence remediation until the OCD has reviewed and approved the recommended cleanup alternatives. A final closure report documenting closure activities and remediated soil contaminant concentrations would be prepared for OCD approval following any required site remediation.

FIGURES



Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

0 1000 2000
SCALE: 1" = 2000'

REV.	DESCRIPTION	BY	DATE

DRAWN BY: JDN DATE 2/16
CHK'D BY: JLC DATE 2/16
APPROVED: LWW DATE

TITLE: VICINITY MAP

CLIENT: WESTERN COMPANY OF NORTH AMERICA

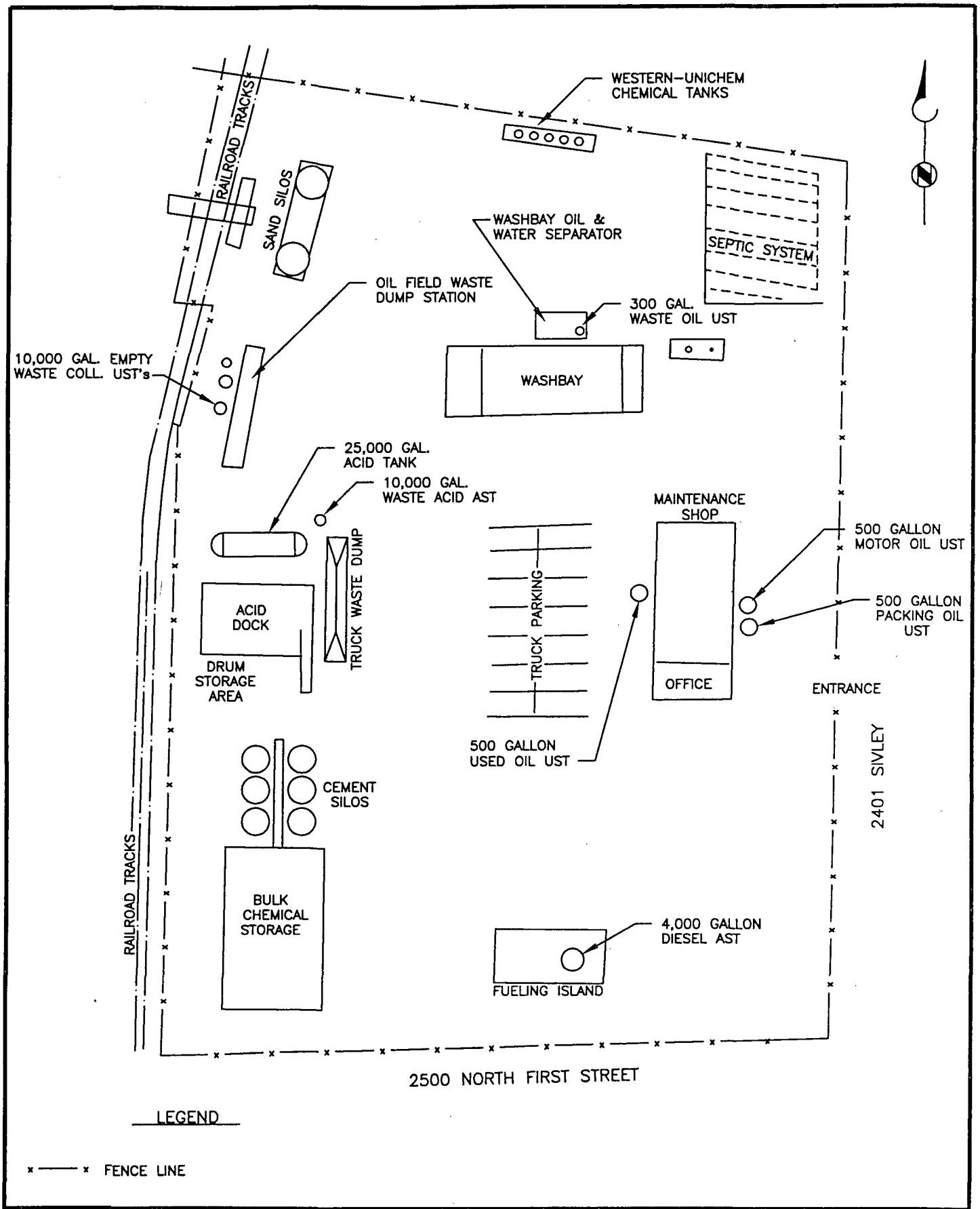
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 03/02/93

PROJECT NUMBER: 7440-01

FIGURE NUMBER: 1-1

E:\7440\7-01



T:\2988\ARTESIA 9/7/95 DHD

BROWN AND CALDWELL
HOUSTON, TEXAS

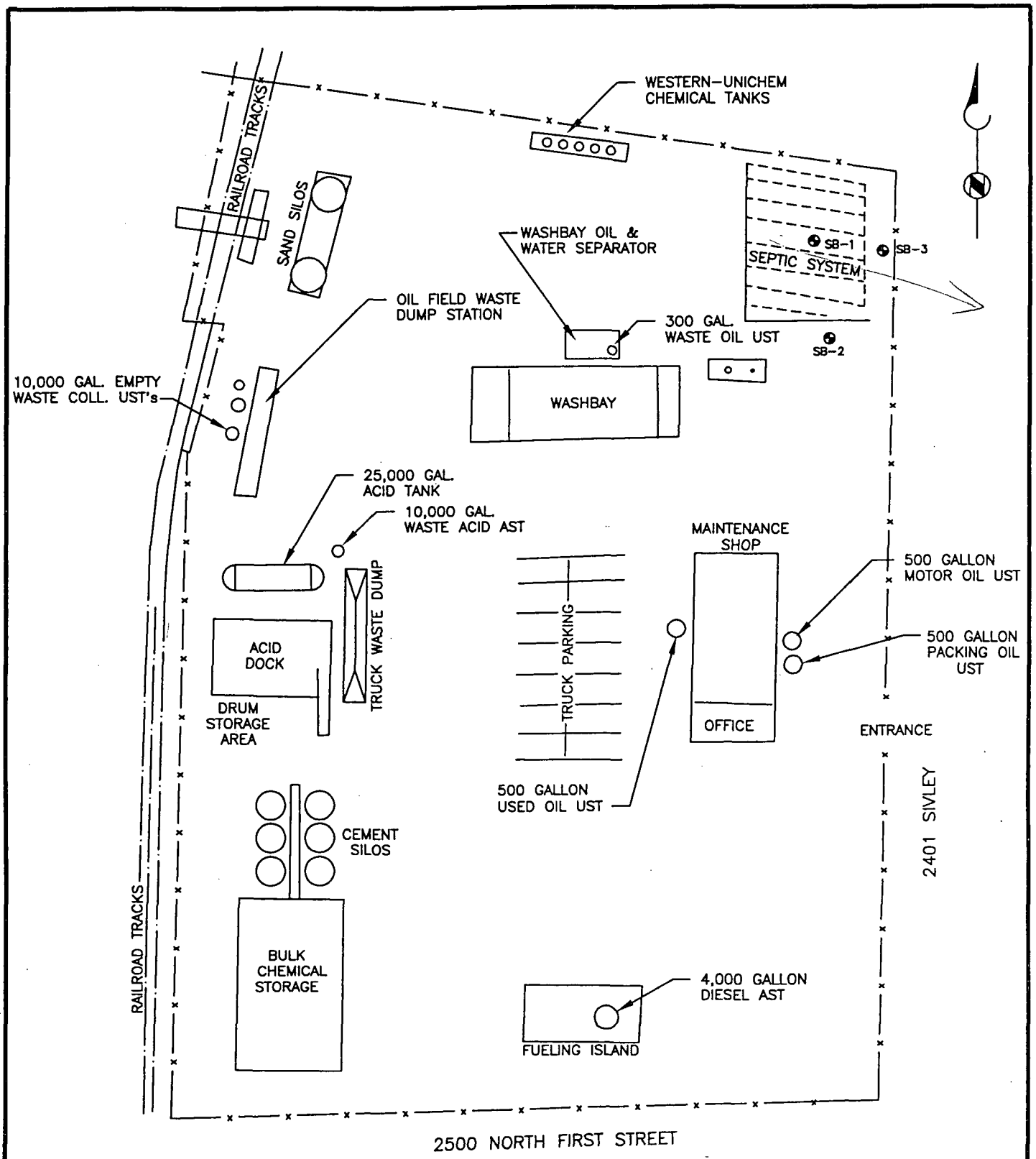
SUBMITTED: _____ DATE: _____
PROJECT MANAGER

APPROVED: _____ DATE: _____
BROWN AND CALDWELL

0 0 0
NOT TO SCALE

DRAWN BY: DHD DATE 9/10
CHK'D BY: _____ DATE _____
APPROVED: _____ DATE _____

TITLE: SITE PLAN	DATE: 9/7/95
CLIENT: BJ SERVICES COMPANY, U.S.A.	PROJECT NUMBER: 2988–05
SITE LOCATION: ARTESIA, NEW MEXICO	FIGURE NUMBER: 2



LEGEND

SB-2 SOIL BORING IDENTIFICATION AND LOCATION

x —— x FENCE LINE

NOTE: BORINGS SB-2 AND SB-3 APPROX. 10' FROM SEPTIC SYS. BOUNDARY SPACE LIMITATIONS PERMITTING.

T:\2988\ARTESIA 9/7/95 DHD

BROWN AND CALDWELL HOUSTON, TEXAS SUBMITTED: _____ DATE: _____ PROJECT MANAGER APPROVED: _____ DATE: _____ BROWN AND CALDWELL	0 0 0 NOT TO SCALE DRAWN BY: DHD DATE 9/7 CHK'D BY: ____ DATE ____ APPROVED: ____ DATE ____	TITLE: SITE PLAN WITH BORING LOCATIONS CLIENT: BJ SERVICES COMPANY, U.S.A. SITE LOCATION: ARTESIA, NEW MEXICO	DATE: 9/7/95 PROJECT NUMBER: 2988-05 FIGURE NUMBER: 3

MONITORING WELL SAMPLING EVENT

THE WESTERN COMPANY OF NORTH AMERICA

ARTESIA, NEW MEXICO
JANUARY 1994

BROWN AND CALDWELL

March 17, 1994

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

19-1149-10

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

Dear Ms. Brown:

On January 28, 1994, Brown and Caldwell conducted a groundwater monitoring well sampling event at The Western Company of North America (Western) facility located in Artesia, New Mexico. The sampling event was conducted in accordance with the State of New Mexico Oil Conservation Division (OCD) letter dated July 1, 1993. The following is a description of the activities conducted during this sampling event.

Prior to purging each monitoring well, the depth to groundwater was measured to the nearest 0.01 foot and recorded. A cumulative table of groundwater elevation data is presented in Enclosure 1, Table 1. The groundwater elevation data was used to calculate well purge volumes, as well as, to estimate groundwater gradient and flow direction. The groundwater flow direction in the vicinity of the monitoring wells continues to be generally west-southwest. Typical groundwater elevation is approximately 2.5 to 3.0 feet lower than measured in July 1993. Based on the current measurements, groundwater gradient is estimated to be approximately 0.02 feet per foot. A groundwater gradient and flow direction map is presented as Figure 1, Enclosure 1.

After depth to groundwater measurements were taken, each monitoring well was purged using

a 2-inch-diameter submersible pump. During the purging of each monitoring well, measurements were made of the pH, temperature, and specific conductivity of the purged groundwater. These measurements were taken at approximately one-half well volume intervals. Two consecutive measurements within five percent (for each of the three parameters) was used to indicated that groundwater parameters had stabilized.

The groundwater parameters in monitoring wells MW-1, MW-2, and MW-3 stabilized when approximately two well volumes had been removed; however, at least three well volumes were removed from these monitoring wells. Monitoring well MW-4 purged dry after approximately one and one-half well volumes were removed. After purging activities were completed, each monitoring well was allowed to recover to near static water level and a groundwater sample was obtained from each monitoring well.

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

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

Groundwater samples collected during this sampling event were analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) by EPA Method 8020 and polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8100.

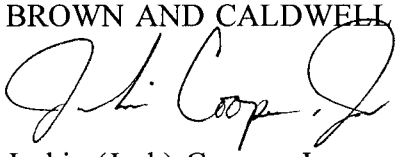
Benzene concentrations were reported in the groundwater samples from monitoring wells MW-1, at 1.8 micrograms per liter (µg/L), and MW-4 at 9.4 µg/L. Total benzene, toluene, ethylbenzene, and xylenes (BTEX) was reported in groundwater samples from each monitoring well. Concentrations of total BTEX ranged from 1.1 µg/L in MW-3 to 54.6 µg/L in MW-1. The reported concentrations are below the regulatory limits for groundwater established by the New Mexico Water Quality Control Commission (WQCC), published in the State of New Mexico-Energy, Minerals, and Natural Resources Department, Oil Conservation Division's "Environmental Regulations." Laboratory analytical reports indicated that all PAH analytes were

below laboratory detection limits. A Summary of Analytical Results for Groundwater Samples is included as Table 2, Enclosure 1. The laboratory analytical reports and chain of custody records are included as Enclosure 2.

The concentration of benzene detected in the sample obtained from MW-1 is near the WQCC standard. Concentrations of other BTEX constituents above the laboratory detection limits were identified in the other existing monitoring wells. Consequently, Brown and Caldwell recommends that another sampling event be conducted in July 1994. Since no PAH analytes above the laboratory detection limits were identified, Brown and Caldwell recommends that analysis of future groundwater samples be limited to BTEX constituents by EPA Method 8020 only.

If you have any questions or require additional information, please call me or Lynn Wright at (713) 759-0999.

Very truly yours,
BROWN AND CALDWELL



Jackie (Jack) Cooper, Jr.
Geologist

JLC:lms
Enclosures (2)

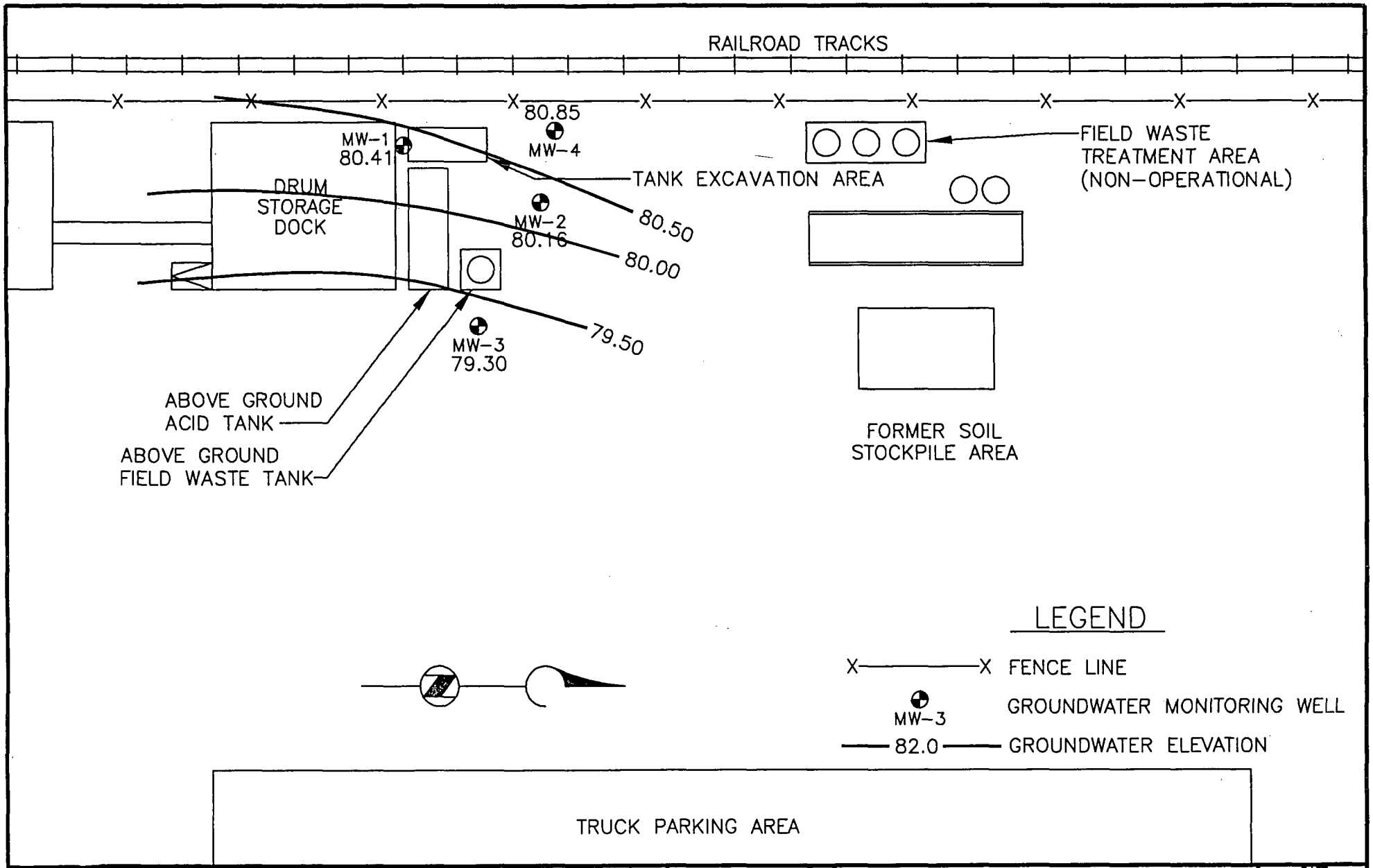
cc: Mr. Phillip Box, The Western Company of North America

ENCLOSURE 1

TABLE 1

THE WESTERN COMPANY OF NORTH AMERICA
ARTESIA, NEW MEXICO

Well Number and Date	Top of Casing Elevation	Depth to Water (feet)	Groundwater Elevation
MW-1			
April 21, 1993	95.82	12.74	83.08
July 18, 1993	95.82	12.74	83.35
January 28, 1994	95.82	15.41	80.41
MW-2			
April 21, 1993	96.40	13.70	82.70
July 18, 1993	96.40	13.35	83.05
January 28, 1994	96.40	16.24	80.16
MW-3			
April 21, 1993	96.09	14.53	81.56
July 18, 1993	96.09	14.22	81.87
January 28, 1994	96.09	16.79	79.30
MW-4			
April 21, 1993	96.07	13.05	83.02
July 18, 1993	96.07	12.08	83.99
January 28, 1994	96.07	15.22	80.85



BROWN AND CALDWELL HOUSTON, TEXAS APPROVED: L.M. WRIGHT DATE: PROJECT MANAGER APPROVED: ROBERT JENNINGS, PE DATE: BROWN AND CALDWELL	REV. / DESCRIPTION / BY / DATE	0 25 50 SCALE: 1" = 50' DRAWN BY: DHD DATE 1/4 CHK'D BY: JLC DATE 1/4 APPROVED: LMW DATE	TITLE: GROUNDWATER GRADIENT MAP JANUARY 28, 1994 CLIENT: THE WESTERN CO. OF NORTH AMERICA SITE LOCATION: ARTESIA, NEW MEXICO	DATE: 1/4/94 PROJECT NUMBER: 1149.10 FIGURE NUMBER: 1

T:\1149.10\FIG1

TABLE 2
Summary of Selected Laboratory Analyses For Groundwater Samples
The Western Company of North America
Artesia, New Mexico

Laboratory Analysis	Well Number			
	MW-1	**MW-2**	**MW-3**	**MW-4**
Volatile Organics EPA Method 8020 (µg/L)				
Benzene				
April 21, 1993	4.1	<0.5	<0.5	<0.5
July 18, 1993	3.3	<0.5	0.67	<0.5
January 28, 1994	1.8	<1.0	<1.0	9.4
Toluene				
April 21, 1993	<0.5	<0.5	<0.5	1.7
July 18, 1993	<0.5	<0.5	<0.5	<0.5
January 28, 1994	1.0	2.6	1.1	29.7
Ethylbenzene				
April 21, 1993	<0.5	<0.5	<0.5	<0.5
July 18, 1993	<0.5	<0.5	<0.5	<0.5
January 28, 1994	4.5	<1.0	<1.0	6.4
Xylenes				
April 21, 1993	32	<1.0	<1.0	<1.0
July 18, 1993	<1.0	<1.0	<1.0	<1.0
January 28, 1994	2.6	2.0	<1.0	9.1
Polynuclear Aromatic Hydrocarbons EPA Method 8270 (µg/L)				
2-Methylnaphthalene				
April 21, 1993	NA	NA	NA	NA
July 18, 1993	30	<5.0	<5.0	<5.0
Benzo(a)pyrene				
April 21, 1993	NA	NA	NA	NA
July 18, 1993	<5.0	<5.0	<5.0	<5.0
Naphthalene				
April 21, 1993	NA	NA	NA	NA
July 18, 1993	<5.0	<5.0	<5.0	<5.0
Polynuclear Aromatic Hydrocarbons EPA Method 8100 (µg/L)				
Benzo (a) pyrene				
January 28, 1993	<2.0	<2.0	<2.0	<2.0

µg/L = micrograms per liter
NA= Not analyzed for the indicated parameter.

ENCLOSURE 2

Inchcape Testing Services
NDRC Laboratories

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

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-4
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-1
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	1.8 µg/L
Toluene	1.0 µg/L	1.0 µg/L
Ethyl benzene	1.0 µg/L	4.5 µg/L
Xylenes	1.0 µg/L	2.6 µg/L
BTEX (total)		9.9 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	113 %

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

Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-4
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-1
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
PREPARATION METHOD : EPA 3520
PREPARED BY : FFL
PREPARED ON : 31-JAN-1994
ANALYSIS METHOD : EPA 8100 /1
ANALYZED BY : LW
ANALYZED ON : 1-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 10
QC BATCH NO : 8100_3520_010

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Acenaphthene	3.0 µg/L	< 3.0 µg/L
Acenaphthylene	6.0 µg/L	< 6.0 µg/L
Anthracene	7.0 µg/L	< 7.0 µg/L
Benzo(a)anthracene	11.0 µg/L	< 11.0 µg/L
Benzo(b)fluoranthene	17.0 µg/L	< 17.0 µg/L
Benzo(k)fluoranthene	3.0 µg/L	< 3.0 µg/L
Benzo(g,h,i)perylene	5.0 µg/L	< 5.0 µg/L
Benzo(a)pyrene	2.0 µg/L	< 2.0 µg/L
Chrysene	7.0 µg/L	< 7.0 µg/L
Dibenzo(a,h)anthracene	2.0 µg/L	< 2.0 µg/L
Fluoranthene	3.0 µg/L	< 3.0 µg/L
Fluorene	6.0 µg/L	< 6.0 µg/L
Indeno(1,2,3-cd)pyrene	2.0 µg/L	< 2.0 µg/L
Naphthalene	6.0 µg/L	< 6.0 µg/L

Inchcape Testing Services
NDRC Laboratories

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

REPORT NUMBER : D94-1064-4
ANALYSIS METHOD : EPA 8100 /1

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Phenanthrene	3.0 µg/L	< 3.0 µg/L
Pyrene	3.0 µg/L	< 3.0 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
2-Fluorobiphenyl	100 µg/L	83.9 %

Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-2
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-2
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	2.6 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	2.0 µg/L
BTEX (total)		4.6 µg/L #

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

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

Martin Jeffus
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-2
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-2
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
PREPARATION METHOD : EPA 3520
PREPARED BY : FFL
PREPARED ON : 31-JAN-1994
ANALYSIS METHOD : EPA 8100 /1
ANALYZED BY : LW
ANALYZED ON : 1-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 10
QC BATCH NO : 8100_3520_010

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Acenaphthene	3.0 µg/L	< 3.0 µg/L
Acenaphthylene	6.0 µg/L	< 6.0 µg/L
Anthracene	7.0 µg/L	< 7.0 µg/L
Benzo(a)anthracene	11.0 µg/L	< 11.0 µg/L
Benzo(b)fluoranthene	17.0 µg/L	< 17.0 µg/L
Benzo(k)fluoranthene	3.0 µg/L	< 3.0 µg/L
Benzo(g,h,i)perylene	5.0 µg/L	< 5.0 µg/L
Benzo(a)pyrene	2.0 µg/L	< 2.0 µg/L
Chrysene	7.0 µg/L	< 7.0 µg/L
Dibenzo(a,h)anthracene	2.0 µg/L	< 2.0 µg/L
Fluoranthene	3.0 µg/L	< 3.0 µg/L
Fluorene	6.0 µg/L	< 6.0 µg/L
Indeno(1,2,3-cd)pyrene	2.0 µg/L	< 2.0 µg/L
Naphthalene	6.0 µg/L	< 6.0 µg/L

Inchcape Testing Services
NDRC Laboratories

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

REPORT NUMBER : D94-1064-2
ANALYSIS METHOD : EPA 8100 /1

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Phenanthrene	3.0 µg/L	< 3.0 µg/L
Pyrene	3.0 µg/L	< 3.0 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
2-Fluorobiphenyl	100 µg/L	128 %

Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-3
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-3
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

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

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	112 %

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

Martin Jeffus
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-3
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-3
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
PREPARATION METHOD : EPA 3520
PREPARED BY : FFL
PREPARED ON : 31-JAN-1994
ANALYSIS METHOD : EPA 8100 /1
ANALYZED BY : LW
ANALYZED ON : 1-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 10
QC BATCH NO : 8100_3520_010

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Acenaphthene	3.0 µg/L	< 3.0 µg/L
Acenaphthylene	6.0 µg/L	< 6.0 µg/L
Anthracene	7.0 µg/L	< 7.0 µg/L
Benzo(a)anthracene	11.0 µg/L	< 11.0 µg/L
Benzo(b)fluoranthene	17.0 µg/L	< 17.0 µg/L
Benzo(k)fluoranthene	3.0 µg/L	< 3.0 µg/L
Benzo(g,h,i)perylene	5.0 µg/L	< 5.0 µg/L
Benzo(a)pyrene	2.0 µg/L	< 2.0 µg/L
Chrysene	7.0 µg/L	< 7.0 µg/L
Dibenzo(a,h)anthracene	2.0 µg/L	< 2.0 µg/L
Fluoranthene	3.0 µg/L	< 3.0 µg/L
Fluorene	6.0 µg/L	< 6.0 µg/L
Indeno(1,2,3-cd)pyrene	2.0 µg/L	< 2.0 µg/L
Naphthalene	6.0 µg/L	< 6.0 µg/L

Inchcape Testing Services
NDRC Laboratories

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

REPORT NUMBER : D94-1064-3
ANALYSIS METHOD : EPA 8100 /1

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Phenanthrene	3.0 µg/L	< 3.0 µg/L
Pyrene	3.0 µg/L	< 3.0 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
2-Fluorobiphenyl	100 µg/L	113 %

Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-1
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-4
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : RDG
ANALYZED ON : 2-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 32-020194

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	
Benzene	1.0 µg/L	9.4 µg/L	
Toluene	1.0 µg/L	29.7 µg/L	
Ethyl benzene	1.0 µg/L	6.4 µg/L	
Xylenes	1.0 µg/L	9.1 µg/L	
BTEX (total)		54.6 µg/L	#

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	109 %

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

Martin Jeffus dm
Martin Jeffus
General Manager

Inchcape Testing Services
NDRC Laboratories

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

DATE RECEIVED : 29-JAN-1994

REPORT NUMBER : D94-1064-1
REPORT DATE : 7-FEB-1994

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

SAMPLE MATRIX : Liquid
ID MARKS : MW-4
PROJECT : 1149-10 Artesia
DATE SAMPLED : 28-JAN-1994
PREPARATION METHOD : EPA 3520
PREPARED BY : FFL
PREPARED ON : 31-JAN-1994
ANALYSIS METHOD : EPA 8100 /1
ANALYZED BY : LW
ANALYZED ON : 1-FEB-1994
DILUTION FACTOR : 1
METHOD FACTOR : 10
QC BATCH NO : 8100_3520_010

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Acenaphthene	3.0 µg/L	< 3.0 µg/L
Acenaphthylene	6.0 µg/L	< 6.0 µg/L
Anthracene	7.0 µg/L	< 7.0 µg/L
Benzo(a)anthracene	11.0 µg/L	< 11.0 µg/L
Benzo(b)fluoranthene	17.0 µg/L	< 17.0 µg/L
Benzo(k)fluoranthene	3.0 µg/L	< 3.0 µg/L
Benzo(g,h,i)perylene	5.0 µg/L	< 5.0 µg/L
Benzo(a)pyrene	2.0 µg/L	< 2.0 µg/L
Chrysene	7.0 µg/L	< 7.0 µg/L
Dibenzo(a,h)anthracene	2.0 µg/L	< 2.0 µg/L
Fluoranthene	3.0 µg/L	< 3.0 µg/L
Fluorene	6.0 µg/L	< 6.0 µg/L
Indeno(1,2,3-cd)pyrene	2.0 µg/L	< 2.0 µg/L
Naphthalene	6.0 µg/L	< 6.0 µg/L

Inchcape Testing Services
NDRC Laboratories

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

REPORT NUMBER : D94-1064-1
ANALYSIS METHOD : EPA 8100 /1

POLYNUCLEAR AROMATIC HYDROCARBONS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Phenanthrene	3.0 µg/L	< 3.0 µg/L
Pyrene	3.0 µg/L	< 3.0 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
2-Fluorobiphenyl	100 µg/L	113 %

Martin Jeffus
Martin Jeffus
General Manager

CHAIN OF CUSTODY RECORD

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

4

Submitted by	Bill to	Lab use only
Name: Brown & Caldwell	Name: SAME	Due Date: Due 2/8/94!
Address: 1415 Louisiana, Ste. 2500 Houston, Tx 77002	Address:	RCRA ☑
Contact: Jack Cooper	Contact:	NPDES ☐
Phone: (713) 759-0999	Phone:	WEC2605FAEL
Fax: (713) 759-0952	Fax:	Section / Date
	PO/SO #:	

Proj. No.: 1149-10 Project Name: ARTESIA

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks	VOA	A/G 1 Lt.	250 ml	P/O	BTEX by 8020	PAHs by 610/8100	Lab. Sample ID
W	1-28-94	1110/1115		X	~~[illegible]~~ MW-4	2	1			X	X	1064-1-~~13~~
W	1-28-94	1125/1130		X	MW-2	2	1			X	X	2 ~~14~~
W	1-28-94	1140/1145		X	MW-3	2	1			X	X	3 ~~15~~
W	1-28-94	1155/1200		X	MW-1	2	1			X	X	4 ~~16~~

(No. of Containers[2])

FAXED

ORIGINAL

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

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

Remarks: Price per quote for Western Co. of North America projects.

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

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

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

THE WESTERN COMPANY OF NORTH AMERICA

Artesia, New Mexico Facility

Monitoring Well Sampling Event

December 15, 1993

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

Brown and Caldwell

Brown and Caldwell
Consultants

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

December 15, 1993

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

19-7440-04

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

Dear Ms. Brown:

During April 17 through 21, 1993, Brown and Caldwell (BC) conducted a soil and groundwater investigation at The Western Company of North America (Western) facility located in Artesia, New Mexico. Subsequently, the report "Soil and Groundwater Investigation, The Western Company of North America, Artesia, New Mexico," dated June 9, 1993, was submitted to The State of New Mexico Oil Conservation Division (OCD). Based on the analytical data and field observations, BC recommended that no further field investigations be conducted at the site. However, BC recommended that the existing monitoring wells be sampled in July 1993.

In a letter to Western, dated July 1, 1993, the OCD requested that the existing monitoring wells be sampled in July 1993 and January 1994. The OCD also requested, that for the July 1993 sampling event, groundwater samples should be analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) by EPA Method 8020 and polynuclear aromatic hydrocarbons (PAH) by EPA Method 8100. In the referenced letter the OCD stated that, if PAHs were not detected during the July 1993 sampling event, PAHs may be eliminated from the analyses during the January 1994 sampling event.

On July 18, 1993, BC personnel purged and sampled the four existing monitoring wells at the Western facility located in Artesia, New Mexico. The depth to groundwater was measured in each monitoring well prior to purging. The purging and sampling of the monitoring wells was accomplished using the same procedures as in the above mentioned investigation report with the

exception that a 2-inch-diameter submersible pump was used to purge the monitoring wells. After purging, a groundwater sample was collected from each monitoring well. The groundwater samples were labelled, placed on ice, and shipped via overnight delivery to BC Analytical in Glendale, California using proper chain of custody procedures.

Groundwater samples collected during this sampling event were analyzed for BTEX and PAHs. EPA Method 8020 was used to analyze for BTEX constituents. Because of a misinterpretation by BC Analytical EPA Method 8270 was used to analyze for PAHs. This analytical method includes all of the constituents listed in EPA Method 8100 which was requested by the OCD; however, EPA Method 8270 has higher detection limits.

Based on the analytical data for the four groundwater samples obtained form the Artesia facility, combined naphthalene and monomethylnaphthatlenes are slightly above the groundwater standards of 30 parts per billion (ppb) established by the New Mexico Water Quality Control Commission (WQCC). These standards were published in the State of New Mexico-Energy, Minerals, and Natural Resources Department, Oil Conservation Division's "Environmental Regulations." Due to the analytical methodology used to analyze for PAHs, the detection limit for benzo-a-pyrene was above the WQCC standard for this constituent. Therefore, it cannot be accurately determined whether benzo-a-pyrene was present in concentrations above the WQCC standard. Benzene was the only BTEX constituent identified. Concentrations of benzene ranged from 0.67 ppb in MW-3 to 3.3 ppb in MW-1. These levels are below the WQCC standard.

Because combined naphthalene and methylnaphthalenes were found in concentrations above WQCC standards and an adequate detection limits was not achieved for benzo-a-pyrene, BC recommends that the groundwater samples collected in January 1994 be analyzed for PAHs using EPA Method 8100. In addition, the groundwater samples should be analyzed for BTEX constituents by EPA Method 8020.

Included with this letter are the following enclosures:

ENCLOSURE 1

- Table 1--Summary of Groundwater Elevations
- Figure 1--Groundwater Gradient Map
- Table 2--Summary of Analytical Results for Groundwater Samples

ENCLOSURE 2

- Laboratory Analytical Reports for Groundwater Samples
- Chain of Custody Record

If you have any questions or require additional information, please call me or Lynn Wright at (713) 759-0999.

Very truly yours,

BROWN AND CALDWELL

Jackie (Jack) Cooper, Jr.
Geologist

JLC:tj
Enclosures (2)

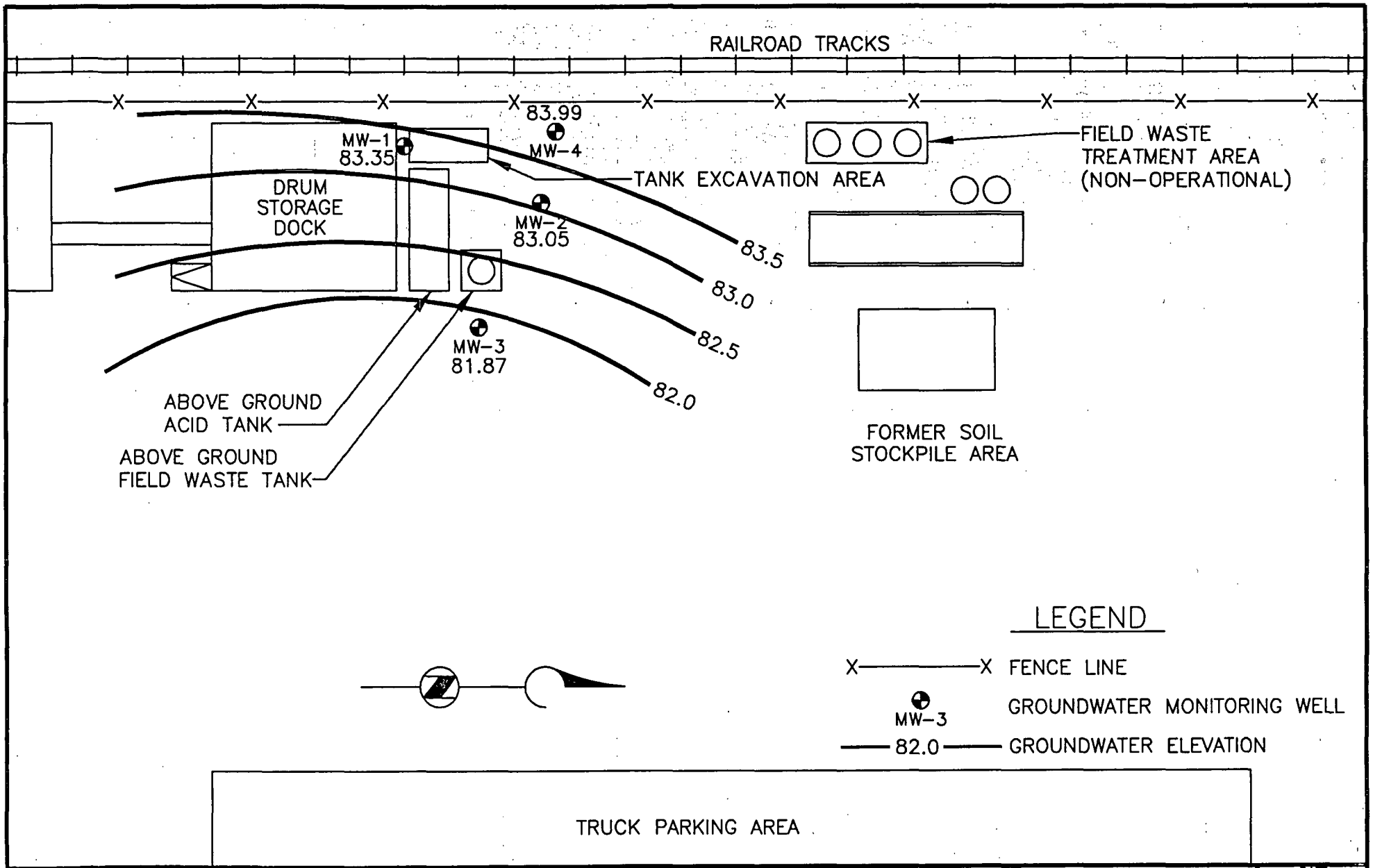
cc: Mr. Phillip Box, The Western Company of North America

ENCLOSURE 1

TABLE 1

THE WESTERN COMPANY OF NORTH AMERICA
ARTESIA, NEW MEXICO

Well Number and Date	Top of Casing Elevation	Depth to Water (feet)	Groundwater Elevation
MW-1			
April 21, 1993	95.82	12.74	83.08
July 18, 1993	95.82	12.74	83.35
MW-2			
April 21, 1993	96.40	13.70	82.70
July 18, 1993	96.40	13.35	83.05
MW-3			
April 21, 1993	96.09	14.53	81.56
July 18, 1993	96.09	14.22	81.87
MW-4			
April 21, 1993	96.07	13.05	83.02
July 18, 1993	96.07	12.08	83.99



Brown and Caldwell
Consultants
HOUSTON, TEXAS

APPROVED: L.M. WRIGHT PROJECT MANAGER DATE:

APPROVED: BROWN AND CALDWELL DATE:

REV.	DESCRIPTION	BY	DATE

0 25 50
SCALE: 1" = 50'

DRAWN BY: DHD DATE 10/8
CHK'D BY: JLC DATE 10/8
APPROVED: LMW DATE 10/8

TITLE: LOCATIONS OF GROUNDWATER MONITORING WELLS

CLIENT: THE WESTERN CO. OF NORTH AMERICA

SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 12/15/93

PROJECT NUMBER: 7440.04

FIGURE NUMBER: 1

T:\7440.04\7440-04

TABLE 2

Summary of Selected Laboratory
Analyses For Groundwater Samples
The Western Company of North America
Artesia, New Mexico

Laboratory Analysis	Well Number			
	MW-1	MW-2	MW-3	MW-4
Volatile Organics EPA Method 8020 (ug/L)				
Benzene				
April 21, 1993	4.1	<0.5	<0.5	<0.5
July 18, 1993	3.3	<0.5	0.67	<0.5
Toluene				
April 21, 1993	<0.5	<0.5	<0.5	1.7
July 18, 1993	<0.5	<0.5	<0.5	<0.5
Ethylbenzene				
April 21, 1993	<0.5	<0.5	<0.5	<0.5
July 18, 1993	<0.5	<0.5	<0.5	<0.5
Xylenes				
April 21, 1993	32	<1.0	<1.0	<1.0
July 18, 1993	<1.0	<1.0	<1.0	<1.0
Polynuclear Aromatic Hydrocarbons EPA Method 8270 (ug/L)				
2-Methylnaphthalene				
April 21, 1993	NA	NA	NA	NA
July 18, 1993	30	<5.0	<5.0	<5.0
Polynuclear Aromatic Hydrocarbons EPA Method 8270 (ug/L)				
Benzo(a)yrene*				
April 21, 1993	NA	NA	NA	NA
July 18, 1993	<5.0	<5.0	<5.0	<5.0
Naphthalene				
April 21, 1993	NA	NA	NA	NA
July 18, 1993	15	<5.0	<5.0	<5.0

ug/L = micrograms per liter = parts per billion.
NA= Not analyzed for the indicated parameter.
* = Detection limit is above regulatory limit for the indicated parameter.

ENCLOSURE 2

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-07-250

Received: 20 JUL 93

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
07-250-3	MW-3	18 JUL 93
07-250-4	MW-2	18 JUL 93
07-250-5	MW-4	18 JUL 93
07-250-6	MW-1	18 JUL 93

PARAMETER	07-250-3	07-250-4	07-250-5	07-250-6
Vol. Aromatics/EPA 8020				
Date Analyzed	07/27/93	07/27/93	07/27/93	07/28/93
Date Confirmed	07/27/93	07/27/93	07/27/93	07/28/93
Dilution Factor, Times	1	1	1	1
1,2-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
Benzene, ug/L	0.67	<0.5	<0.5	3.3
Chlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene, ug/L	<0.5	<0.5	<0.5	<0.5
Toluene, ug/L	<0.5	<0.5	<0.5	<0.5
Total Xylene Isomers, ug/L	<1	<1	<1	32

James C. Hein, Laboratory Director

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-10-036

Received: 05 OCT 93

Mr. Jack Cooper
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
10-036-2	MW-3	18 JUL 93
10-036-3	MW-2	18 JUL 93
10-036-4	MW-4	18 JUL 93
10-036-5	MW-1	18 JUL 93

PARAMETER	10-036-2	10-036-3	10-036-4	10-036-5
B/N,A Ext.Pri.Poll. (EPA 8270)				
Date Analyzed	07/23/93	07/23/93	07/23/93	07/23/93
Date Extracted	07/22/93	07/22/93	07/22/93	07/22/93
Dilution Factor, Times	1	1	1	1
1,2,4-Trichlorobenzene, ug/L	<5	<5	<5	<5
1,2-Dichlorobenzene, ug/L	<6	<6	<6	<6
1,2-Diphenylhydrazine, ug/L	<5	<5	<5	<5
1,3-Dichlorobenzene, ug/L	<5	<5	<5	<5
1,4-Dichlorobenzene, ug/L	<5	<5	<5	<5
2,4,5-Trichlorophenol, ug/L	<6	<6	<6	<6
2,4,6-Trichlorophenol, ug/L	<5	<5	<5	<5
2,4-Dichlorophenol, ug/L	<5	<5	<5	<5
2,4-Dimethylphenol, ug/L	<5	<5	<5	<5
2,4-Dinitrophenol, ug/L	<5	<5	<5	<5
2,4-Dinitrotoluene, ug/L	<5	<5	<5	<5
2,6-Dinitrotoluene, ug/L	<5	<5	<5	<5
2-Chloronaphthalene, ug/L	<6	<6	<6	<6
2-Chlorophenol, ug/L	<5	<5	<5	<5
2-Methyl-4,6-dinitrophenol, ug/L	<5	<5	<5	<5
2-Methylnaphthalene, ug/L	<5	<5	<5	30
2-Methylphenol (o-Cresol), ug/L	<5	<5	<5	<5
2-Nitroaniline, ug/L	<5	<5	<5	<5
2-Nitrophenol, ug/L	<5	<5	<5	<5
3,3'-Dichlorobenzidine, ug/L	<20	<20	<20	<20

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-10-036

Received: 05 OCT 93

Mr. Jack Cooper
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
10-036-2	MW-3	18 JUL 93
10-036-3	MW-2	18 JUL 93
10-036-4	MW-4	18 JUL 93
10-036-5	MW-1	18 JUL 93

PARAMETER	10-036-2	10-036-3	10-036-4	10-036-5
3-Nitroaniline, ug/L	<5	<5	<5	<5
4-Bromophenylphenylether, ug/L	<5	<5	<5	<5
4-Chloro-3-methylphenol, ug/L	<5	<5	<5	<5
4-Chloroaniline, ug/L	<5	<5	<5	<5
4-Chlorophenylphenylether, ug/L	<5	<5	<5	<5
4-Methylphenol (p-Cresol), ug/L	<8	<8	<8	<8
4-Nitroaniline, ug/L	<6	<6	<6	<6
4-Nitrophenol, ug/L	<5	<5	<5	<5
Acenaphthene, ug/L	<5	<5	<5	<5
Acenaphthylene, ug/L	<5	<5	<5	<5
Aniline, ug/L	<5	<5	<5	<5
Anthracene, ug/L	<5	<5	<5	<5
Benzidine, ug/L	<200	<200	<200	<200
Benzo(a)anthracene, ug/L	<5	<5	<5	<5
Benzo(a)pyrene, ug/L	<5	<5	<5	<5
Benzo(b)fluoranthene, ug/L	<5	<5	<5	<5
Benzo(g,h,i)perylene, ug/L	<5	<5	<5	<5
Benzo(k)fluoranthene, ug/L	<5	<5	<5	<5
Benzyl Alcohol, ug/L	<5	<5	<5	<5
Benzoic acid, ug/L	<50	<50	<50	<50
Butylbenzylphthalate, ug/L	<5	<5	<5	<5
Chrysene, ug/L	<5	<5	<5	<5
Di-n-octylphthalate, ug/L	<5	<5	<5	<5
Dibenzo(a,h)anthracene, ug/L	<5	<5	<5	<5

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-10-036

Received: 05 OCT 93

Mr. Jack Cooper
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
10-036-2	MW-3	18 JUL 93
10-036-3	MW-2	18 JUL 93
10-036-4	MW-4	18 JUL 93
10-036-5	MW-1	18 JUL 93

PARAMETER	10-036-2	10-036-3	10-036-4	10-036-5
Dibenzofuran, ug/L	<5	<5	<5	<5
Dibutylphthalate, ug/L	13	<5	5.6	6.4
Diethylphthalate, ug/L	<5	<5	<5	<5
Dimethylphthalate, ug/L	<5	<5	<5	<5
Fluoranthene, ug/L	<5	<5	<5	<5
Fluorene, ug/L	<5	<5	<5	<5
Hexachlorobenzene, ug/L	<5	<5	<5	<5
Hexachlorobutadiene, ug/L	<5	<5	<5	<5
Hexachlorocyclopentadiene, ug/L	<5	<5	<5	<5
Hexachloroethane, ug/L	<5	<5	<5	<5
Indeno(1,2,3-c,d)pyrene, ug/L	<7	<7	<7	<7
Isophorone, ug/L	<5	<5	<5	<5
N-Nitrosodimethylamine, ug/L	<6	<6	<6	<6
N-Nitrosodiphenylamine, ug/L	<5	<5	<5	<5
N-Nitrosodi-n-propylamine, ug/L	<6	<6	<6	<6
Nitrobenzene, ug/L	<5	<5	<5	<5
Naphthalene, ug/L	<5	<5	<5	15
Phenanthrene, ug/L	<5	<5	<5	<5
Phenol, ug/L	<5	<5	<5	<5
Pentachlorophenol, ug/L	<5	<5	<5	<5
Pyrene, ug/L	<5	<5	<5	<5
Pyridine, ug/L	<10	<10	<10	<10
Bis(2-chloroethoxy)methane, ug/L	<5	<5	<5	<5
Bis(2-chloroethyl)ether, ug/L	<5	<5	<5	<5

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-10-036

Received: 05 OCT 93

Mr. Jack Cooper
Brown and Caldwell Consultants
1415 Louisiana, Suite 2500
Houston, Texas 77002

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
10-036-2	MW-3	18 JUL 93
10-036-3	MW-2	18 JUL 93
10-036-4	MW-4	18 JUL 93
10-036-5	MW-1	18 JUL 93

PARAMETER	10-036-2	10-036-3	10-036-4	10-036-5
Bis(2-chloroisopropyl)ether, ug/L	<6	<6	<6	<6
Bis(2-ethylhexyl)phthalate, ug/L	<7	<7	<7	<7

James C. Hein, Laboratory Director

BCA

CHAIN OF CUSTODY RECORD

BCA Log Number G93-07-250

Client name: BC-Dallas	Project or PO#: 7440-02
Address: 2710 Stemmons Freeway, 1100 Tower North	Phone #: (214) 630-0001
City, State, Zip: Dallas, TX 75207	Report attention: Jack Cooper
Sampled by: J. P. Wiegand	

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	TCLP metals	TCLP volatiles	TCLP semi-volatiles	TPH by SHELL met	BCL Profile	BTEX by 8020	PAH by 8100	Hazardous sample Special handling required	Remarks
	7/18/93	1525	SO	SP-1 (western Yard-Artesia)	5	X	X	X	X	X	~~X~~	JPW		
	7/18/93	1545	GW	MW-3 (Western Yard-Artesia)	3						X	X		
	7/18/93	1600	GW	MW-2 (Western Yard-Artesia)	3						X	X		JPW
	7/18/93	1623	GW	MW-4 (Western Yard-Artesia)	3						X	X		
	7/18/93	1627	GW	MW-1 (Western Yard-Artesia)	3						X	X		
														Temp 6°C

	Signature	Print Name	Company	Date	Time
Relinquished by	J. Patrick Wiegand	J. PATRICK WIEGAND	Brown and Caldwell	7/19/93	1700
Received by	FED EX!				
Relinquished by					
Received by	Lab Susan Arrowsmith	ARROWSMITH	BC Analytical	7/20/93	9.30am
Relinquished by					
Received by Laboratory					

B C ANALYTICAL

- ☐ 1255 Powell Street, Emeryville, CA 94608 (415) 428-2300
- ☐ 801 Western Avenue, Glendale, CA 91201 (818) 247-5737
- ☐ 5000 Pacific Avenue, Anaheim, CA 92805 (714) 978-0113

Note: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client's expense.

Disposal arrangements: _____

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

12/14/1993 14:57 BCAL GLENDALE LAB 818 247 9797 P.02

TOTAL P.02

SOIL AND GROUNDWATER INVESTIGATION

THE WESTERN COMPANY OF NORTH AMERICA

ARTESIA, NEW MEXICO
FACILITY
JUNE 9, 1993

Brown and Caldwell
Consultants

Brown and Caldwell
Consultants

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

June 9, 1993

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

19-7440-03

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

Dear Ms. Brown:

On behalf of The Western Company of North America, Brown and Caldwell is submitting the enclosed Soil and Groundwater Investigation Report for the Artesia facility.

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

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Jackie (Jack) Cooper, Jr.
Geologist

JLC:el
Enclosure

cc: Mr. Phillip Box, The Western Company of North America, Houston, Texas
Oil Conservation Division District Office, Artesia, New Mexico

CONTENTS

LIST OF TABLES

LIST OF FIGURES

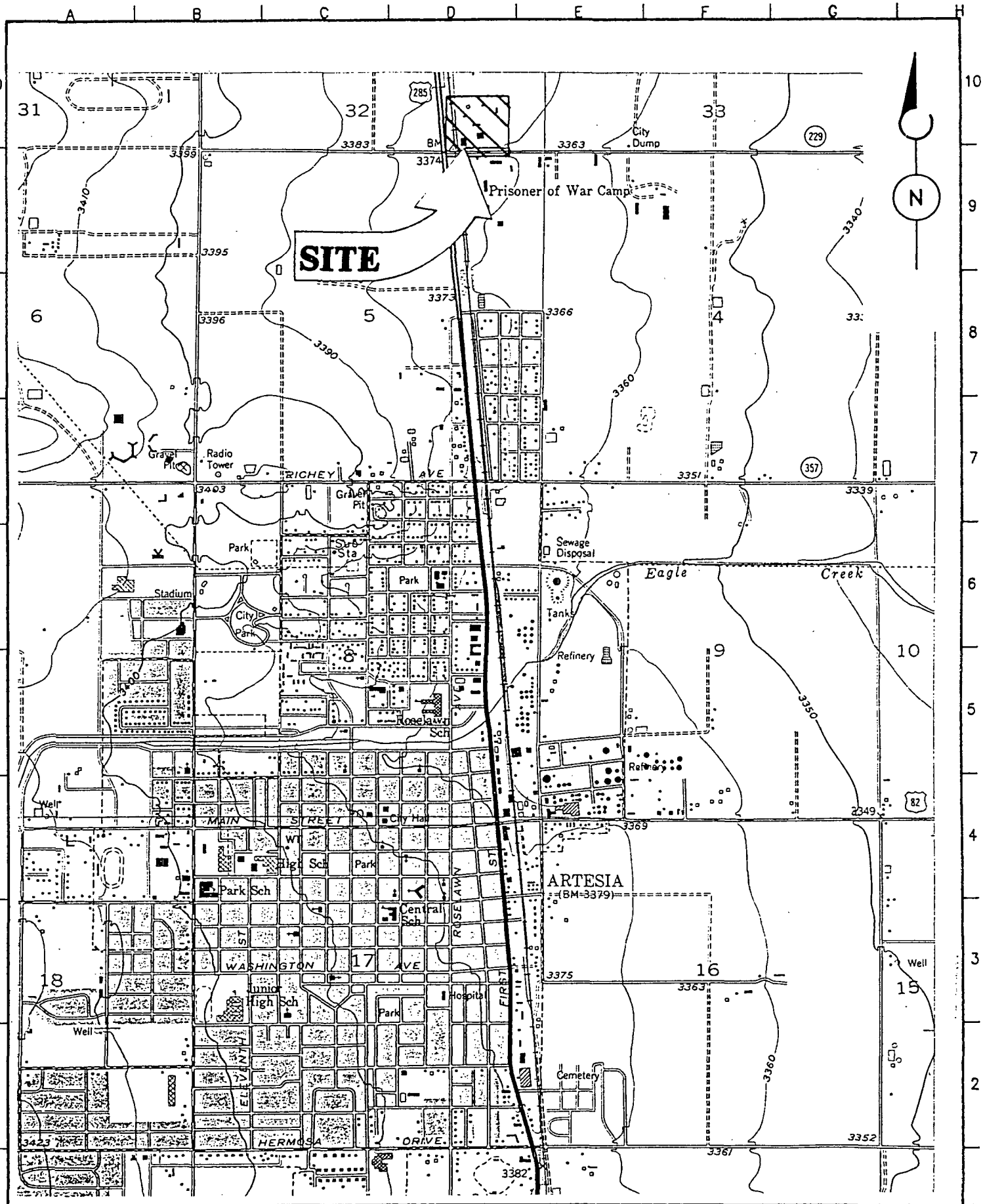
CHAPTER 1

EXECUTIVE SUMMARY

Brown and Caldwell Consultants (BCC) conducted a soil and groundwater investigation at The Western Company of North America (Western) Artesia, New Mexico facility. The facility is located at 2500 North First Street in Artesia, New Mexico (Figure 1-1). The purpose of these investigation activities was to define the horizontal and vertical extent of subsurface hydrocarbons at the facility and identify any water wells located within one-half (1/2) mile of the facility. The investigation activities consisted of drilling five (5) soil borings, converting four (4) of them into groundwater monitoring wells, soil and groundwater sampling, and conducting a water well search at the New Mexico State Engineer's office in Roswell, New Mexico.

Based on the soil and groundwater investigation, Total Petroleum Hydrocarbons (TPH) were detected in soil boring SB-1 only, at a concentration of 850 parts per million (ppm). Toxic Characteristic Leaching Procedure (TCLP) analyses of soil samples for volatile and extractable organics were below detection limits for all constituents. Metals detected by TCLP analyses were below federal limits published in 40 CFR 261.24 (Table 1-1). Benzene was detected in groundwater monitoring well MW-1 only, at a concentration of 4.1 parts per billion (ppb). Toluene was detected in MW-4 only, at a concentration of 1.7 ppb. Ethyl benzene was below detection limits in each of the groundwater monitoring wells. Total xylenes were detected in MW-1 only, at a concentration of 67.0 ppb. The groundwater gradient at the facility is approximately 0.02 feet per foot with a flow direction to the east-southeast. No water wells were located within one half (1/2) mile of the facility.

Based on analytical data and field observations, BCC recommends that no further field investigations be conducted. However, in order to verify data obtained from the April 21, 1993 groundwater sampling event, BCC recommends that the existing monitoring wells be sampled in July 1993.



Brown and Caldwell Consultants, DALLAS–HOUSTON, TEXAS	
SCALE: 1" = 2000' (0 1000 2000)	
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CHK'D BY: JLC DATE 5/17	
APPROVED: LMW DATE	
TITLE	VICINITY MAP
CLIENT	WESTERN COMPANY OF NORTH AMERICA
SITE LOCATION	ARTESIA, NEW MEXICO
DATE	06/09/93
PROJECT NUMBER	7440–03
FIGURE NUMBER	1–1

REV.	DESCRIPTION	BY	DATE

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CHAPTER 2

CHRONOLOGY OF EVENTS

A chronology of events associated with the emergency removal of the field waste tank and subsequent soil and groundwater investigations are presented in Table 2-1. Referenced regulatory correspondence is presented in Appendix A.

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

Date	Description of Event
July 29, 1992	Removal of field waste tank. Tank collapses during removal.
July 30, 1992	Tank pit overexcavated.. East, west, south walls, and floor soil sampled and one water sample collected.
August 4, 1992	Analytical results for soil and water samples submitted to the New Mexico Oil Conservation Division (OCD).
August 10, 1992	Verbal approval to backfill the excavation with clean soil granted by the OCD.
September 8, 1992	Excavation backfilled with clean soil.
October 21, 1992	Stockpiled soil disposed at Controlled Recovery, Inc. (CRI) on Highway 80/62, between Hobbs and Carlsbad, New Mexico.
January 29, 1993	OCD requests the submittal of a technical work plan to define the vertical and horizontal extent of affected soil and groundwater at the facility.
March 3, 1993	Soil and Groundwater Investigation Work Plan submitted to the OCD.
March 30, 1993	OCD approves work plan with modifications.
April 17 to 21, 1993	Soil and groundwater investigation conducted.

CHAPTER 3

TEXT

Background Information

On July 29, 1992, The Western Company of North America (Western) removed an underground field waste tank at the Artesia, New Mexico facility. During removal, the tank collapsed and released its contents into the tank pit. The liquid was pumped out of the tank pit by a vacuum truck and disposed by a licensed contractor. The tank pit was overexcavated and soil samples were taken from the south, east, and west walls and the floor of the excavation. A sample of the groundwater that had seeped into the bottom of the excavation was also collected. The analytical results of the soil and groundwater samples were submitted to the New Mexico Oil Conservation Division (OCD) for review on August 4, 1992. After obtaining approval from the OCD, the excavation was backfilled with clean soil, and the excavated soil was disposed at Controlled Recovery, Inc. (CRI) on Highway 82/60 between Hobbs and Carlsbad, New Mexico.

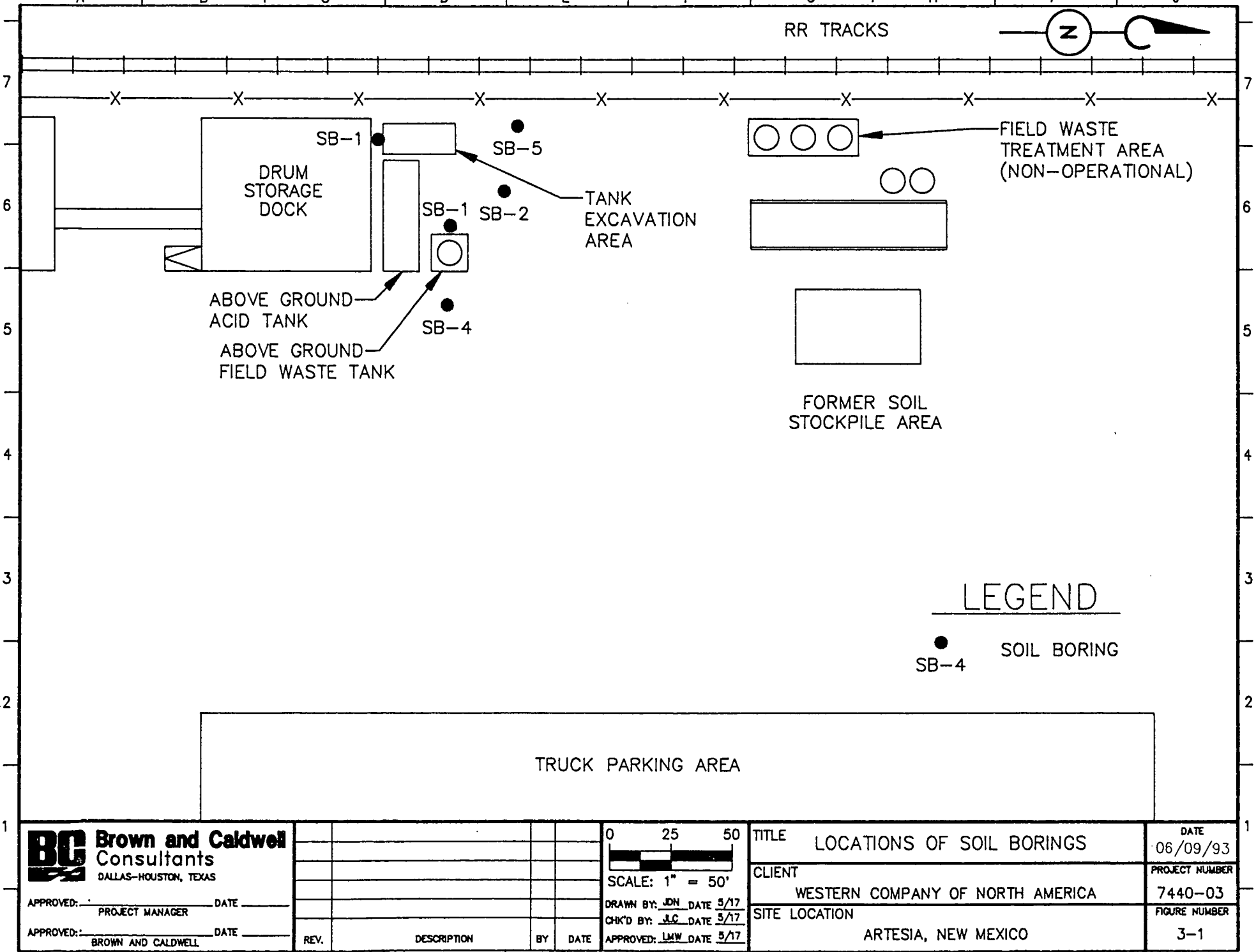
In a letter dated January 29, 1993, the OCD requested that a soil and groundwater investigation work plan be submitted for their approval. The purpose of this Soil and Groundwater Investigation Work Plan was to provide the OCD with information regarding field procedures, sample analyses, water well research procedures, and the scheduling proposed for the Artesia facility. The Soil and Groundwater Investigation Work Plan was submitted by Brown and Caldwell Consultants (BCC) on March 3, 1993, and received OCD approval on March 30, 1993. Relevant regulatory correspondence for the Artesia facility is presented in Appendix A.

SOIL INVESTIGATION

On April 14 through April 20, 193, BCC completed five soil borings by hollow-stem auger drilling methods. The following is a description of the drilling, sampling, and laboratory results of the soil borings at the Artesia facility.

Soil Boring Drilling and Sampling

From February 3 through February 6, 1993, BCC completed five soil borings. The locations of four of the borings were proposed in the March 3, 1993, work plan and approved by the OCD in a letter dated March 30, 1993. The fifth soil boring was added by verbal approval of the OCD on April 19, 1993. Each soil boring was drilled and continuously sampled to a depth of approximately 26.0 feet. The borings were drilled using hollow-stem-auger drilling methods. Soil samples were collected using a 1.5-inch-diameter split spoon sampler. The locations of the borings are presented on Figure 3-1. Borehole logs prepared for each location are presented in Appendix B.



Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

APPROVED: _____ DATE _____
PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

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0 25 50
SCALE: 1" = 50'
DRAWN BY: JDN DATE 5/17
CHK'D BY: JLC DATE 5/17
APPROVED: LMW DATE 5/17

TITLE: LOCATIONS OF SOIL BORINGS
CLIENT: WESTERN COMPANY OF NORTH AMERICA
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 06/09/93
PROJECT NUMBER: 7440-03
FIGURE NUMBER: 3-1

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Two samples from each boring were selected for laboratory analysis. In each boring the sample with the highest photoionization detector (PID) reading and the sample from the soil-water interface were selected for analyses except in SB-2 and SB-5. In these two borings, no organic vapors were detected; therefore, the samples from the bottom of the borings were submitted for laboratory analyses. 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 PID probe and an organic vapor reading was taken. This procedure for measuring organic vapors in a headspace is known as the ambient temperature headspace (ATH) method (Van Zyl, 1987). Organic vapor readings are presented on the boring logs in Appendix B. At the conclusion of the sampling, the cooled samples were shipped via overnight delivery to BC Analytical in Glendale, California 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 west property fence on-site to await 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 the highest 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 summary of the selected analytical results for the 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 indicated that total volatile organics were below detection limits. Total Petroleum Hydrocarbons (TPH) was detected in SB-1 only, at a concentration of 850 parts per million (ppm). The other soil samples were below the detection limit of 5.0 ppm for TPH.

TCLP analyses indicated that concentrations of volatile and extractable organics were below detection limits in SB-1 and SB-4 soil samples. TCLP analyses for metals indicated arsenic concentrations of 0.078 ppm in SB-1 and 0.059 ppm in SB-4. Selenium was detected in SB-1 at a concentration of 0.13 ppm. Barium concentrations ranged from 0.48 ppm in SB-1 and 0.57 ppm in SB-4. These concentrations for each detectable constituent were below standards for Maximum Concentration of Contaminants for the Toxicity Characteristic (40 CFR 264.24, Table 1).

Table 3-1 Summary of Selected Laboratory Analyses Results for Soil Samples
The Western Company of North America
Artesia, New Mexico Facility

Laboratory Analyses	Soil Boring Sample							
	SB-1-3 (8-10 ft)	SB-1-10 (22-24 ft)	SB-2-11 (24-26 ft)	SB-3-7 (16-18 ft)	SB-3-10 (22-24 ft)	SB-4-6 (14-16 ft)	SB-4-10 (22-24 ft)	SB-5-9 (20-22 ft)
EPA 8020 (ug/Kg) Volatile Organics	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
EPA Modified 8015 (mg/Kg) TPH (Diesel fraction)	850	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
EPA 8240 (ug/L) TCLP Volatile Organics	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
EPA 8270 (ug/L) TCLP Extractable Organics	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
EPA 6010 or EPA 7470 (mg/L) TCLP Metals								
Mercury	<0.08	N/A	N/A	N/A	N/A	<0.08	N/A	N/A
Arsenic	0.078	N/A	N/A	N/A	N/A	0.059	N/A	N/A
Selenium	0.13	N/A	N/A	N/A	N/A	<0.01	N/A	N/A
Lead	<0.05	N/A	N/A	N/A	N/A	<0.05	N/A	N/A
Silver	<0.01	N/A	N/A	N/A	N/A	<0.01	N/A	N/A
Barium	0.48	N/A	N/A	N/A	N/A	0.57	N/A	N/A
Cadmium	<0.02	N/A	N/A	N/A	N/A	<0.02	N/A	N/A
Chromium	<0.03	N/A	N/A	N/A	N/A	<0.03	N/A	N/A

ug/Kg= micrograms per kilogram = parts per billion
mg/Kg= milligrams per kilogram = parts per million
ug/L= micrograms per liter = parts per billion
mg/L= milligrams per liter = parts per million
BDL= below detection limits
N/A= not analyzed for the indicated parameter(s)

GROUNDWATER INVESTIGATION

On April 17 through April 20, 1993, BCC installed groundwater monitoring wells in four of the newly drilled soil borings. On April 21, BCC developed, purged, and sampled the four newly installed groundwater monitoring wells. The following is a description of the installation, development, purging, and sampling of the newly installed groundwater monitoring wells.

Monitoring Well Installation

Each well consisted of approximately 2.5 feet of 4-inch-diameter schedule 40 PVC blank casing, to act as a sump for the collection of fine sediments, followed by 15 feet of 4-inch-diameter Schedule 40 PVC slotted casing (0.01-inch slots). The slotted PVC was followed by 10 feet of 4-inch-diameter Schedule 40 PVC solid casing. Each section of casing was joined using threaded, flush-mounted connections.

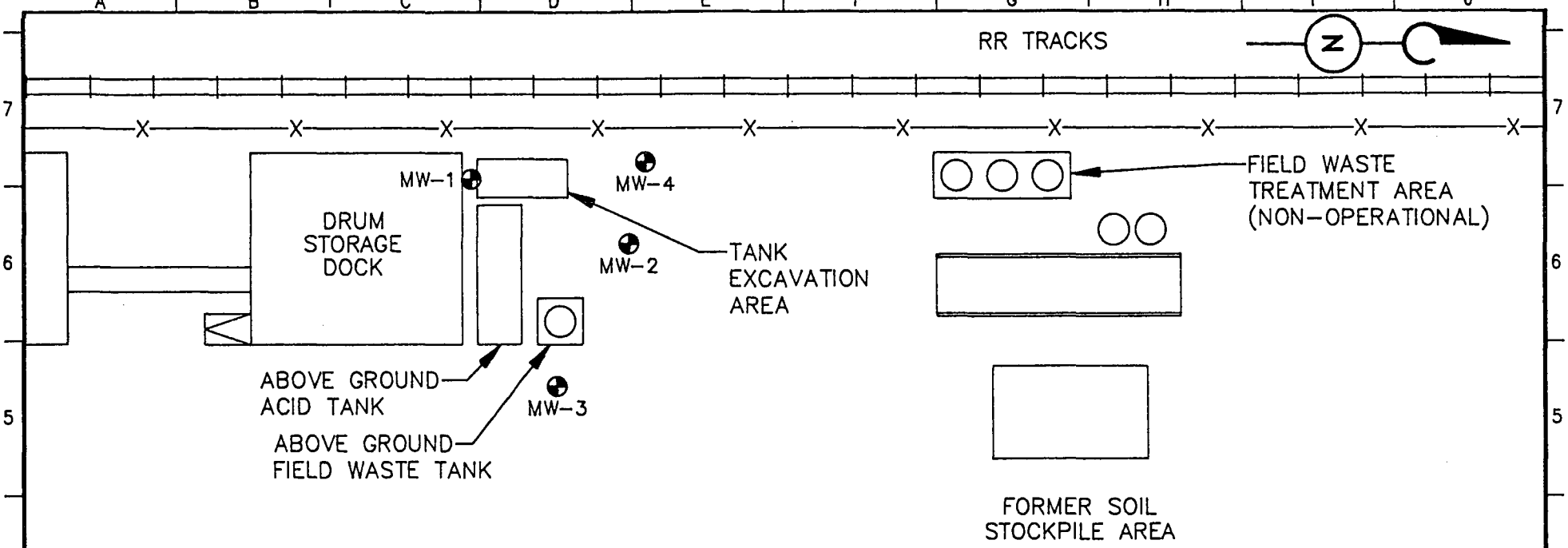
Silica sand (20-40 grain size) was slowly poured down the borehole to provide a filter pack. The filter pack extends approximately two feet above the top of the screened interval and this depth was verified by measurement. Approximately two feet of bentonite pellets were poured down the borehole immediately 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.

All monitoring wells were completed as at-grade completions. The 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 four newly installed groundwater monitoring wells can be found on Figure 3-2.

The four newly installed groundwater monitoring wells were developed to remove fine sediments from the bottom of the well. Development was accomplished by using a clean PVC bailer to evacuate water from each well until clear water was achieved. Approximately 11 gallons were removed from MW-1. Approximately 18 gallons, 15 gallons, and 12 gallons were removed from MW-2, MW-3, and MW-4 respectively. The evacuated water was placed in the on-site field waste tanks.

Monitoring Well Sampling

Groundwater samples for laboratory analysis were collected from the newly installed groundwater monitoring wells on February 21, 1992. Prior to sample collection, a clean PVC bailer was used to purge each well. Approximately 3 well volumes of water were removed and the pH, temperature, and specific conductance stabilized (two consecutive readings in each well). After purging the groundwater monitoring wells, they were allowed to recharge until static water level was achieved.



Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

APPROVED: _____ DATE _____
PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

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SCALE: 1" = 50'
DRAWN BY: JDN DATE 5/17
CHK'D BY: JLC DATE 5/17
APPROVED: LMW DATE 5/17

TITLE: LOCATIONS OF GROUNDWATER MONITORING WELLS
CLIENT: WESTERN COMPANY OF NORTH AMERICA
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 06/09/93
PROJECT NUMBER: 7440-03
FIGURE NUMBER: 3-2

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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 BC Analytical in Glendale, California using proper chain-of-custody procedures.

Groundwater Sample Analysis

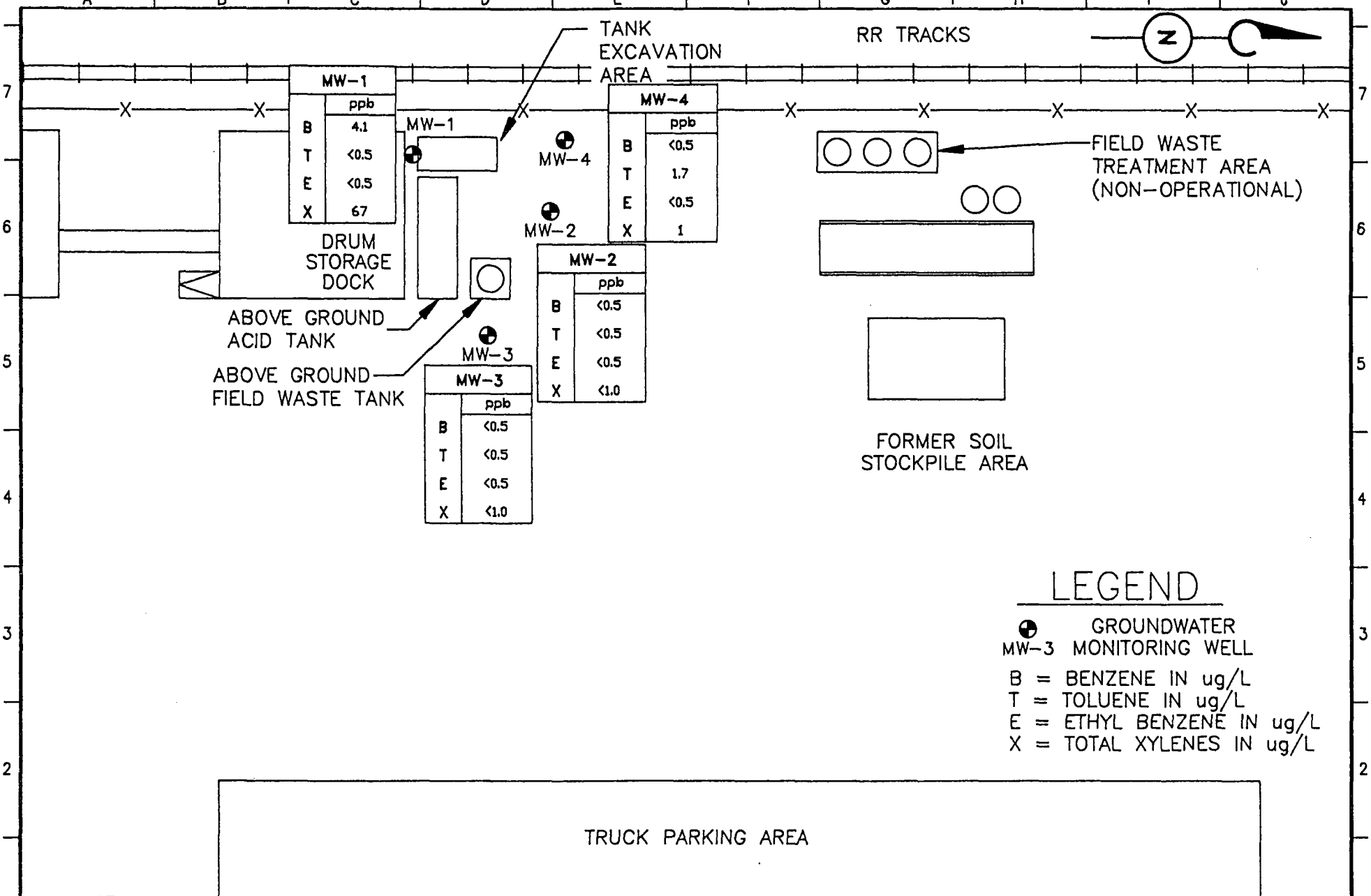
The four groundwater samples were analyzed for BTEX constituents by EPA Method 8020. A summary of the analytical results for the April 21, 1993, groundwater samples are presented in Table 3-2. BTEX concentrations may also be found on the Dissolved-Phase Concentration Map (Figure 3-3). Laboratory analytical reports are presented in Appendix D.

The results of the groundwater samples analyzed by EPA Method 8020 indicated that benzene and xylenes were detected in MW-1 only, at concentrations of 4.1 ppb and 67.0 ppb, respectively. Toluene was detected in MW-4, at a concentration of 1.7 ppb. All other constituents were below detection limits in all monitoring wells.

Table 3-2 Summary of Laboratory Analysis Results for Groundwater Samples
The Western Company of North America
Artesia, New Mexico Facility

Laboratory Analysis	Well Number			
	MW-1	MW-2	MW-3	MW-4
EPA 8020 (ug/L) Volatile Organics				
1,2 Dichlorobenzene	<0.5	<0.5	<0.5	<0.5
1,3 Dichlorobenzene	<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	<0.5	<0.5	<0.5	<0.5
Benzene	4.1	<0.5	<0.5	<0.5
Chlorobenzene	<0.5	<0.5	<0.5	<0.5
Ethyl benzene	<0.5	<0.5	<0.5	<0.5
Toluene	<0.5	<0.5	<0.5	1.7
Total xylenes	67.0	<1.0	<1.0	<1.0

ug/L= micrograms per Liter = parts per billion



LEGEND

MW-3 GROUNDWATER MONITORING WELL

B = BENZENE IN ug/L
T = TOLUENE IN ug/L
E = ETHYL BENZENE IN ug/L
X = TOTAL XYLENES IN ug/L

Brown and Caldwell Consultants
DALLAS–HOUSTON, TEXAS

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

REV.	DESCRIPTION	BY	DATE

0 25 50
SCALE: 1" = 50'
DRAWN BY: JDN DATE 5/17
CHK'D BY: JLC DATE 5/17
APPROVED: LMW DATE 5/17

TITLE: DISSOLVED-PHASE CONCENTRATION MAP
CLIENT: WESTERN COMPANY OF NORTH AMERICA
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 06/09/93
PROJECT NUMBER: 7440-03
FIGURE NUMBER: 3-3

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Determination of Groundwater Flow Direction and Gradient

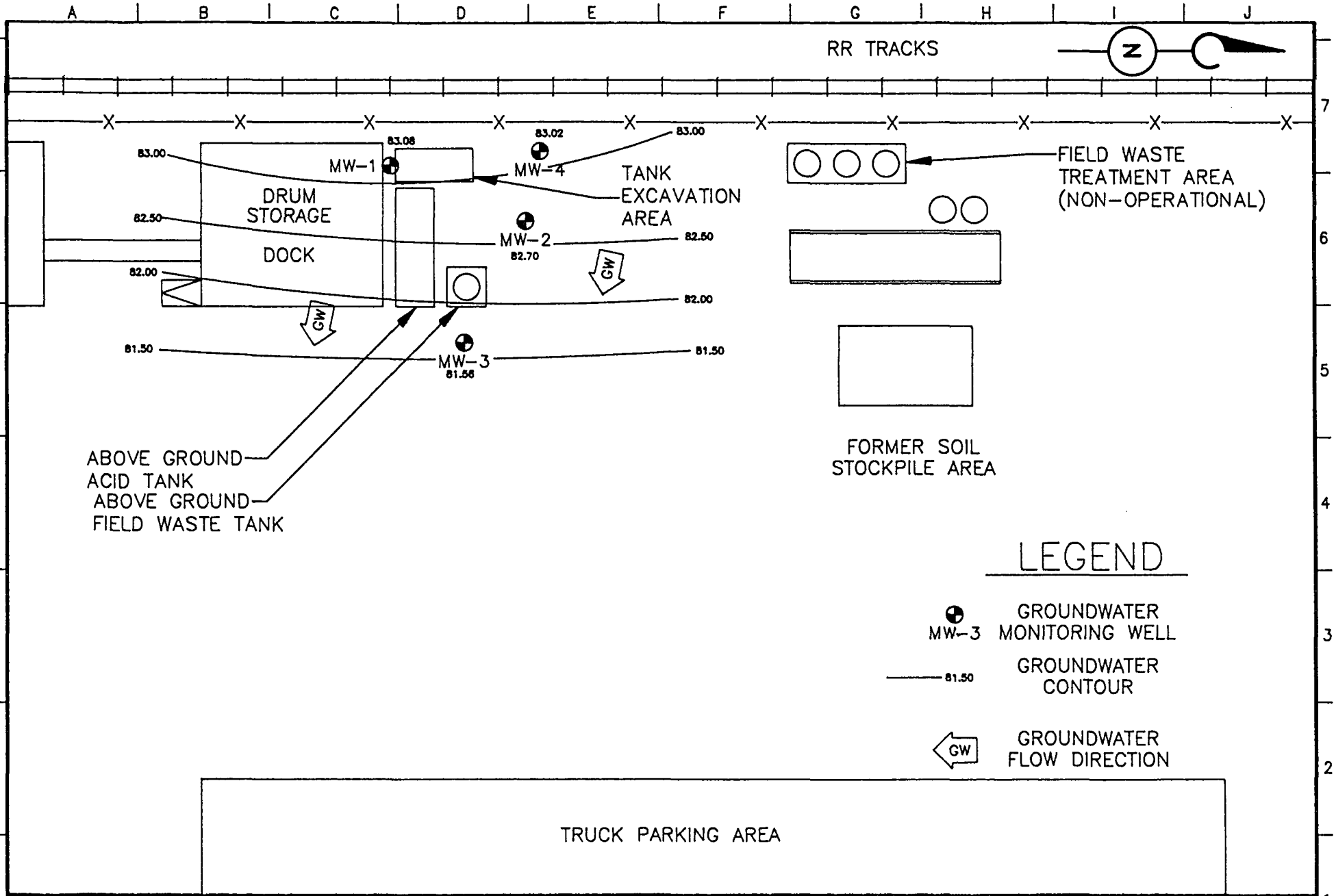
On April 21, 1993, BCC recorded groundwater level measurements in each of the four groundwater monitoring wells. To identify the presence or absence of phase-separated hydrocarbons, a dual interface probe (Marine Moisture Control Company Model D-2401-2UI) was used for the groundwater level measurements. All readings were measured relative to the survey marks on the top of each well casing which were established by a survey conducted on April 21, 1993, by BCC. The benchmark (relative elevation of 100.00 feet) was defined as the northwest corner of the drum storage dock and all top casing elevations were surveyed relative to that point. All data was recorded to the nearest 0.01 foot. No phase-separated hydrocarbons were identified in any of the monitoring wells. Groundwater elevation data for April 21, 1993 is presented in Table 3-3. The groundwater flow direction at the site is to the east-northeast with a gradient of <0.01 feet per foot. Figure 3-4 presents the Groundwater Gradient Map for the Western Facility in Artesia, New Mexico.

Table 3-3 Groundwater Elevation Data
The Western Company of North America
Artesia, New Mexico Facility

Well Number	Top of Casing Elevation	Depth to Water (feet)	Groundwater Elevation
MW-1	95.82	12.74	83.08
MW-2	96.40	13.70	82.70
MW-3	96.09	14.53	81.56
MW-4	96.07	13.05	83.02

WATER WELL SEARCH

In the letter to Western dated January 29, 1993, the OCD requested that a water well search be conducted to identify all water wells within one-half (1/2) mile of the facility. This water well search included well locations (by quarter/quarter section), well depth, water level, water quality, and use of each well. BCC personnel conducted this search at the State Engineer's office in Roswell, New Mexico on February 21, 1993. No existing water wells within one-half (1/2) mile of the facility were identified. A copy of the computer printout obtained from the state Engineer's office is presented in Appendix E.



Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

APPROVED: _____ DATE _____
PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

REV.	DESCRIPTION	BY	DATE

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SCALE: 1" = 50'
DRAWN BY: JDN DATE 5/17
CHK'D BY: JLC DATE 5/17
APPROVED: LMW DATE 5/17

TITLE: GROUNDWATER GRADIENT MAP, APRIL 21,1993
CLIENT: WESTERN COMPANY OF NORTH AMERICA
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 06/09/93
PROJECT NUMBER: 7440-03
FIGURE NUMBER: 3-4

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CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Based on information obtained during this soil and groundwater investigation, Brown and Caldwell consultants (BCC) presents the following conclusions and recommendations for The Western Company of North America (Western) Artesia, New Mexico facility.

Conclusions

Based on field investigations and laboratory analytical results:

- Concentrations of volatile organics are below detection limits in all soil samples selected for analysis.
- TPH was detected in soil boring SB-1 only, at a concentration of 850 parts per million (ppm).
- TCLP analyses for volatile and extractable organics in the soil samples indicated that all constituents were below detection limits.
- TCLP analyses for metals in the soil samples indicated that concentrations of detectable metals were below standards for Maximum Concentration of Contaminants for the Toxicity Characteristic (40 CRF 261.24, Table 1).
- Detectable volatile organic constituents in groundwater samples were below New Mexico Water Quality Control Commission standards published in the New Mexico Oil Conservation Division's manual, "Environmental Regulations."
- Based on this investigation, BCC has determined that the groundwater gradient is 0.02 feet per foot and has a flow direction toward the east-southeast.
- Based on records obtained from the New Mexico State Engineer's office, no water wells are located within one-half (1/2) mile of the facility.

Recommendations

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

- No further field investigations should be conducted at the Artesia, New Mexico facility.
- In order to verify the data obtained during the April 21, 1993 sampling event, the recently installed monitoring wells should be sampled again in July 1993.

APPENDIX A

REGULATORY CORRESPONDENCE

Brown and Caldwell
Consultants

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

August 4, 1992

Mr. Roger Anderson
New Mexico Energy Minerals and
Natural Resources Department
Oil Conservation Division
P. O. Box 2088
Santa FE, New Mexico 87504

19-7059-10

Subject: Soil and Water Sample Results
The Western Company of North America
Artesia, New Mexico Facility

Dear Mr. Anderson:

As discussed during our telephone conversation on July 29, 1992, Brown and Caldwell Consultants (BCC), on behalf of the Western Company of North America (WCNA), is submitting the attached analytical results from water and soil samples collected at the WCNA facility. The samples were collected during emergency removal activities of an underground field waste tank at the facility.

Four soil samples and one water sample were collected to verify cleanup of affected material had been achieved (see attached sample location map). The water sample was collected at the bottom of the tank pit from water seeping into the excavation. Soil samples were collected from the walls and floor of the excavation. No sample was collected from the north side of the excavation because this sidewall was removed to allow equipment access to the tank pit.

Your review and comments regarding the attached analytical results as well as future considerations for final closure of the field waste tank will be appreciated. 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

Lynn M. Wright
Project Manager

LMW:mae

cc/attach: Mr. Phillip Box, Western Company of North America, Houston, TX
Mr. Teddy Gandy, Western Company of North America, Hobbs, NM

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

January 29, 1993

RECEIVED
FEB 02 1993
REAL ESTATE AND
FACILITIES CONSTRUCTION

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-937

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

RE: Artesia Service Facility
Soil & Groundwater Contamination Investigation
Eddy County, New Mexico

Dear Mr. Box:

The New Mexico Oil Conservation Division (OCD) has received the August 4, 1992, analytical results from water and soil samples collected at the Western Company of North America's (WCNA) Artesia Service Facility submitted by Brown and Caldwell Consultants on behalf of the WCNA. The analytical results were collected during the emergency removal activities of an underground field waste tank at the facility.

Based on the analytical results, the OCD requests that the WCNA submit an investigation workplan to determine the extent and magnitude of the soil and groundwater contamination at your Artesia Service Facility. Please submit the required investigation plan to the OCD Santa Fe Office by March 1, 1993. The plan should include a time schedule for all investigation activities and submission of an investigation report.

Because of the possible threat of contamination to underground drinking water sources, the OCD requires the WCNA to identify all water wells within one-half (1/2) mile of the facility. Include all available data such as location (by quarter/quarter section), well depth, water level, water quality, and purpose of the well (ie. domestic, stock, community). Please submit this information with your investigation workplan.

Please note that when analyzing groundwater samples the detection limit must be low enough to detect contaminant levels at or above the Water Quality Control Commission (WQCC) groundwater standards. Enclosed is a copy of the New Mexico WQCC Regulations.

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

Sincerely,

Kathy M. Brown
Geologist

xc: Mike Williams, OCD Artesia Office

Brown and Caldwell
Consultants

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

March 3, 1993

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

19-7440-01

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

Dear Ms. Brown:

On behalf of The Western Company of North America, Brown and Caldwell Consultants is submitting the enclosed Soil and Groundwater Investigation Work Plan for the Artesia facility.

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

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Lynn M. Wright

Lynn M. Wright
Project Manager

LMW:mae

cc: Mr. Phillip Box, The Western Company of North America, Houston, Texas
OCD Artesia District Office

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

March 30, 1993

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

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-954

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

RECEIVED
APR 05 1993
REAL ESTATE AND
FACILITIES CONSTRUCTION

RE: Artesia Service Facility
Soil & Groundwater Contamination Investigation
Eddy County, New Mexico

Dear Mr. Box:

The New Mexico Oil Conservation Division (OCD) has received the March 3, 1993 "Soil and Groundwater Investigation Work Plan" for the Western Company of North America (WCNA) submitted by Brown and Caldwell Consultants on behalf of the WCNA. The above document outlines a plan for an investigation into the extent and magnitude of soil and groundwater contamination at the WCNA Artestia Service Facility. The above referenced Investigation Work Plan is hereby approved with the following conditions:

1. Soil Borings: The WCNA has proposed to drill 4 soil borings to approximately 15 to 20 feet deep. The borings will then be deepened to approximately 25 to 30 feet and completed as monitoring wells. Any changes in the number, location or completion of these soil borings and/or monitor wells must be approved by the OCD.

2. Soil Sampling: Soil samples will be taken approximately every 2 feet on all soil borings. For each soil boring, soil samples from the highest flame ionization detector (FID) or photoionization detector (PID) reading and at approximately 2 feet above the water table, if there is any FID/PID reading at this location, will be submitted for laboratory analysis.

3. Soil Sample Analysis: The soil samples selected for laboratory analysis will be analyzed for volatile aromatic organics (BTEX) using EPA Method 8020 and for total petroleum hydrocarbons (TPH) using EPA Modified Method 8015. Because waste genereated at oilfield service companies is not exempt from RCRA Subtitle C regulations, a soil sample from the borehole with the highest PID/FID reading will also be analyzed for hazardous waste characteristics. Herbicides and pesticides may be obmitted if a certified statement from a corporate representative is submitted stating that herbicides and pesticides have never been used at the facility.

4. Groundwater Sample Analysis: The groundwater samples from the monitor wells will be analyzed for BTEX using EPA Method 8020.

   NOTE: The proposed groundwater analyses by the WCNA is limited to volatile aromatic organics (BTEX). Please be advised that after evaluation of the investigation results, the OCD will require a full groundwater characterization for all Water Quality Control groundwater standards.

5. Monitor Well Construction: All monitor wells will be constructed with 4-inch diameter PVC casing and will have a minimum of 10 feet of screen below the water table and 5 feet of screen above the water table.

6. Investigaton Report: The WCNA will submit a soil and groundwater investigation report to the OCD within 45 days of completing the proposed investigation. The water well data requested January 29, 1993 by the OCD will be included in the investigation report.

7. Clean-up Fluid Disposal: The WCNA will submit a copy of the authorization for disposal of the fluids removed from the emergency clean-up of the underground field waste tank failure to the OCD. Please include the name of the operator, location and permit number of the Class 2 injection well.

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 for compliance with 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: Mike Williams, OCD Artesia Office

APPENDIX B

BOREHOLE LOGS AND WELL CONSTRUCTION DIAGRAMS

Brown and Caldwell Consultants

BORING LOG

Project Name: WESTERN - ARTESIA Project Number: 7440-02

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

Boring Location	Elevation and Datum: 45.82
Drilling Contractor: HARRISON DRILLING	Date Started: 4-17-93 / Date Finished: 4-17-93
Drilling Equipment: Hollow Stem Auger	Completed Depth(feet): 27.5 / Water Depth (Feet): ~20.0
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒	WELL CONSTRUCTION
Drilling Fluid: None	Type and Diameter of Well Casing: 4" Schedule 40 PVC
Backfill Material: —	Slot Size: .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
		Fill -- sandy clay; brown			concrete	4" Sch. 40 PVC blank		moist; no sample
5		Silty clay -- some sand; white to tan — small gravel	1		bentonite plug		0.0	moist; no odor
			2				32.6	black stain; slightly moist; odor
			3				36.7	" " " " "
10			4		20-40 silica sand		7.8	" " " " ; slight odor
			5			4" Sch. 40 0.01" slotted PVC	9.9	dark stain; " " ; slight odor
15		Clay -- brown; interbedded white silty clay; some gravel	6				12.1	staining; slightly moist; foul odor ↳ strong
			7				22.0	slightly moist; strong foul odor
		— small gravel	8				5.7	" " ; foul odor
20			9				5.1	black stain; very moist to wet; strong odor
		-23.0 to 23.5 sandy clay with gravel	10				6.0	very wet; odor; some staining
			11				4.8	very moist; slight odor
25		T.D. boring @ 25.0'				4" Sch. 40 PVC blank		
30								

Brown and Caldwell Consultants

BORING LOG

Project Name: Western - Artesia Project Number: 7440-02

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

Boring Location		Elevation and Datum: 96.40	
Drilling Contractor: Harrison Drilling		Date Started: 4-18-93	Date Finished: 4-18-93
Drilling Equipment: Hollow Stem Auger		Completed Depth(feet): 27.5'	Water Depth (feet): ~ 20.0
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: 4" Schedule 40 PVC	
Backfill Material: ———		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
		Fill -- brown sandy clay				concrete	4" Sch. 40 PVC blank		No sample
5		Silty clay -- some sand; tan to white		1				0.0	slightly moist; no odor
				2		bentonite seal		0.0	aa
				3		20-40 silica sand		0.0	aa
10		— some gravel		4			4" Sch. 40 0.010" slotted PVC	0.0	moist; no odor
		Clay -- interbedded white silty clay; some small gravel		5				0.0	aa
15				6				0.0	aa
				7				0.0	aa
				8				0.0	aa
20				9				0.0	aa
				10				0.0	aa
25				11				0.0	aa
		T.D. boring @ 26.0'					4" Sch. 40 PVC blank		aa = as above
30									

Brown and Caldwell Consultants

BORING LOG

Project Name: Western - Artesia Project Number: 7440-02

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

Boring Location		Elevation and Datum: 96.40	
Drilling Contractor: Harrison Drilling		Date Started: 4-18-93	Date Finished: 4-19-93
Drilling Equipment: Hollow Stem Auger		Completed Depth (feet): 26.0'	Water Depth (Feet): ~ 20.0
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing:	
Backfill Material: —		Slot Size:	Filter Material:
Logged By: J. Cooper	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
		Fill -- brown sandy clay w/small gravel							No sample
									No sample
5		Silty clay -- some sand and small gravel; white to tan		1				0.0	dry; no odor
				2				2.5	aa
				3				0.4	slightly moist; no odor
10				4				0.0	slightly moist to moist; no odor
				5				0.0	dry to moist; no odor
15		Clay -- interbedded white silty clay with small gravel		6				1.4	moist; no odor
				7				3.2	moist; slight odor
				8				1.7	black staining; moist; odor
20				9				1.7	slight staining; moist; odor
		- gravel layer		10				0.0	wet; slight odor
25				11				0.8	moist; odor
		T.D. boring at 26.0'							aa = as above
30									

Brown and Caldwell Consultants

BORING LOG

Project Name: Western - Artesia Project Number: 7440-02

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

Boring Location	Elevation and Datum: 96.09
Drilling Contractor: Harrison Drilling	Date Started: 4-19-93 / Date Finished: 4-19-93
Drilling Equipment: Hollow Stem Auger	Completed Depth (feet): 27.5' / Water Depth (Feet): -20.0
Sampling Method: California Modified ☐ Shelby Tube ☐ Split Spoon ☒	WELL CONSTRUCTION
Drilling Fluid: None	Type and Diameter of Well Casing: 4" Schedule 40 PVC
Backfill Material: —	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
		Hardpack -- caliche gravel				concrete	4" Sch. 40 PVC blank		No sample
									No sample
5		Silty clay -- some sand and small gravel; white to tan		1				0.0	dry to slightly moist; no odor.
				2		bentonite seal		0.0	" " "
				3				0.0	" "
10		Clay -- some interbedded white silty clay and small gravel		4		20-40 silica sand	4" Sch. 40 PVC 0.010" slotted casing	0.0	moist; no odor
				5				71.2	moist; odor
15				6				94.4	aa
				7				16.2	aa
				8				15.5	aa
20				9				0.0	moist
		— gravel layer		10				0.0	moist to wet
25				11				0.0	moist; no odor
		T.D. at 26.0'					4" Sch. 40 PVC blank		aa = as above
30									

Brown and Caldwell Consultants

BORING LOG

Project Name: Western - Artesia Project Number: 7440-02R

Soil Boring ☒ Monitoring Well ☒ Boring/Well Number: SB-5/MW-4 Sheet 1 of 1

Boring Location		Elevation and Datum: 96.07	
Drilling Contractor: Harrison Drilling		Date Started: 4-19-93	Date Finished: 4-20-93
Drilling Equipment: Hollow Stem Auger		Completed Depth(feet): 25.5'	Water Depth (Feet): ~18.0'
Sampling Method: California Modified☐ Shelby Tube☐ Split Spoon☒		WELL CONSTRUCTION	
Drilling Fluid: None		Type and Diameter of Well Casing: 4" Schedule 40 PVC	
Backfill Material: —		Slot Size: 0.010"	Filter Material: 20-40 Silica Sand
Logged By: S. 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
		Fill -- brown sandy clay				concrete	4" Sch.40 PVC blank		No sample
5		Silty clay -- some sand and small gravel; tan to white; interbedded brown clay		1		bentonite seal		0.0	moist; no odor
				2		20-40 silica sand		0.0	aa
				3			4" Sch.40 0.010" slotted PVC	0.0	aa
10				4				0.0	aa
				5				0.0	aa
15		Clay -- some gravel; tan and brown		6				0.0	moist; no odor
				7				0.0	aa
				8				0.0	moist to wet; no odor
20				9				0.0	aa
				10			4" Sch.40 PVC blank	0.0	aa
25		T.D. boring at 24.0'							aa = as above
30									

APPENDIX C

LABORATORY ANALYTICAL REPORTS
FOR
SOIL SAMPLES

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

RECEIVED
MAY 19 1993
BROWN AND CALDWELL-DFW

ANALYTICAL REPORT

AMENDED REPORT

5-10-93

LOG NO: G93-04-282

Received: 23 APR 93
Mailed : 06 MAY 93

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
04-282-1	SB-1-3	17 APR 93
04-282-2	SB-4-6	19 APR 93
04-282-3	SB-1-10	17 APR 93
04-282-4	SB-2-11	18 APR 93
04-282-5	SB-3-7	19 APR 93

PARAMETER	04-282-1	04-282-2	04-282-3	04-282-4	04-282-5
TPH - Modified 8015					
Date Analyzed	04/27/93	04/27/93	04/27/93	04/27/93	04/27/93
Date Extracted	04/26/93	04/26/93	04/26/93	04/26/93	04/26/93
Dilution Factor, Times	10	1	1	1	1
Carbon Range, .	C10-C22	---	---	---	---
Total Fuel Hydrocarbons, mg/kg	850	<5	<5	<5	<5
Fuel Character, .	Diesel	---	---	---	---
Vol. Aromatics/EPA 8020					
Date Analyzed	04/26/93	04/26/93	04/26/93	04/26/93	04/26/93
Date Confirmed	04/26/93	04/26/93	04/26/93	04/26/93	04/26/93
Dilution Factor, Times	1	1	1	1	1
1,2-Dichlorobenzene, ug/kg	<5	<5	<5	<5	<5
1,3-Dichlorobenzene, ug/kg	<5	<5	<5	<5	<5
1,4-Dichlorobenzene, ug/kg	<5	<5	<5	<5	<5
Benzene, ug/kg	<5	<5	<5	<5	<5
Chlorobenzene, ug/kg	<5	<5	<5	<5	<5
Ethylbenzene, ug/kg	<5	<5	<5	<5	<5
Toluene, ug/kg	<5	<5	<5	<5	<5
Total Xylene Isomers, ug/kg	<10	<10	<10	<10	<10
Other Vol. Aromatics/EPA 8020	---	---	---	---	---

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-04-282

Received: 23 APR 93
Mailed : 06 MAY 93

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
04-282-6	SB-3-10	19 APR 93
04-282-7	SB-4-10	19 APR 93
04-282-8	SB-5-9	20 APR 93

PARAMETER	04-282-6	04-282-7	04-282-8
TPH - Modified 8015			
Date Analyzed	04/27/93	---	---
Date Extracted	04/26/93	---	---
Dilution Factor, Times	1	---	---
Total Fuel Hydrocarbons, mg/kg	<5	---	---
Other TPH - Modified 8015	---	---	---
Vol. Aromatics/EPA 8020			
Date Analyzed	04/26/93	04/26/93	04/26/93
Date Confirmed	04/26/93	04/26/93	04/26/93
Dilution Factor, Times	1	1	1
1,2-Dichlorobenzene, ug/kg	<5	<5	<5
1,3-Dichlorobenzene, ug/kg	<5	<5	<5
1,4-Dichlorobenzene, ug/kg	<5	<5	<5
Benzene, ug/kg	<5	<5	<5
Chlorobenzene, ug/kg	<5	<5	<5
Ethylbenzene, ug/kg	<5	<5	<5
Toluene, ug/kg	<5	<5	<5
Total Xylene Isomers, ug/kg	<10	<10	<10
Other Vol. Aromatics/EPA 8020	---	---	---

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-04-282

Received: 23 APR 93
Mailed : 06 MAY 93

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, TCLP EXTRACT SAMPLES	DATE SAMPLED
04-282-9	SB-1-3	17 APR 93
04-282-10	SB-4-6	19 APR 93
04-282-11	SB-1-3	17 APR 93
04-282-12	SB-4-6	19 APR 93

PARAMETER	04-282-9	04-282-10	04-282-11	04-282-12
Mercury (EPA 7470), mg/L	---	---	<0.08	<0.08
Arsenic (6010), mg/L	---	---	0.078	0.059
Selenium (6010), mg/L	---	---	0.13	<0.1
Lead (6010), mg/L	---	---	<0.05	<0.05
Silver (6010), mg/L	---	---	<0.01	<0.01
Barium (6010), mg/L	---	---	0.48	0.57
Cadmium (6010), mg/L	---	---	<0.02	<0.02
Chromium (6010), mg/L	---	---	<0.03	<0.03
Digestion (3010), Date	---	---	04/27/93	04/28/93
TCLP Extract, Date	---	---	04/26/93	04/26/93

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-04-282

Received: 23 APR 93
Mailed : 06 MAY 93

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, TCLP EXTRACT SAMPLES	DATE SAMPLED
04-282-9	SB-1-3	17 APR 93
04-282-10	SB-4-6	19 APR 93
04-282-11	SB-1-3	17 APR 93
04-282-12	SB-4-6	19 APR 93

PARAMETER	04-282-9	04-282-10	04-282-11	04-282-12
TCLP/8270 Organics				
Date Analyzed	---	---	05/04/93	05/04/93
Date Extracted	---	---	04/30/93	04/30/93
Dilution Factor, Times	---	---	1	1
1,4-Dichlorobenzene, ug/L	---	---	<5	<5
2,4,5-Trichlorophenol, ug/L	---	---	<6	<6
2,4,6-Trichlorophenol, ug/L	---	---	<5	<5
2,4-Dinitrotoluene, ug/L	---	---	<5	<5
2-Methylphenol (o-Cresol), ug/L	---	---	<5	<5
3-Methylphenol (m-Cresol), ug/L	---	---	<10	<10
4-Methylphenol (p-Cresol), ug/L	---	---	<8	<8
Total Cresol Isomers, ug/L	---	---	<20	<20
Hexachlorobenzene, ug/L	---	---	<5	<5
Hexachlorobutadiene, ug/L	---	---	<5	<5
Hexachloroethane, ug/L	---	---	<5	<5
Nitrobenzene, ug/L	---	---	<5	<5
Phenol, ug/L	---	---	<5	<5
Pentachlorophenol, ug/L	---	---	<5	<5
Pyridine, ug/L	---	---	<10	<10
Surrogates **				
2-Fluorobiphenyl Reported, ug/L	---	---	37.7	45.7
2-Fluorobiphenyl Theoretical, ug/L	---	---	50.0	50.0
2-Fluorophenol Reported, ug/L	---	---	55.8	58.6
2-Fluorophenol Theoretical, ug/L	---	---	75.0	75.0

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
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LOG NO: G93-04-282

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Mr. Jack Cooper
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1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, TCLP EXTRACT SAMPLES	DATE SAMPLED
04-282-9	SB-1-3	17 APR 93
04-282-10	SB-4-6	19 APR 93
04-282-11	SB-1-3	17 APR 93
04-282-12	SB-4-6	19 APR 93

PARAMETER	04-282-9	04-282-10	04-282-11	04-282-12
2,4,6-Tribromophenol Reported, ug/L	---	---	69.8	66.0
2,4,6-Tribromophenol Theoretical, ug/L	---	---	75.0	75.0
Nitrobenzene-d5 Reported, ug/L	---	---	43.9	48.1
Nitrobenzene-d5 Theoretical, ug/L	---	---	50.0	50.0
Phenol-d5 Reported, ug/L	---	---	58.0	61.2
Phenol-d5 Theoretical, ug/L	---	---	75.0	75.0
Terphenyl-d14 Reported, ug/L	---	---	41.5	44.8
Terphenyl-d14 Theoretical, ug/L	---	---	50.0	50.0
Zero Headspace Extraction	04/23/93	04/23/93	---	---

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-04-282

Received: 23 APR 93
Mailed : 06 MAY 93

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, TCLP EXTRACT SAMPLES	DATE SAMPLED
04-282-9	SB-1-3	17 APR 93
04-282-10	SB-4-6	19 APR 93
04-282-11	SB-1-3	17 APR 93
04-282-12	SB-4-6	19 APR 93

PARAMETER	04-282-9	04-282-10	04-282-11	04-282-12
TCLP/8240 Organics				
Date Analyzed	04/26/93	04/26/93	---	---
Date Extracted	04/23/93	04/23/93	---	---
Dilution Factor, Times	1	1	---	---
1,1-Dichloroethene, ug/L	<1	<1	---	---
1,2-Dichloroethane, ug/L	<1	<1	---	---
Benzene, ug/L	<5	<5	---	---
Chlorobenzene, ug/L	<1	<1	---	---
Carbon Tetrachloride, ug/L	<1	<1	---	---
Chloroform, ug/L	<1	<1	---	---
Methyl ethyl ketone, ug/L	<5	<5	---	---
Trichloroethene, ug/L	<1	<1	---	---
Tetrachloroethene, ug/L	<1	<1	---	---
Vinyl chloride, ug/L	<1	<1	---	---

BCA

B C Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

LOG NO: G93-04-282

Received: 23 APR 93
Mailed : 06 MAY 93

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

AMENDED REPORT:
The Reporting Detection Limit (RDL) for Benzene has been raised to eliminate the possible existance of false positives.
C. McHale 5/10/93

James C. Hein, Laboratory Director

BCA

APPENDIX D

LABORATORY ANALYTICAL REPORTS FOR GROUNDWATER SAMPLES

Analytical Report

LOG NO: G93-04-284
Received: 23 APR 93
Mailed: MAY 5 1993

Mr. Jack Cooper
Brown and Caldwell
1100 Tower North, 2710 Stemmons Freeway
Dallas, Texas 75207

Purchase Order: WCNA

Project: 7440-02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
04-284-1	MW-1	21 APR 93
04-284-2	MW-2	21 APR 93
04-284-3	MW-3	21 APR 93
04-284-4	MW-4	21 APR 93

PARAMETER	04-284-1	04-284-2	04-284-3	04-284-4
Vol. Aromatics/EPA 8020				
Date Analyzed	04/26/93	04/26/93	04/26/93	04/26/93
Date Confirmed	04/26/93	04/26/93	04/26/93	04/26/93
Dilution Factor, Times	1	1	1	1
1,2-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
Benzene, ug/L	4.1	<0.5	<0.5	<0.5
Chlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene, ug/L	<0.5	<0.5	<0.5	<0.5
Toluene, ug/L	<0.5	<0.5	<0.5	1.7
Total Xylene Isomers, ug/L	67	<1	<1	<1

James C. Hein, Laboratory Director

Brown and Caldwell
Analytical

801 Western Avenue
Glendale, California 91201
(818) 247-5737
FAX (818) 247-9797

Record	BASIN	FILE_NO	FIL_SUF	REF_BAS	REF_NO	REF_SUF	OWNERSHIP	DEPTH	WBF	DATECLTD	CLTR	USE	LOCATION	LSELEV	PT	CLTN	CHLORIDES	CONDUCT	TDS	YEMC	ADD DATA	CARD DATE	SOURCE	PDN	METER
47	RA	06105						560	PSA	68/10/14	SEO	STK	17S.23E.34.4212442	3980.00	DP		16	1914	0	65		1085			0
48								0	PAT	88/10/12	SEO	STK	17S.24E.03.42341	3713.00	DP		27	775	0	68		1088		15-71053	0
79	RA							360	PAT	85/11/15	SEO	DOM	17S.24E.11.32444	3712.00	YT		21	870	0	0		0186		15-71055	0
79								360	PAT	88/11/16	SEO	DOM	17S.24E.11.32444	3712.00	YT		16	913	0	0		0289		15-71055	0
80	RA							300	PAT	50/01/11	USG	STK	17S.24E.13.344443	3694.00	DP		5	571	0	0	X	0685	U	15-71113	0
81	RA							300	PAT	55/06/06	USG	STK	17S.24E.13.344443	3694.00	DP		8	601	0	68	X	0685	U	15-71113	0
82	RA							300	PAT	61/09/12	USG	STK	17S.24E.16.433332	3785.00	DP		5	531	0	0		1382	U	15-10063	0
49								300	PAT	88/10/12	SEO	STK	17S.24E.16.433332	3785.00	DP		6	440	0	0		1088		15-10063	0
56	RA	04075						387	PAT	88/11/23	SEO	DOM	17S.25E.07.33224	3650.00	YT		33	799	0	0		0289		15-71060	0
83	RA	01398						225	QAL	68/09/12	SEO	IRR	17S.25E.12.211432	3452.00	YT		29	1275	0	0		482		15-10064	0
84	RA	01398						225	QAL	70/08/20	USG	IRR	17S.25E.12.211432	3452.00	DP		30	1280	0	66		0285		15-10064	0
85	RA	01398						225	QAL	74/09/09	SEO	IRR	17S.25E.12.211432	3452.00	DP		40	1231	0	67		482		15-10064	0
86	RA	01398						225	QAL	78/08/03	SEO	IRR	17S.25E.12.211432	3452.00	DP		28	0	0	0		0186		15-10064	0
87	RA			GS	00132			130	QAL	40/07/23	USG	STK	17S.25E.14.14123	3509.00	DP		18	946	0	0	X	0585	U	15-06203	0
88	08	00275						0	PSA	59/04/25	ONR	OIL	17S.25E.14.43000	0.00	BLR720		70	2070	0	0		482			0
89	08	00275						0	PSA	59/05/07	ONR	OIL	17S.25E.14.43000	0.00	BL1040		30	2970	0	0		482			0
90	RA	01371		GS	00088			0	QAL	49/05/24	USG	DOM	17S.25E.22.24214	0.00	DP		32	869	0	0	X	0585	U		0
91	RA	04008						325	QAL	68/09/13	SEO	DOM	17S.25E.22.24214A	3530.00	YT		14	858	0	65		482		15-10066	0
91	RA	04008						325	QAL	88/10/12	SEO	DOM	17S.25E.22.24214A	3530.00	YT		33	829	0	0		1088		15-10066	0
92	RA	04012						247	QAL	70/08/20	USG	STK	17S.25E.23.121411	3492.00	DP		30	960	0	66		0285		15-10067	0
93	RA	05286						285	QAL	85/10/09	SEO	DWD	17S.25E.23.314123	3505.00	DP		13	954	0	67		0186			0
94	RA	00821	S2					1148	PSA	67/08/10	SEO	MUN	17S.25E.24.22422	3442.00	DP		15	1078	0	72		1282		15-10068	0
95	RA	00821	S2					1148	PSA	68/05/03	SEO	MUN	17S.25E.24.22422	3442.00	DP		14	1090	0	71		1282		15-10068	0
96	RA	00821	S2					1148	PSA	68/08/12	SEO	MUN	17S.25E.24.22422	3442.00	DP		13	1113	0	72		1282		15-10068	0
97	RA	00821	S2					1148	PSA	69/04/02	SEO	MUN	17S.25E.24.22422	3442.00	DP		18	1152	0	64		1282		15-10068	0
98	RA	00821	S2					1148	PSA	69/08/21	SEO	MUN	17S.25E.24.22422	3442.00	DP		14	1093	0	72		1282		15-10068	0
99	RA	00821	S2					1148	PSA	70/04/06	SEO	MUN	17S.25E.24.22422	3442.00	DP		17	1129	0	66		1282		15-10068	0
00	RA	00821	S2					1148	PSA	70/08/19	SEO	MUN	17S.25E.24.22422	3442.00	YT		12	1088	0	72		1282		15-10068	0
01	RA	00821	S2					1148	PSA	71/01/09	SEO	MUN	17S.25E.24.22422	3442.00	DP		14	1021	0	74		1282		15-10068	0
02	RA	00821	S2					1148	PSA	71/04/26	SEO	MUN	17S.25E.24.22422	3442.00	YT		13	1127	0	70		1282		15-10068	0
03	RA	00821	S2					1148	PSA	72/04/26	SEO	MUN	17S.25E.24.22422	3442.00	DP		14	1117	0	71		1282		15-10068	0
04	RA	00821	S2					1148	PSA	73/04/13	SEO	MUN	17S.25E.24.22422	3442.00	DP		23	1009	0	0		0783		15-10068	0
05	RA	00821	S2					1148	PSA	73/08/23	SEO	MUN	17S.25E.24.22422	3442.00	YT		12	1102	0	72		1282		15-10068	0
06	RA	00821	S2					1148	PSA	74/04/05	SEO	MUN	17S.25E.24.22422	3442.00	DP		14	1129	0	0		1282		15-10068	0
07	RA	00821	S2					1148	PSA	74/08/16	USG	MUN	17S.25E.24.22422	3442.00	DP		10	971	0	72		0385	U	15-10068	0
08	RA	00821	S2					1148	PSA	78/07/26	SEO	IRR	17S.25E.24.22422	3442.00	DP		22	1140	0	0		0186		15-10068	0
09	RA	00821	S2					1148	PSA	85/08/09	SEO	MUN	17S.25E.24.224224	3442.00	DP		10	1105	0	72		1185		15-10068	0
10	RA	02776						225	QAL	68/09/13	SEO	STK	17S.25E.24.433122	3465.00	DP		17	1018	0	67		0683		15-71064	0
11	RA	[illegible]		GS	00090			0	QAL	39/02/09	USG	STK	17S.25E.24.43313	0.00	DP		29	972	0	0	X	0585	U		0
50	RA	03525						250	QAL	88/10/12	SEO	STK	17S.25E.27.141413	3538.00	DP		35	979	0	0		1088		15-71065	0
12	RA	[illegible]						0	SWN	63/07/19	SEO	SWN	17S.26E.02.333333	0.00	DP		336	2384	0	0		0683			0
13	RA	01606						177	QAL	70/08/19	USG	IRR	17S.26E.03.231214	3331.00	DP		110	2500	0	66		0285		15-71067	0
14	RA	01606						177	QAL	74/08/08	USG	IRR	17S.26E.03.231214	3331.00	DP		66	2084	0	66		0385	U	15-71067	0
15	RA	01606						177	QAL	78/07/26	SEO	IRR	17S.26E.03.231214	3331.00	DP		74	0	0	0		0186		15-71067	0
16	RA	01606						177	QAL	85/08/12	SEO	IRR	17S.26E.03.231214	3331.00	DP		65	2194	0	67		1185		15-71067	0
17	RA	01488						283	QAL	74/08/08	USG	IRR	17S.26E.03.33334	3338.00	DP		158	2982	0	66		0385	U	15-10403	0
18	RA	01488						283	QAL	78/08/03	SEO	IRR	17S.26E.03.33334	3338.00	DP		161	0	0	0		0186		15-10403	0
19	RA	01488						283	QAL	70/08/19	USG	IRR	17S.26E.03.333341	3338.00	DP		170	3200	0	64		0285		15-10403	0
20	RA	01488						283	QAL	85/08/12	SEO	IRR	17S.26E.03.333341	3338.00	DP		178	3218	0	66		1185		15-10403	0
21	RA	01668						185	QAL	70/08/28	USG	IRR	17S.26E.03.433112	3331.00	DP		270	3100	0	64		0285		15-10074	0
22	RA	01668						185	QAL	74/08/08	USG	IRR	17S.26E.03.433112	3331.00	DP		232	3074	0	66		0385	U	15-10074	0
23	RA	01668						185	QAL	78/07/26	SEO	IRR	17S.26E.03.433112	3331.00	DP		250	0	0	0		0186		15-10074	0
24	RA	01668						185	QAL	85/08/12	SEO	IRR	17S.26E.03.433112	3331.00	DP		324	3715	0	66		1185		15-10074	0
25	RA	[illegible]		GS	00054			18	QAL	40/07/22	USG	DOM	17S.26E.04.121132	0.00	BLR		133	2540	0	0	X	PLUG	U		0
26	RA	01903	S					325	QAL	85/08/28	SEO	IRR	17S.26E.05.14133A	0.00	DP		66	1595	0	67		1185			0
27	RA	01147		B	00034			0	PSA	40/09/03	USG	IRR	17S.26E.05.24343	0.00	DP		16	1180	0	0	X	0585	U		0
28	RA	01147		B	00034			0	PSA	85/08/12	SEO	IRR	17S.26E.05.24343	0.00	DP		15	1112	0	75		1185			0
29	RA	01604		RA	01498			0	QAL	85/08/19	SEO	IRR	17S.26E.07.131113	0.00	DP		70	1701	0	68		1185			0
30	RA	01453	B	RA	01604	B		200	QAL	55/04/25	USG	IRR	17S.26E.07.131123	3426.00	DP		33	1280	0	66	X	0685	U	15-05049	0
[redacted]								200	[redacted]	04/30	[redacted]	IRR	17[redacted].07.131[redacted]	26.00	[redacted]		[redacted]	1250	0	64	X	0585	U	15-05049	0

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

July 1, 1993

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

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-997

Mr. Phillip Box NMGCA HARDY
Manager Real Estate and EPA Compliance (713) 629-2600
The Western Company of North America
515 Post Oak Blvd., Suite 915
Houston, Texas 77027

RE: SOIL AND GROUNDWATER INVESTIGATION
THE WESTERN COMPANY OF NORTH AMERICA ARTESIA FACILITY
EDDY COUNTY, NEW MEXICO

Dear Mr. Box:

The New Mexico Oil Conservation Division (OCD) has completed a review of the June 9, 1993 "SOIL AND GROUNDWATER INVESTIGATION, THE WESTERN COMPANY OF NORTH AMERICA (Western), ARTESIA, NEW MEXICO" submitted by Brown and Caldwell Consultants on behalf of the Western. The report contains the results of the soil and groundwater investigations to determine the extent and magnitude of soil and groundwater contamination identified during the emergency removal of an underground field waste tank at Westerns Artesia Service Facility. Based on the analytical data and field observations, Western recommends that no further field investigations be conducted and that the existing monitoring wells be sampled in July 1993.

Based on review of the analytical data, the OCD hereby approves the above referenced recommendations with the following conditions:

1. Sampling Schedule: All four monitor wells will be sampled in July 1993 and again in January 1994.

2. Sampling Constituents: The groundwater samples from the monitor wells will be analyzed for volatile aromatic organics (BTEX) using EPA Method 8020. The groundwater samples taken in July will also be analyzed for Polynuclear Aromatic Hydrocarbons (PAH) using EPA Method 8100. If the PAH's are not present then Western does not need to analyze for them during the January 1994 sampling event.

3. Sampling Report: Western will submit the groundwater sampling analytical results to the OCD by August 31, 1993 and February 28, 1994 for the respective sampling period.

Based upon the results of the July 1993 and January 1994 sampling, the OCD will determine if further sampling will be required

Please be advised that OCD approval does not relieve Western of liability should remaining soil contaminants be found to be migrating into ground waters or surface waters or pose a threat to public health. In addition, the OCD approval does not relieve you of liability for compliance with any other laws and/or regulations.

If you have any questions, please do not hesitate to contact me at (505) 827-5884.

Sincerely,

Kathy M. Brown

Kathy M. Brown
Geologist

xc: Mike Williams, OCD Artesia Office
Lynn M. Wright, Brown and Caldwell Consultants

Brown and Caldwell
Consultants

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

June 10, 1993

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

19-7440-03/01

Subject: Liquid Disposal During Emergency Tank Clean-Up
The Western Company of North America, Artesia, New Mexico Facility

Dear Ms. Brown:

In the New Mexico Oil Conservation Division (OCD) letter dated March 30, 1993, it was requested that The Western Company of North America submit documentation regarding the disposal of liquids recovered during the emergency tank excavation on July 29, 1993. During the tank excavation, Mike Williams of the OCD office in Artesia was contacted and advised of field activities including soil stockpiling and plans for immediate liquid disposal. Mr. Williams agreed that because of the circumstances immediate liquid disposal would be acceptable.

Enclosed with this letter is a fax from Steve Carter, Inc., in Loco Hills, New Mexico, documenting the amount of liquid and the location of disposal.

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

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Jackie (Jack) Cooper, Jr.
Geologist

JLC:el
Enclosure

cc: Mr. Phillip Box, The Western Company of North America
Oil Conservation Division, District Office, Artesia, New Mexico

STEVE CARTER, INC.

P. O. BOX 26
(505) 677-3113
LOCO HILLS, NM 88255

MAY 5, 1993

JACK COOPER
BROWN AND CAULDWELL CONSULTANTS
2170 STEMMONS FWY.
1100 TOWER N.
DALLAS, TX 75207-2290

COPIES OF STEVE CARTER, INC. WORK TICKERS W/INVOICES.

FROM THE WESTERN COMPANY'S YARD IN ARTESIA, THE FLUIDS WERE HAULED TO THE LOCO HILLS WATER DISPOSAL IN LOCO HILLS. THE LOCO HILLS WATER DISPOSAL IS AN OPEN PIT FACILITY. PERMIT #R-3221 AND LEGALS S16 T17 R30E.

THE DATE IN QUESTION, JULY 29, 1992, THERE WAS 140 BBLS HAULED TO DISPOSAL.

I HOPE THIS IS THE INFORMATION YOU NEED.

Judy Beadle
Accounting Secretary

ACCOUNTING ADDRESS:
P. O. BOX 26
LOCO HILLS, N.M. 88255
PHONE:
(505) 677-2320
DAY OR NIGHT NUMBER:
(505) 677-2113

STEVE CARTER, INC.

HOT OIL UNITS — OIL FIELD TRANSPORTS — PUMP TRUCK

LOCO HILLS, NEW MEXICO

68834

DATE 7-29-92

DRIVER Henry Everson TRUCK NO. 12 CAPACITY 80 BBLS 140

SHIPPED FROM pit AT Western

SHIPPED TO Mesa LEASE Yard

DESCRIPTION	HRS. OR BBLS.	RATE	AMOUNT	TAX	TOTAL
Empty pit	7 1/2 hrs	54.00	405 00		
140 disp	140	25	35 00	22 55	462 55

TIME STARTED 12:00 pm

TIME FINISHED 7:30 pm

TOTAL HOURS

COMPANY NAME Western (CMS)

BY:

Bryan Printers & Stationers, Inc. Form No. 1903-D1

ACCOUNTING ADDRESS:
P. O. BOX 26
LOCO HILLS, N.M. 88255
PHONE:
(505) 677-2320
DAY OR NIGHT NUMBER:
(505) 677-2113

STEVE CARTER, INC.

HOT OIL UNITS — OIL FIELD TRANSPORTS — PUMP TRUCK

LOCO HILLS, NEW MEXICO

68839

DATE 7-31-92

DRIVER Henry Everson TRUCK NO. 12 CAPACITY 80 BBLS 140

SHIPPED FROM pit AT Western

SHIPPED TO Mesa LEASE Yard

DESCRIPTION	HRS. OR BBLS.	RATE	AMOUNT	TAX	TOTAL
Empty pit	6 hrs	54.00	324 00		
140 disp	140	25	35 00	18 40	377 40

TIME STARTED 8:30 am

TIME FINISHED 2:30 pm

TOTAL HOURS

COMPANY NAME Western (CMS)

BY:

Bryan Printers & Stationers, Inc. Form No. 1903-D1

Brown and Caldwell
Consultants

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

June 9, 1993

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

19-7440-03

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

See report, bound

Dear Ms. Brown:

On behalf of The Western Company of North America, Brown and Caldwell is submitting the enclosed Soil and Groundwater Investigation Report for the Artesia facility.

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

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Jackie Cooper, Jr.

Jackie (Jack) Cooper, Jr.
Geologist

JLC:el
Enclosure

cc: Mr. Phillip Box, The Western Company of North America, Houston, Texas
Oil Conservation Division District Office, Artesia, New Mexico

BORINGS

4 – 15 to 20', Hollow stem auger, continuously sampled with split-spoon sampler.

← 2 Lab Samples from PID/PID for BTEX (8020) & TPH diesel (mod 8015) analysis

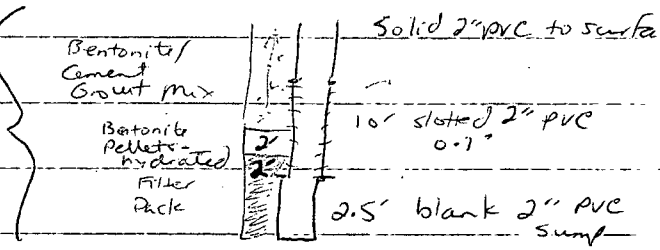
55 TPH .7 BTEX

361 TPH 4.0 BTEX

361 TPH 8.35 BTEX

Deepen boring to 25–30' & install 2" PVC monitor wells

Remove water samples til no sediment. Then ~~sample~~ purge & sample for BTEX



? Water gradient

Tank Contained –

Underground field ~~waste~~ tank for spent acids & oil/fuel chemical wastes.

Begin investigation 30 days after approval

Investigation report (w/ RAP if > reg. levels) w/in 45 days of completing investigation

4"

15' 10' below 5' above water table

① PVC, 10', 5'

② Soil boring every 2', highest water table

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

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

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

March 30, 1993

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-954

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

RE: Artesia Service Facility
Soil & Groundwater Contamination Investigation
Eddy County, New Mexico

Dear Mr. Box:

The New Mexico Oil Conservation Division (OCD) has received the March 3, 1993 "Soil and Groundwater Investigation Work Plan" for the Western Company of North America (WCNA) submitted by Brown and Caldwell Consultants on behalf of the WCNA. The above document outlines a plan for an investigation into the extent and magnitude of soil and groundwater contamination at the WCNA Artestia Service Facility. The above referenced Investigation Work Plan is hereby approved with the following conditions:

1. Soil Borings: The WCNA has proposed to drill 4 soil borings to approximately 15 to 20 feet deep. The borings will then be deepened to approximately 25 to 30 feet and completed as monitoring wells. Any changes in the number, location or completion of these soil borings and/or monitor wells must be approved by the OCD.

2. Soil Sampling: Soil samples will be taken approximately every 2 feet on all soil borings. For each soil boring, soil samples from the highest flame ionization detector (FID) or photoionization detector (PID) reading and at approximately 2 feet above the water table, if there is any FID/PID reading at this location, will be submitted for laboratory analysis.

3. Soil Sample Analysis: The soil samples selected for laboratory analysis will be analyzed for volatile aromatic organics (BTEX) using EPA Method 8020 and for total petroleum hydrocarbons (TPH) using EPA Modified Method 8015. Because waste genereated at oilfield service companies is not exempt from RCRA Subtitle C regulations, a soil sample from the borehole with the highest PID/FID reading will also be analyzed for hazardous waste characteristics. Herbicides and pesticides may be obmitted if a certified statement from a corporate representative is submitted stating that herbicides and pesticides have never been used at the facility.

4. Groundwater Sample Analysis: The groundwater samples from the monitor wells will be analyzed for BTEX using EPA Method 8020.

   NOTE: The proposed groundwater analyses by the WCNA is limited to volatile aromatic organics (BTEX). Please be advised that after evaluation of the investigation results, the OCD will require a full groundwater characterization for all Water Quality Control groundwater standards.

5. Monitor Well Construction: All monitor wells will be constructed with 4-inch diameter PVC casing and will have a minimum of 10 feet of screen below the water table and 5 feet of screen above the water table.

6. Investigaton Report: The WCNA will submit a soil and groundwater investigation report to the OCD within 45 days of completing the proposed investigation. The water well data requested January 29, 1993 by the OCD will be included in the investigation report.

7. Clean-up Fluid Disposal: The WCNA will submit a copy of the authorization for disposal of the fluids removed from the emergency clean-up of the underground field waste tank failure to the OCD. Please include the name of the operator, location and permit number of the Class 2 injection well.

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 for compliance with any other laws and/or regulations.

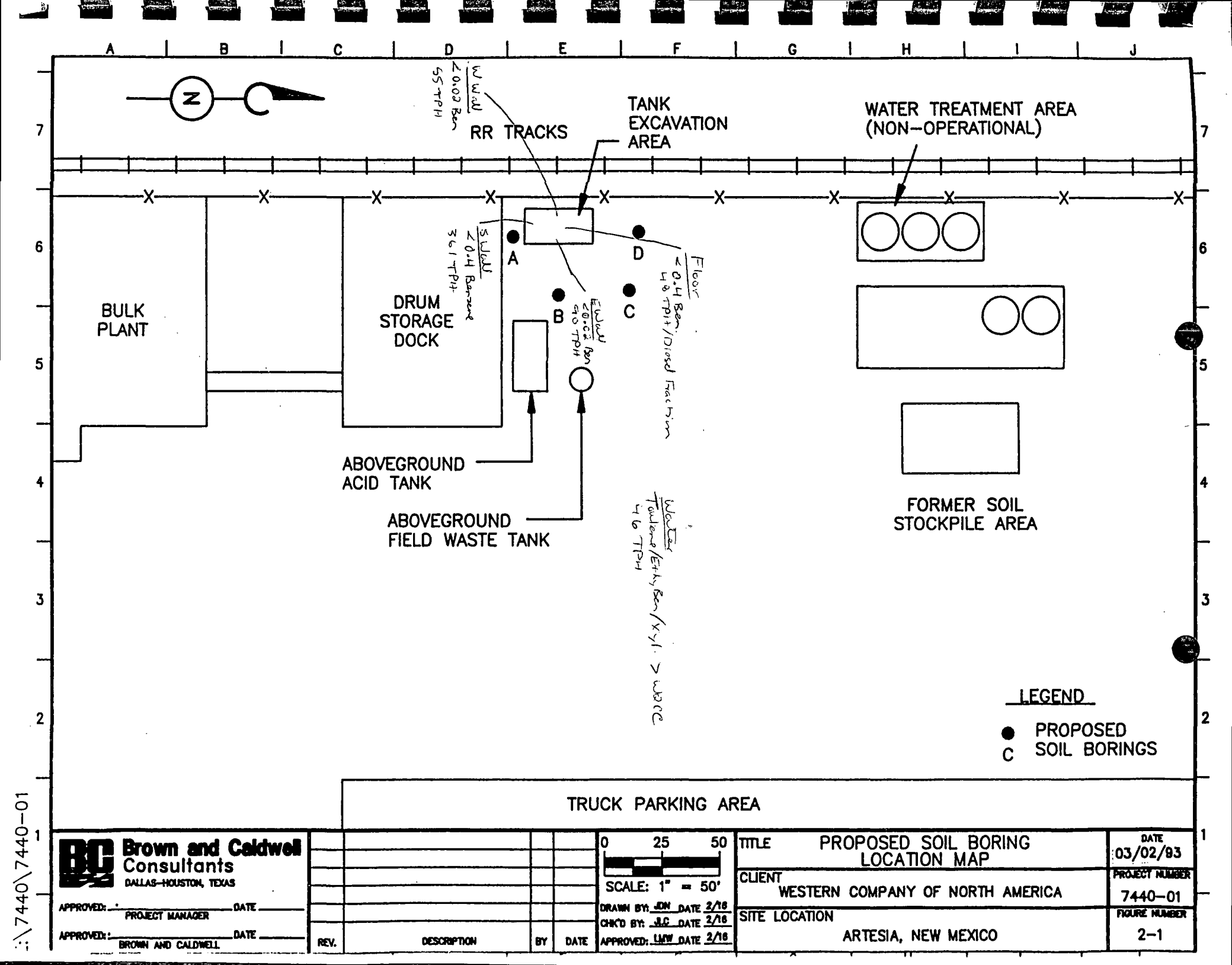
If you have any questions, please contact me at (505) 827-5884.

Sincerely,

Kathy M. Brown

Kathy M. Brown
Geologist

xc: Mike Williams, OCD Artesia Office



Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

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

REV.	DESCRIPTION	BY	DATE

DRAWN BY: JDN DATE 2/16
CHK'D BY: JLC DATE 2/16
APPROVED: LMW DATE 2/16

TITLE: PROPOSED SOIL BORING LOCATION MAP
CLIENT: WESTERN COMPANY OF NORTH AMERICA
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 03/02/93
PROJECT NUMBER: 7440-01
FIGURE NUMBER: 2-1

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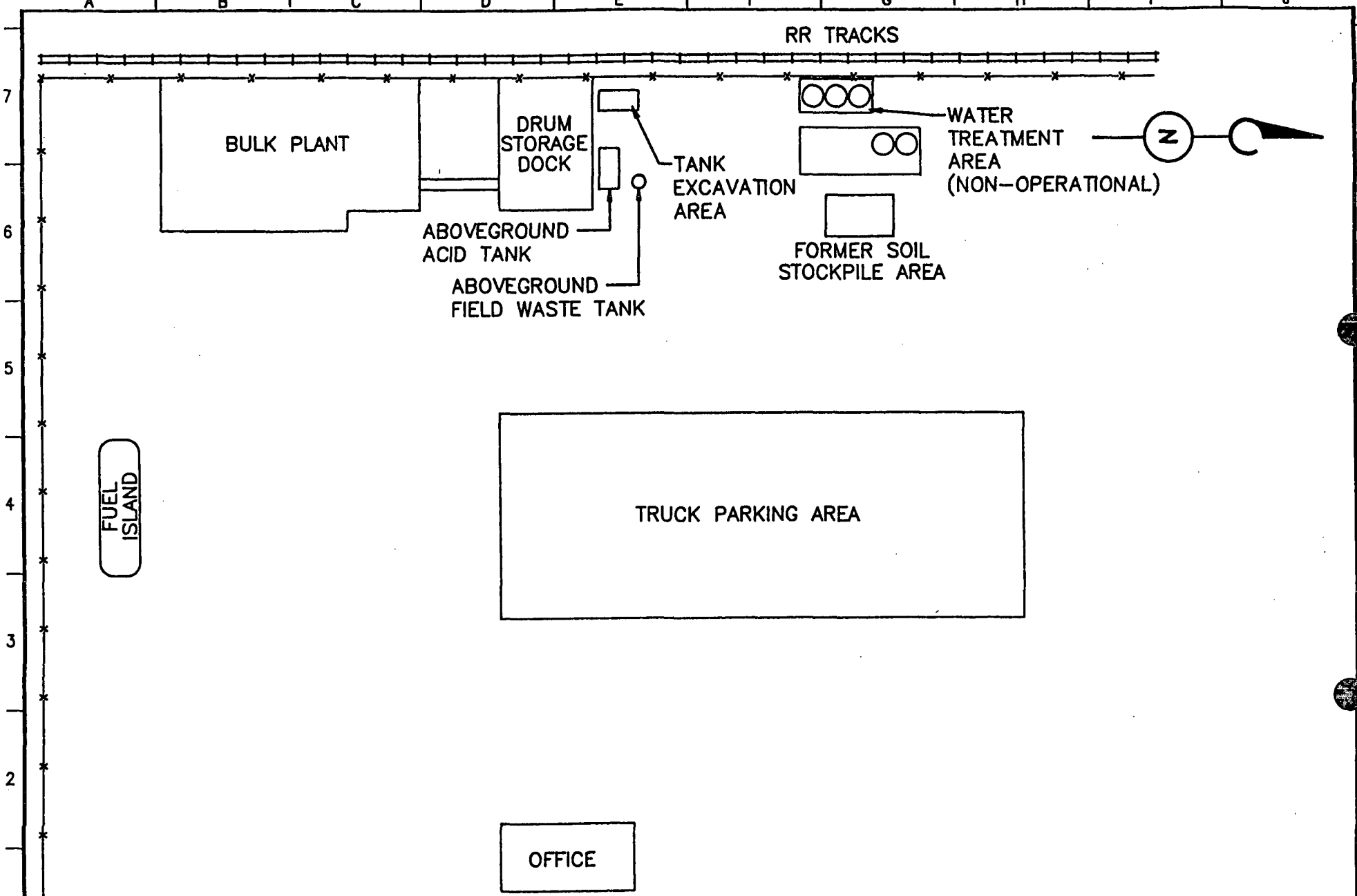

Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

APPROVED: _____ PROJECT MANAGER DATE _____

APPROVED: _____ BROWN AND CALDWELL DATE _____

REV.	DESCRIPTION	BY	DATE

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SCALE: 1" = 100'
DRAWN BY: JDN DATE 2/16
CHK'D BY: JLC DATE 2/16
APPROVED: LMW DATE 2/16

TITLE: SITE MAP
CLIENT: WCNA
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 03/02/93
PROJECT NUMBER: 7440-01
FIGURE NUMBER: 1-2

:\7440\7440-01

Brown and Caldwell
Consultants

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

March 3, 1993

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

19-7440-01

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

Dear Ms. Brown:

On behalf of The Western Company of North America, Brown and Caldwell Consultants is submitting the enclosed Soil and Groundwater Investigation Work Plan for the Artesia facility.

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

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Lynn M. Wright

Lynn M. Wright
Project Manager

LMW:mae

cc: Mr. Phillip Box, The Western Company of North America, Houston, Texas
OCD Artesia District Office

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

January 29, 1993

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-937

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

RE: Artesia Service Facility
Soil & Groundwater Contamination Investigation
Eddy County, New Mexico

Dear Mr. Box:

The New Mexico Oil Conservation Division (OCD) has received the August 4, 1992, analytical results from water and soil samples collected at the Western Company of North America's (WCNA) Artesia Service Facility submitted by Brown and Caldwell Consultants on behalf of the WCNA. The analytical results were collected during the emergency removal activities of an underground field waste tank at the facility.

Based on the analytical results, the OCD requests that the WCNA submit an investigation workplan to determine the extent and magnitude of the soil and groundwater contamination at your Artesia Service Facility. Please submit the required investigation plan to the OCD Santa Fe Office by March 1, 1993. The plan should include a time schedule for all investigation activities and submission of an investigation report.

Because of the possible threat of contamination to underground drinking water sources, the OCD requires the WCNA to identify all water wells within one-half (1/2) mile of the facility. Include all available data such as location (by quarter/quarter section), well depth, water level, water quality, and purpose of the well (ie. domestic, stock, community). Please submit this information with your investigation workplan.

Please note that when analyzing groundwater samples the detection limit must be low enough to detect contaminant levels at or above the Water Quality Control Commission (WQCC) groundwater standards. Enclosed is a copy of the New Mexico WQCC Regulations.

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

Sincerely,

Kathy M. Brown
Geologist

xc: Mike Williams, OCD Artesia Office

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time	Date

Originating Party	Other Parties
K. Braun-OCD	Lyn M. Wright 214-630-0001 Brown & Caldwell

Subject: The Western Co. of North America
Artesia Service Facility &
Tank Yank 4 Groundwater Contamination

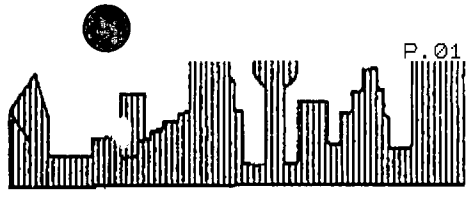
Discussion: HISTORY - Had a below ground plastic lined metal tank to hold spent acids & oilfield chemical (waste). Ground above tank sunk. (≈ 1 ft) Uncovered tank & found it had collapsed. Excavated tank & soils down to bedrock & groundwater. Sampled soils - OK. Sampled water - shows contamination (≈ 15 ft deep).
OCD needs to send TWC a letter requesting investigation of the groundwaters.
Replaced tank with an aboveground fiberglass tank on a pad.

Conclusions or Agreements

Distribution

Signed Kathy Braun

Brown and Caldwell
Consultants
2710 Stemmons Freeway, 1100 Tower North
Dallas, TX 75207



DATE: 8-5-92 JOB NUMBER: 7059

TO: Mr Roger Anderson

FAX # 505-827-~~5812~~ 5741

FROM: Lynn Wright DALLAS

NUMBER OF PAGES EXCLUDING COVER: 5

COMMENTS: Analytical results from soil and water samples collected during the removal of a field waste tank at the Western Company of North America facility in Artesia, N.M. Your comments on further closure action for this tank removal will be appreciated.

Thanks

Lynn Wright

Please call (214) [illegible] if all pages are not received.

Brown and Caldwell
Consultants

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

August 4, 1992

Mr. Roger Anderson
New Mexico Energy Minerals and
Natural Resources Department
Oil Conservation Division
P. O. Box 2088
Santa FE, New Mexico 87504

19-7059-10

Subject: Soil and Water Sample Results
The Western Company of North America
Artesia, New Mexico Facility

Dear Mr. Anderson:

As discussed during our telephone conversation on July 29, 1992, Brown and Caldwell Consultants (BCC), on behalf of the Western Company of North America (WCNA), is submitting the attached analytical results from water and soil samples collected at the WCNA facility. The samples were collected during emergency removal activities of an underground field waste tank at the facility.

Four soil samples and one water sample were collected to verify cleanup of affected material had been achieved (see attached sample location map). The water sample was collected at the bottom of the tank pit from water seeping into the excavation. Soil samples were collected from the walls and floor of the excavation. No sample was collected from the north side of the excavation because this sidewall was removed to allow equipment access to the tank pit.

Your review and comments regarding the attached analytical results as well as future considerations for final closure of the field waste tank will be appreciated. If you have any questions or require additional information please contact me at (214) 630-0001.

Verbal approval to close tank 8/10/92 RA

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Lynn M. Wright

Lynn M. Wright
Project Manager

LMW:mae

cc/attach: Mr. Phillip Box, Western Company of North America, Houston, TX
Mr. Teddy Gandy, Western Company of North America, Hobbs, NM

PO Box 56006 77256

Manager of Real estate + EPA Compliance

SwL

SOUTHWESTERN LABORATORIES

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

222 CAVALCADE * P.O. BOX 8768, HOUSTON, TEXAS 77249 * 713 692-9151

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. 92-07-500
Report Date 08/05/92 09:26

Project NM 5173/WCNA ARTESIA NM

Date Sampled 07/30/92

Sampled By BROWN & CALDWELL

Sample Type SOIL & LIQUID SAMPLES

Transported by FEDEX

P.O. # _____

Date Received 07/31/92

Lab No.	Sample Identification
92-07-500-01	EX-1
92-07-500-02	EX-2
92-07-500-03	EX-3
92-07-500-04	EX-4
92-07-500-05	EXW-1
92-07-500-06	SP-1

SOUTHWESTERN LABORATORIES

P.S.
Reviewed By

CHRIS BARRY

TEST RESULTS BY SAMPLE

Sample: 01A EX-1 Collected: 07/30/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.020	mg/kg	0.020	07/31/92	JFG
Toluene	SW846 8020	<0.020	mg/kg	0.020		
Ethylbenzene	SW846 8020	0.077	mg/kg	0.020		
Xylenes	SW846 8020	0.620	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	54.7	MG/KG	1.0	08/04/92	DBS
TOT.PET.HYDROCARBON PREP	FREON_EXT	08/03/92	DATE		08/03/92	CJG

Sample: 02A EX-2 Collected: 07/30/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.40	mg/kg	0.40	07/31/92	JFG
Toluene	SW846 8020	<0.40	mg/kg	0.40		
Ethylbenzene	SW846 8020	0.87	mg/kg	0.40		
Xylenes	SW846 8020	7.48	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	361	MG/KG	1.0	08/04/92	DBS
TOT.PET.HYDROCARBON PREP	FREON_EXT	08/03/92	DATE		08/03/92	CJG

Sample: 03A EX-3 Collected: 07/30/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.020	mg/kg	0.020	08/01/92	JFG
Toluene	SW846 8020	0.073	mg/kg	0.020		
Ethylbenzene	SW846 8020	0.315	mg/kg	0.020		
Xylenes	SW846 8020	3.560	mg/kg	0.020		
DIESEL - SOLID SAMPLE	SW846/8015	89.6	MG/KG	1.0	08/04/92	DBS
TOT.PET.HYDROCARBON PREP	FREON_EXT	08/03/92	DATE		08/03/92	CJG

Sample: 04A EX-4 Collected: 07/30/92

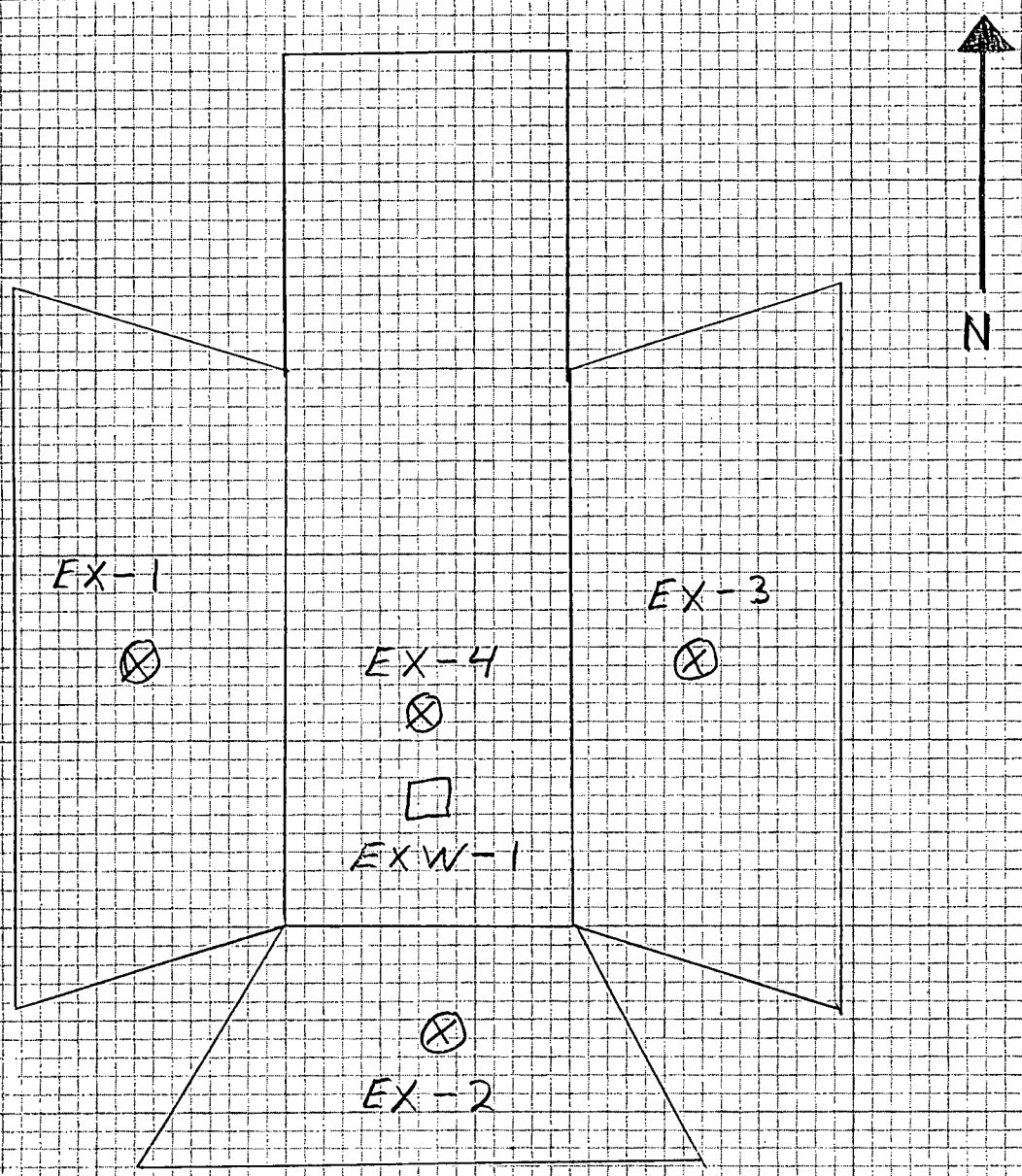
Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - SOIL SAMPLE	SW846 8020					
Benzene	SW846 8020	<0.40	mg/kg	0.40	07/31/92	JFG
Toluene	SW846 8020	1.74	mg/kg	0.40		
Ethylbenzene	SW846 8020	4.74	mg/kg	0.40		
Xylenes	SW846 8020	52.31	mg/kg	0.40		
DIESEL - SOLID SAMPLE	SW846/8015	48.2	MG/KG	1.0	08/04/92	DBS
TOT.PET.HYDROCARBON PREP	FREON_EXT	08/03/92	DATE		08/03/92	CJG

Sample: 05A EXW-1 Collected: 07/30/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX - WATER SAMPLE	SW846_8020					
Benzene	SW846_8020	<0.20	mg/l	0.20	07/31/92	JFG
Toluene	SW846_8020	1.31	mg/l	0.20		
Ethylbenzene	SW846_8020	2.29	mg/l	0.20		
Xylenes	SW846_8020	21.43	mg/l	0.20		
DIESEL - WATER SAMPLE	SW846/8015	45.8	MG/L	1.0	08/04/92	DBS
TOT.PET.HYDROCARBON PREP	FREON_EXT	08/03/92	DATE		08/03/92	CJG

BROWN AND CALDWELL CONSULTING ENGINEERS

REFERENCES/NOTES



Approximate excavation size is:
30' long X 15' wide X 15' deep

Not to scale

DATE CHECKED	CHECKED BY	JOB NUMBER	BY	DATE	CALC. NO.	SHEET NO.
		7059-10	LW	8-3-92		1/1

PROJECT	SUBJECT
WCNA - Artesia	Sample location map

GEN-020-3/5/85

Soil and Groundwater Investigation Work Plan

The Western Company of North America
Artesia, New Mexico Facility

March 3, 1993

Brown and Caldwell
Consultants

Brown and Caldwell
Consultants

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

March 3, 1993

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

19-7440-01

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

Dear Ms. Brown:

On behalf of The Western Company of North America, Brown and Caldwell Consultants is submitting the enclosed Soil and Groundwater Investigation Work Plan for the Artesia facility.

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

Very truly yours,

BROWN AND CALDWELL CONSULTANTS

Lynn M. Wright

Lynn M. Wright
Project Manager

LMW:mae

cc: Mr. Phillip Box, The Western Company of North America, Houston, Texas
OCD Artesia District Office

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CHAPTER 1

INTRODUCTION

The purpose and objective of this Soil and Groundwater Investigation Work Plan are described in this chapter. A site description and account of past activities at the Artesia, New Mexico facility are also presented.

Purpose

In a letter dated January 29, 1993, the New Mexico Oil Conservation Division (OCD) requested that a soil and groundwater investigation work plan be submitted for their approval. The purpose of this Soil and Groundwater Investigation Work Plan is to provide the OCD with information regarding field procedures, sample analyses, water well research procedures, and scheduling proposed for the Artesia facility.

Objectives

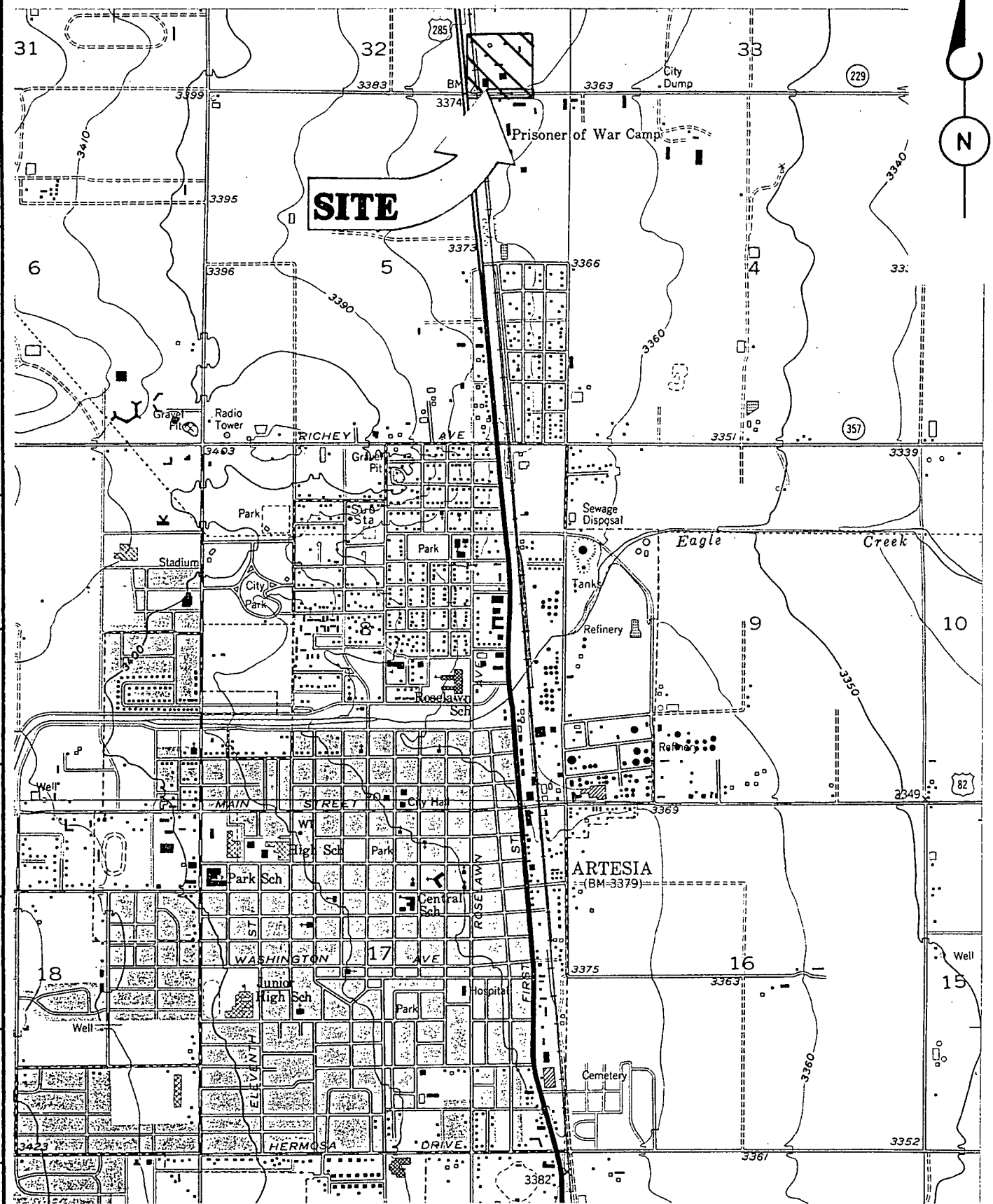
Based on the analytical results of soil and water samples collected during emergency removal activities of an underground field waste tank, the OCD has requested that a work plan be submitted. The objectives of this investigation work plan are: 1) to assist in determining vertical and horizontal extend of affected soil and groundwater, 2) provide data regarding fresh water wells in the vicinity of the site, and 3) identify a schedule for the planned activities.

Site Description

The Western Company of North America (Western) Artesia site is located at 2500 North First Street in Artesia, New Mexico. A vicinity map showing the location of the site is presented on Figure 1-1. The facility consists of a cement bulk plant, a two-story office building, a drum storage dock, and a non-operational water treatment area. A site map showing the layout of the facility is shown on Figure 1-2. The Artesia facility operates as an oil and gas servicing company providing well fracturing, acidizing, and cementing services to the petroleum industry. This site is identified as U.S. Environmental Protection Agency (EPA) Identification No. NMD 000711515.

Past Activities

On July 29, 1992, Western removed an underground field waste tank which was located adjacent to the railroad tracks on the north end of the facility (see Figure 1-2). During removal, the tank collapsed and released its contents into the tank pit. The liquid was pumped out of the tank pit by a vacuum truck and properly disposed by a licensed contractor into an injection well. The tank pit was overexcavated and soil



Brown and Caldwell Consultants, DALLAS–HOUSTON, TEXAS	0 1000 2000 SCALE: 1" = 2000'	TITLE: VICINITY MAP	DATE: 03/02/93
	DRAWN BY: JDN DATE 2/16 CHK'D BY: JLC DATE 2/16 APPROVED: LMW DATE	CLIENT: WESTERN COMPANY OF NORTH AMERICA	PROJECT NUMBER: 7440–01
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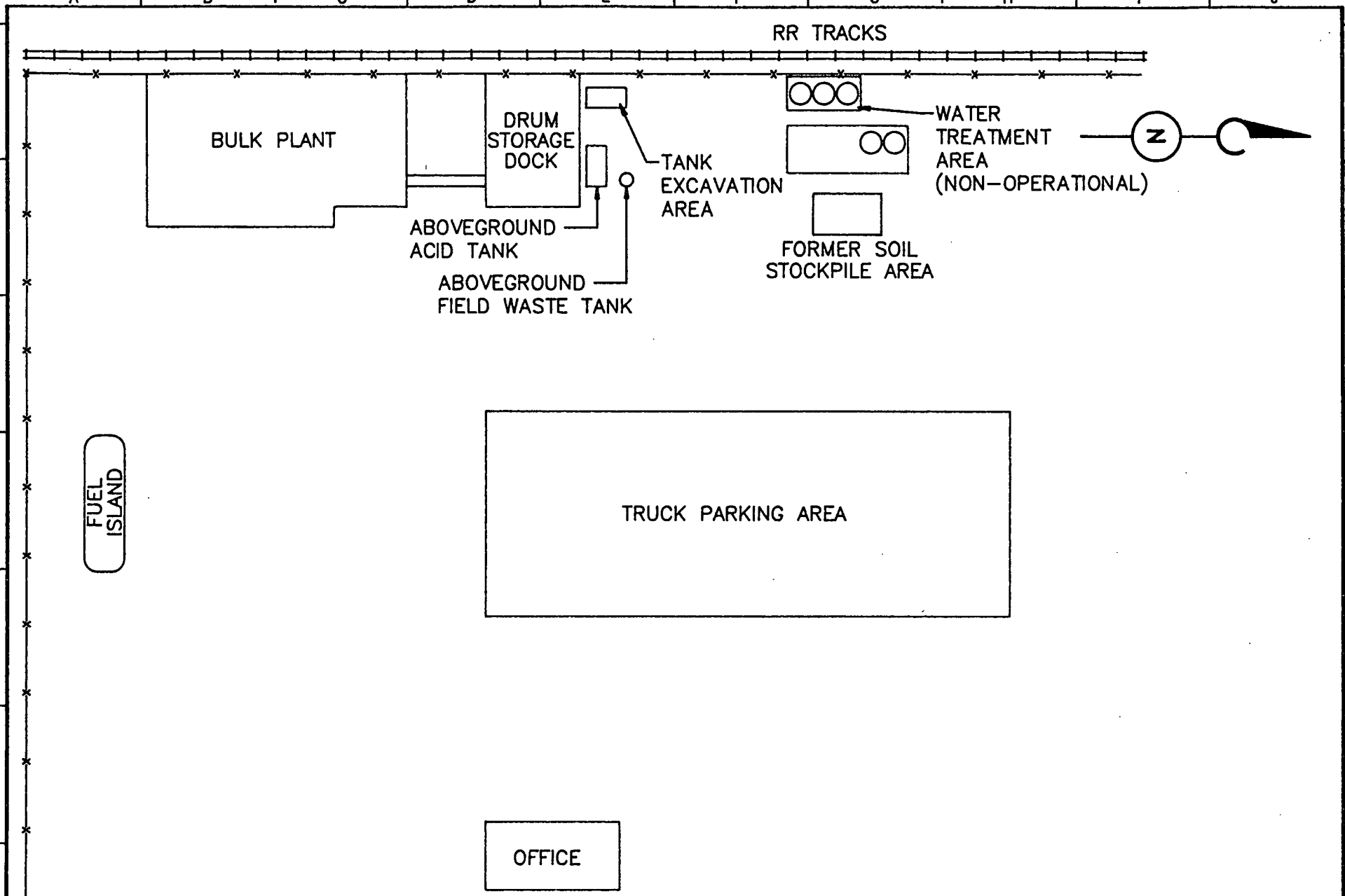

Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

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PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

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CHK'D BY: JLC DATE 2/16
APPROVED: LMW DATE 2/16

TITLE: SITE MAP
CLIENT: WCNA
SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 03/02/93
PROJECT NUMBER: 7440-01
FIGURE NUMBER: 1-2

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samples were taken from the south, east, and west walls and the floor of the excavation. A sample of the groundwater that had seeped into the bottom of the excavation was also collected. The analytical results of the soil and groundwater samples were submitted to the New Mexico Oil Conservation Division (OCD) for review. After obtaining approval from the OCD, the excavation was backfilled with clean soil, and the excavated soil was disposed of at CRI on Highway 82/60 between Hobbs and Carlsbad, New Mexico. Analytical results of the soil and water samples are presented in Table 1-1. A chronology of events for the site is presented in Table 1-2.

All correspondence with the OCD regarding the field waste tank removal is presented in Appendix A.

Table 1-1 Analytical Results for Soil and Water Samples
July 30, 1992, The Western Company of North America
Artesia, New Mexico

Sample Identification	Laboratory Analyses						Field Measurement[b]
	EPA Method 8020[a]					EPA Modified 8015 Diesel Fraction[a]	pH
	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX		
EX-1 (West Wall)	<0.020	<0.20	0.077	0.620	0.697	54.7	NA
EX-2 (South Wall)	<0.40	<0.40	0.87	7.48	8.35	361	NA
EX-3 (East Wall)	<0.020	0.073	0.315	3.56	3.948	89.6	NA
EX-4 (Floor)	<0.40	1.74	4.74	52.31	58.79	48.2	NA
EXW-1 (Water)	<0.20	1.31	2.29	21.43	25.03	45.8	NA
Tank Contents Pumped from Excavation	NA	NA	NA	NA	NA	NA	6.0-7.0

[a]measured in milligrams per kilogram for soil and milligrams per liter for water = parts per million.
[b]measured in the field with pH test paper.
NA = not analyzed for this parameter.

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

Date	Description of Event
July 29, 1992	Removal of field waste tank. Tank collapses during removal.
July 30, 1992	Tank pit overexcavated. East, west, south walls, and floor soil samples and one water sample collected.
August 4, 1992	Analytical results for soil and water samples submitted to the New Mexico Oil Conservation Division (OCD).
August 10, 1992	Verbal approval to backfill the excavation with clean soil granted by the OCD.
September 8, 1992	Excavation backfilled with clean soil.
October 21, 1992	Stockpiled soil disposed of at CRI on Highway 80/62, between Hobbs and Carlsbad, New Mexico.
January 29, 1993	OCD requests the submittal of a technical work plan to define the vertical and horizontal extent of affected soil and groundwater at the facility.

CHAPTER 2

SOIL AND GROUNDWATER INVESTIGATION

The following chapter provides a discussion of the investigation activities for The Western Company of North America (Western) Artesia, New Mexico facility. These activities will assist in determining the vertical and horizontal extent of affected soil and groundwater and provide data concerning fresh water wells in the vicinity of the site.

Soil Boring Locations and Drilling Procedures

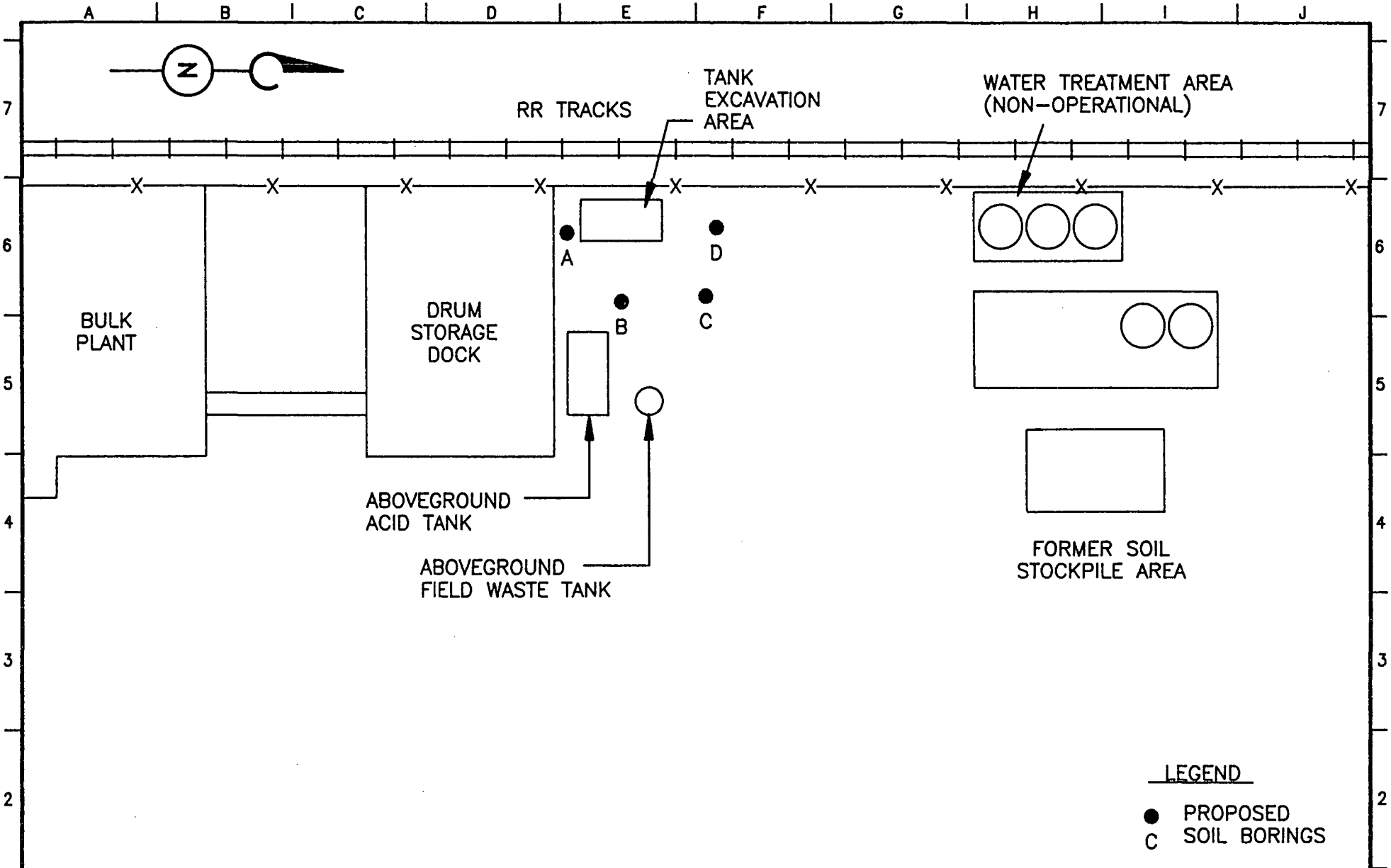
Brown and Caldwell Consultants (BCC) will drill four soil borings at the site to determine subsurface stratigraphy and to assist in determining the vertical and horizontal extent of affected soils near the former location of the underground field waste tank. Based on the analytical results of the walls and floor soil samples taken during overexcavation, one boring will be placed south of the excavated area near the drum storage dock; one boring will be placed near the north end, the northeast corner, and the east side of the excavated area. The depth of each boring is estimated to be approximately 15 to 20 feet from the ground surface. The anticipated soil boring locations are presented on Figure 2-1.

The four soil borings will be drilled utilizing a hollow stem auger or air rotary drilling methods depending on the lithology encountered at the facility. Each boring will be continuously sampled using a split-spoon sampler.

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

Sample Selection and Analyses

Two samples from each boring will be selected for laboratory analysis by a certified laboratory. Soil samples will be selected on the basis of flame ionization detector (FID) or photoionization detector (PID) readings and visual observations. The soil samples will be split with half of the sample being placed in a laboratory-cleaned glass jar and half placed in a clean 16-ounce wide-mouth container covered with aluminum foil with the cap screwed on to seal the container. The sample jar will then be placed on ice to minimize the loss of volatile constituents. The headspace of the portion of the sample placed in the wide-mouth container will then monitored for organic vapors using an FID/PID. At the conclusion of the sampling, the cooled samples will be delivered by express courier to Brown and Caldwell Analytical (BCA) in Glendale, California using proper chain-of-custody procedures.



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Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

APPROVED: _____ PROJECT MANAGER DATE _____

APPROVED: _____ BROWN AND CALDWELL DATE _____

REV.	DESCRIPTION	BY	DATE

0 25 50
SCALE: 1" = 50'
DRAWN BY: JDN DATE 2/16
CHK'D BY: JLC DATE 2/16
APPROVED: LMW DATE 2/16

TITLE: PROPOSED SOIL BORING LOCATION MAP

CLIENT: WESTERN COMPANY OF NORTH AMERICA

SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 03/02/93

PROJECT NUMBER: 7440-01

FIGURE NUMBER: 2-1

Based on the analytical results of the soil samples and field measurements taken during over excavation of the field waste tank area, and knowledge of materials used by Western, the soil samples selected will be analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX) by EPA Method 8020. The soil samples will also be analyzed for total petroleum hydrocarbons (TPH) by EPA Modified Method 8015 for the diesel constituent fraction. These analyses should sufficiently indicate whether constituents from the contents of the field waste tank are present in the adjacent soils.

Monitoring Well Installation

After soil sampling procedures are completed, it is anticipated that each soil boring will be advanced to a suitable depth (approximately 25 to 30 feet below ground surface) in preparation for the installation of four, 2-inch-diameter monitoring wells. The anticipated location of the monitoring wells is shown on Figure 2-2.

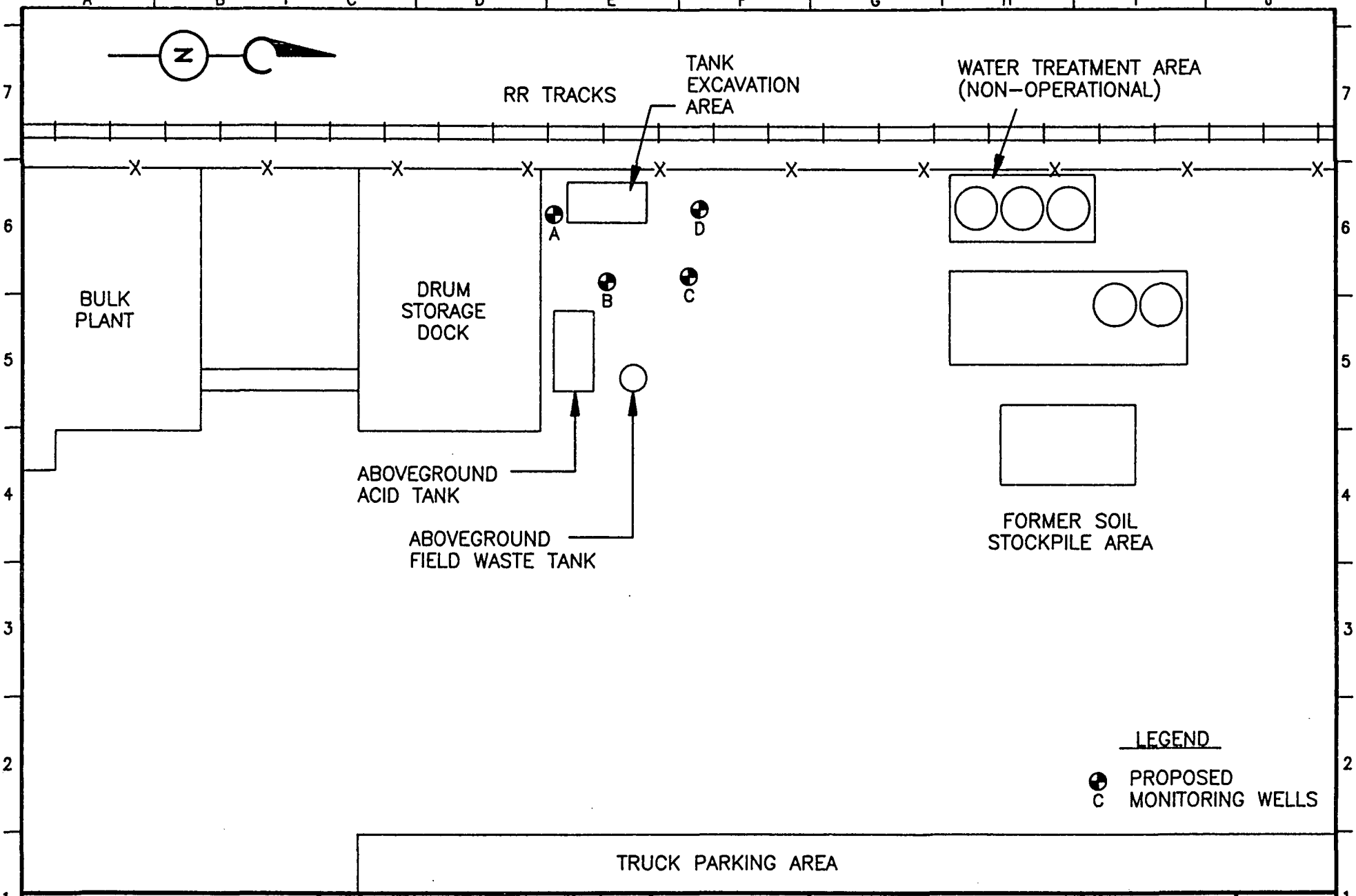
Each well will consist of approximately 2.5 feet of 2-inch-diameter schedule 40 PVC blank casing, to act as a sump for the collection of fine sediments, followed by 10 feet of 2-inch diameter Schedule 40 PVC slotted casing (0.01-inch slots). The slotted PVC will be followed by a 2-inch-diameter Schedule 40 PVC solid casing to the surface. Each section of casing will be joined using threaded, flush-mounted connections.

Silica sand (20-40 grain size) will be slowly poured down the borehole to provide a filter pack. The filter pack will extend approximately two feet above the top of the screened interval and this depth will be verified by measurement. Approximately two feet of bentonite pellets will be poured down the borehole immediately above the filter pack and hydrated to form an annular seal. The remaining annular space will be filled with a cement/bentonite grout mix. Each monitoring well will be completed approximately 0.5 feet above grade as a locking surface completion surrounded by a small (approximately three-foot-diameter) concrete pad.

Well Development, Sampling and Analysis

Monitoring wells installed at the facility will be developed to remove fine sediments from the bottom of the well. Development will be accomplished by using a clean stainless steel bailer to evacuate the well until sediment-free water is obtained. The evacuated water will be placed in the on-site aboveground field waste tank for disposal.

Groundwater samples for laboratory analysis will be collected from each monitoring well. Prior to sample collection, a clean stainless steel bailer will be used to purge each well. Water will be removed until the pH, temperature, and specific conductance stabilized (two consecutive readings). After purging the monitor wells, they will be allowed time to recharge to static water level and then sampled.



E:\7440\7440-01

Brown and Caldwell Consultants
DALLAS-HOUSTON, TEXAS

APPROVED: _____ DATE _____
PROJECT MANAGER

APPROVED: _____ DATE _____
BROWN AND CALDWELL

REV.	DESCRIPTION	BY	DATE

0 25 50
SCALE: 1" = 50'
DRAWN BY: JDN DATE 2/16
CHK'D BY: JLC DATE 2/16
APPROVED: LMW DATE 2/16

TITLE: PROPOSED MONITORING WELL LOCATION MAP

CLIENT: WESTERN COMPANY OF NORTH AMERICA

SITE LOCATION: ARTESIA, NEW MEXICO

DATE: 03/02/93

PROJECT NUMBER: 7440-01

FIGURE NUMBER: 2-2

The monitoring wells will be sampled at static water level by lowering a clean Teflon bailer into the well. All equipment used for bailing and sampling will be 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 will be placed in labeled, laboratory-cleaned bottles. These bottles will be immediately placed on ice to prevent the loss of any volatile constituents. At the conclusion of sampling, the cooled samples will be shipped via overnight express to BCA in Glendale, California using proper chain-of-custody procedures.

The groundwater samples will be analyzed for BTEX constituents only, using EPA Method 8020. This analysis should be sufficient to detect if groundwater near the excavation has been affected by material that was stored in the underground field waste tank.

Water Well Search

In the January 29, 1993, letter to Western, the New Mexico Oil Conservation Division (OCD) requested that data (water levels, water quality, total depth, screened interval, etc.) be collected for water wells within a 1/2-mile-radius of the site. Because accurate location information for each well could not be obtained, the requested data cannot be submitted with this work plan. However, the water well data will be obtained from the State Engineers Office in Roswell, New Mexico and will be included in the subsequent Soil and Groundwater Investigation Report.

CHAPTER 3

INVESTIGATION REPORT AND SCHEDULE

The following chapter outlines the contents of the proposed investigation report and a tentative schedule for project completion.

Investigation Report

After completion of the investigation activities described herein, an investigation report will be submitted to the New Mexico Oil Conservation Division (OCD). This report will detail all field activities, procedures, laboratory analytical results, information from the water well search, as well as conclusions and recommendations for the facility. Appropriate maps, boring logs, and backup information will also be included. In the event that laboratory analytical results indicate constituent levels above regulatory limits, a remedial action plan (RAP) will be submitted as part of the investigation report.

Schedule

Brown and Caldwell Consultants (BCC) anticipates that field work at the facility and the water well record search will begin within 30 days after approval of this work plan is received from the OCD. The Santa Fe and Artesia offices of the OCD will be notified at least seven days prior to commencement of work at the facility. The investigation activities, including the water well search, should be completed within seven working days after the start of field work.

Following the completion of investigation activities, an investigation report will be filed with the OCD within 45 days.

APPENDIX A

REGULATORY CORRESPONDENCE

Brown and Caldwell
Consultants

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

August 4, 1992

Mr. Roger Anderson
New Mexico Energy Minerals and
Natural Resources Department
Oil Conservation Division
P. O. Box 2088
Santa FE, New Mexico 87504

19-7059-10

Subject: Soil and Water Sample Results
The Western Company of North America
Artesia, New Mexico Facility

Dear Mr. Anderson:

As discussed during our telephone conversation on July 29, 1992, Brown and Caldwell Consultants (BCC), on behalf of the Western Company of North America (WCNA), is submitting the attached analytical results from water and soil samples collected at the WCNA facility. The samples were collected during emergency removal activities of an underground field waste tank at the facility.

Four soil samples and one water sample were collected to verify cleanup of affected material had been achieved (see attached sample location map). The water sample was collected at the bottom of the tank pit from water seeping into the excavation. Soil samples were collected from the walls and floor of the excavation. No sample was collected from the north side of the excavation because this sidewall was removed to allow equipment access to the tank pit.

Your review and comments regarding the attached analytical results as well as future considerations for final closure of the field waste tank will be appreciated. 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/attach: Mr. Phillip Box, Western Company of North America, Houston, TX
Mr. Teddy Gandy, Western Company of North America, Hobbs, NM

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

January 29, 1993

RECEIVED
FEB 02 1993
REAL ESTATE AND
FACILITIES CONSTRUCTION

CERTIFIED MAIL
RETURN RECEIPT NO. P-667-241-937

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

RE: Artesia Service Facility
Soil & Groundwater Contamination Investigation
Eddy County, New Mexico

Dear Mr. Box:

The New Mexico Oil Conservation Division (OCD) has received the August 4, 1992, analytical results from water and soil samples collected at the Western Company of North America's (WCNA) Artesia Service Facility submitted by Brown and Caldwell Consultants on behalf of the WCNA. The analytical results were collected during the emergency removal activities of an underground field waste tank at the facility.

Based on the analytical results, the OCD requests that the WCNA submit an investigation workplan to determine the extent and magnitude of the soil and groundwater contamination at your Artesia Service Facility. Please submit the required investigation plan to the OCD Santa Fe Office by March 1, 1993. The plan should include a time schedule for all investigation activities and submission of an investigation report.

Because of the possible threat of contamination to underground drinking water sources, the OCD requires the WCNA to identify all water wells within one-half (1/2) mile of the facility. Include all available data such as location (by quarter/quarter section), well depth, water level, water quality, and purpose of the well (ie. domestic, stock, community). Please submit this information with your investigation workplan.

Please note that when analyzing groundwater samples the detection limit must be low enough to detect contaminant levels at or above the Water Quality Control Commission (WQCC) groundwater standards. Enclosed is a copy of the New Mexico WQCC Regulations.

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

Sincerely,

Kathy M. Brown

Kathy M. Brown
Geologist

xc: Mike Williams, OCD Artesia Office