GW - 28

REPORTS

YEAR(S):

1997-1999

BOREHOLE LITHOLOGIC DATA
SUBSURFACE HYDROCARBON INVESTIGATION
NAVAJO REFINERY, ARTESIA, NEW MEXICO
1991 - 1997

prepared for:

Navajo Refining Company
501 East Main Street
P. O. Drawer 159
Artesia, New Mexico 88210

September 1997

COVENANT TECHNICAL ASSOCIATES, INC.

12258 Mountain Haze NE, Albuquerque, NM 87122 (505) 856-1755

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Introduction

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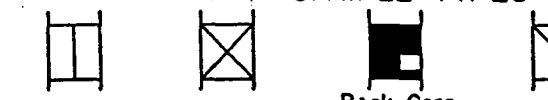
Beginning in 1991, Navajo Refining Company commenced a drilling program to evaluate shallow subsurface conditions in the area immediately to the east of the Artesia refinery. The program was undertaken for several reasons. Initially, the program was designed to provide information as to the possible release of hydrocarbons from the process and product storage areas of the refinery and, if found, to provide information on the extent and magnitude of such releases. Information from investigative work conducted in 1992 was compiled and presented in a report to Navajo entitled "Investigation of the Subsurface Hydrocarbon Plume at the Navajo Refinery, Artesia, New Mexico." Recommendations presented in the 1992 report led to the installation of an extensive hydrocarbon recovery trench system east of the refinery along Bolton Road. Follow-up drilling was conducted in 1995 in an attempt to locate highly permeable zones which could be utilized for re-injection of treated water produced from the Bolton Road trenches and other product recovery units at the refinery. Additional data was collected during confirmatory drilling to assist in interpretation and evaluation of data generated from the electromagnetic (EM) surface geophysical surveys performed in 1996 and 1997.

Borehole and monitor well information collected during the subsurface investigations has been assembled and included in this volume. To date, over 200 boreholes (not including monitor wells) have been drilled in the area northeast, east and southeast of the refinery complex. Except for some borehole and monitor well data included with the 1992 investigation report and data presented in the RCRA reports of the contamination studies conducted along Three-Mile Ditch, borehole information has not been compiled or presented in a convenient and accessible form for potential use in future investigations or remedial actions. Consequently, the field borehole data was collected and entered into a PC Windows-based computer program which quickly generated a lithologic boring diagram to graphically provide information on subsurface features and drilling details. Interpretation is assisted by reference to the "Key to Symbols and Soil Classification" shown on the next page. Ultimately, the quality of the data provided in the boring logs is dependent on the type of drilling equipment used, the types of information collected and tests performed on each sample, and the skill and diligence of the person recording and interpreting the information.

The collective data reveals the existence of a near surface saturated zone (NSSZ) present at depths from 15 to 30 feet. The NSSZ consists of highly permeable gravel seams interbedded with fine grained silts and clays. The gravel zones, which result from fluvial deposition of high energy sediments transported by the ancestral Eagle Creek, are extremely variable in location and extent and overlain by 10 to 15 feet of silty clay and clay soils. Because no surface manifestation of the variable subsurface sedimentary features exists, the shallow boring and monitor well logs provide discrete-point information on below-ground characteristics. This information can be used to guide further efforts to locate permeable and/or hydrocarbon containing zones either for additional investigation or for installation of hydrocarbon remediation equipment.

KEY TO SYMBOLS AND SOIL CLASSIFICATION

SAMPLE TYPES



Thin-walled Tube | Split-barrel | Rock Core w/Testable Sample | Disturbed | No Recovery

COMPRESSIVE STRENGTH TESTS

Hand Penetrometer | Torvane | Unconfined | U-U Triaxial

Major Divisions			Group Symbols	Typical Names	Consistency Terms
COARSE-GRAINED SOILS: More Than Half of Material Is LARGER Than No. 200 Sieve Size.	GRAVELS: More Than Half of Coarse Fraction Is LARGER Than No. 4 Sieve Size.	Clean Gravels (Little or no Fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines.	
			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines.	
		Gravels With Fines (Appreciable Amount of Fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures.	
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures.	
	SANDS: More Than Half of Coarse Fraction Is SMALLER Than No. 4 Sieve Size.	Clean Sands (Little or no Fines)	SW	Well-Graded Sands, Gravelly Sands, Little or no Fines.	
			SP	Poorly-Graded Sands, Gravelly Sands, Little or no Fines.	
		Sands With Fines (Appreciable Amount of Fines)	SM	Silty Sands, Sand-Silt Mixtures.	
			SC	Clayey Sands, Sand-Clay Mixtures.	
FINE-GRAINED SOILS: More Than Half of Material is SMALLER Than No. 200 Sieve Size.	SILTS and CLAYS	Liquid Limit Less Than 50	ML	Inorganic Silts & Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity.	
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays.	
			OL	Organic Silts & Organic Silty Clays of Low Plasticity.	
		Liquid Limit Greater Than 50	MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sand or Silty Soils, Elastic Silts.	
			CH	Inorganic Clays of High Plasticity, Fat Clays.	
			OH	Organic Clays of Medium to High Plasticity, Organic Silts.	

Penetration Resistance, Blows/Foot*	Descriptive Term
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Over 50	Very Dense

* Based on driving a split-barrel sampler with a 140 lb. weight dropped 30 in.

Compressive Strength, ton/sq ft	Descriptive Term
0 to 0.25	Very Soft
0.25 to 0.50	Soft
0.50 to 1.00	Firm
1.00 to 2.00	Stiff
2.00 to 4.00	Very Stiff
Over 4.00	Hard

Ref. Unified Soil Classification System (ASTM D 2487)

Offsite Borings
1991 - 1992

LOG OF BORING OS #01

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Brown loam
5		CL	Caliche soil
10			Gray clay, H/C odor, staining(?) at 11 ft.
15			16-19 ft. gravelly(?) clay, silt, H/C odor
20		GC	Gravel, water
25		CL	Silty
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location SE of fire training center. At completion of drilling, hole caved to 22.6 ft., DTW 7.5 ft. Product TSTM on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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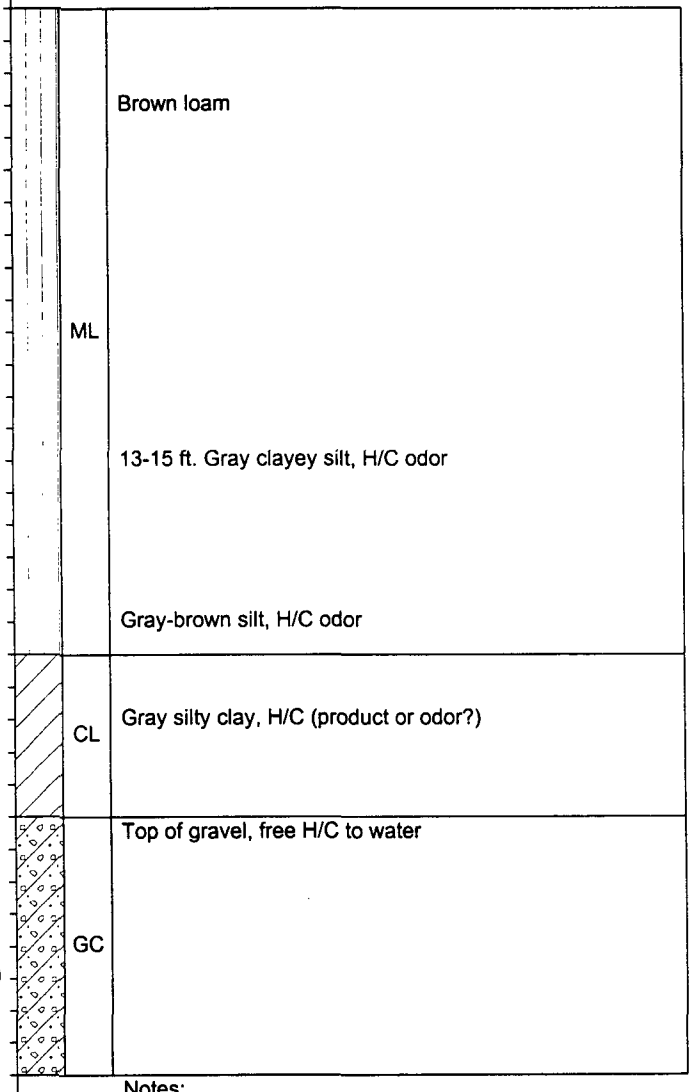
LOG OF BORING OS #02

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman



Notes:
Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location W. of fire training center, approx. 75 ft. north of E-W dirt road. At completion of drilling, hole caved to 23 ft., DTW 7.6 ft. H/C TSTM on 10/04. Refinery workers plugged back hole with cuttings. DTW=Depth to water, H/C=Petroleum hydrocarbon, NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #03

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			
10			Black staining, H/C odor
			Gray clayey silt
15		ML	
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location south of MW-28. Approx. 0.25 in. product on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #04

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-14 ft. Clayey silt; gray, tan and white; gypsiferous
5			
10			
15			H/C odor at 18 ft., gasoline smell, water at 18 ft.(?)
20			Total depth 24 ft.(?)
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 250 ft. north of 91-02. Product TSTM on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #05

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			Loam, tan
10			
		ML	
15			Clayey silt, gray, faint H/C odor
20			
			Water
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 550 ft. north of 91-02. Product TSTM on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #06

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			Loam, brown
10			Clayey silt, tan, gypsiferous
15		ML	
20			Water
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 1000 ft. north of 91-02. Product TSTM on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #07

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10			
15			No H/C odor or fluid
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in field approx. 600 ft. south of Eagle Creek and 900 ft. east of old city wastewater treatment plant. No lithologic information in log book. On 10/04 DTW measured 12 ft., no product. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #08

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			Clayey loam, brown
10		ML	
15			Clayey silt, gypsiferous
20			Water, no H/C odor or fluid
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 1250 ft. north of 91-01. No product measured on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #09

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			Loam, brown
10			Clayey silt, tan and white
15		ML	
20			
25			Water, possible trace H/C odor
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 1000 ft. north of 91-01. Product TSTM on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #10

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/03/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/03/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10			Caliche, tan and white, faint H/C odor
15		ML	
20			H/C odor and product on water
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 600 ft. north of 91-01. Product TSTM on 10/04. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #11

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/04/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/04/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, brown
5			
10		CL	11 ft. Silty clay, black, no H/C odor
			13 ft. Clayey silt, gray, H/C odor
15			
20		ML	21 ft.(?) H/C odor and NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 50 ft. south of KWB-10. On 10/07 top of fluid 6.3 ft.(?), top of water approx. 2.0 ft(?). Refinery workers plugged back hole with cuttings.

DTW=Depth to water,.H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #12

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/04/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/04/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			Loam, brown
10			9.5 ft. Clayey silt, black, trace of H/C odor
15		ML	14 ft. Clayey silt, gray, H/C odor
20			18 ft. Sandy silt, dripping with jet fuel, water, indication of migrating H/C in zone above water zone
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 500 ft. west of KWB-10 in field north of dirt road. On 10/07 indication of NAPL in caved hole. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #13

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/04/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/04/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Topsoil, brown
			2 ft. Caliche
5			5 ft. Silty loam, light brown
10		ML	13.5 ft. Clayey silt, gray
15			Water (18 ft.?), faint H/C odor, no NAPL
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

ZRS measurement on 10/11/91 found approx. 1/4 in. H/C

Location in "boneyard" east of TEL area near 1995 boring OS 95-15. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #14

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/04/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/04/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Top soil, brown
5			(no further soil descriptions)
10			
15			
20			18 ft.(?) H/C and NAPL, not as much water
25			
30			Notes:
35			Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?). ZRS measurement on 10/11/91 found approx. 1/4 in. H/C Location in field east of old wastewater treatment plant, approx. 150 ft. east of security fence and 750 ft. south of Eagle Draw fence. Location near 1995 boring OS 95-06. Refinery workers plugged back hole with cuttings. DTW=Depth to water, H/C=Petroleum hydrocarbon NAPL=Non-aqueous phase liquid, TSTM=Too small to measure
40			

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LOG OF BORING OS #15

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/04/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/04/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, tan and brown
			2 ft. Caliche, white
5			(no further soil descriptions)
10			
15		FO	
20			20 ft. Water, no H/C odor, no NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

ZRS measurement on 10/11/91 found no indication of H/C

Location in field east of old wastewater treatment plant, approx. 100 ft. east of security fence and 250 ft. south of Eagle Draw fence. Location near 1995 boring OS 95-02. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #16

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/08/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/08/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Loam, brown
			Becomes moister
5			
10		ML	
			13 ft. Caliche soil, white, caliche nodules
15			
20			Grades into brown clay
25		CL	
30			30 ft. Water, no H/C odor, no NAPL
35			
40			
45			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

ZRS measurement on 10/11/91 found no indication of H/C

Location in Armstrong field south of Bearing Supply Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #17

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/08/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/08/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Loam, brown
5			
10		ML	10 ft. Clayey silt, tan
15			14 ft. Gravel in clayey silt, well rounded, faint H/C odor 17-19 ft. (?) sorted, more H/C odor at top of interval
20		GC	19 ft. Gravel becoming moist 20 ft. Gray zone in gravel, trace NAPL
25		CL	22 ft. H/C odor, drilling out of gravel into gray silty clay
30			Wet to total depth
35			Notes: Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?). ZRS measurement on 10/11/91 found H/C TSTM Location in Armstrong field south of Coll farm house. Refinery workers plugged back hole with cuttings. DTW=Depth to water, H/C=Petroleum hydrocarbon NAPL=Non-aqueous phase liquid, TSTM=Too small to measure
40			

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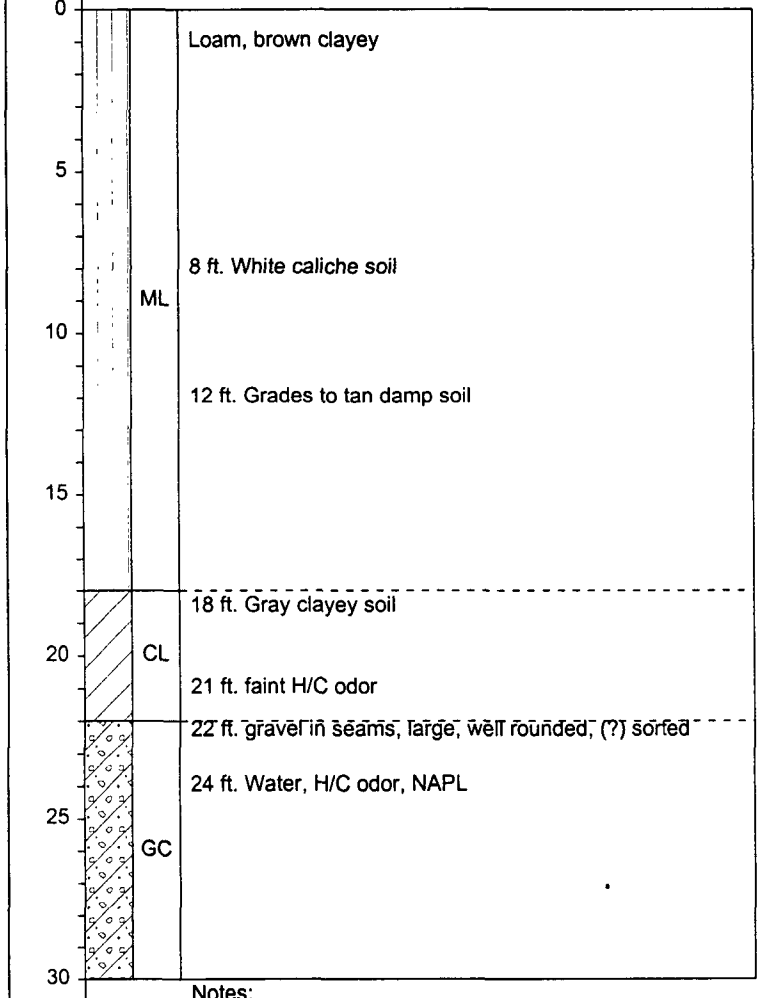
LOG OF BORING OS #18

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/08/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/08/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman



Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

ZRS measurement on 10/11/91 found H/C TSTM

Location in Armstrong field south of highway, midway between Coll farm house and tenant farmer. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #19

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/08/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/08/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Tan silty clay loam
5			7 ft. White/tan caliche soil
10		ML	12 ft. Brown clayey silt
15			16 ft. Trace H/C odor
20			19 ft. Top of gravel, water, H/C odor and NAPL
25		GC	19-30 ft. Gravel, unconsolidated, in silt/clay
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

On 10/11/91 ZRS measured 2 ft. of H/C

Location in Armstrong field south of tenant farmer house. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #20

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/08/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/08/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Tan silty clayey loam
5			
10			
			13 ft. Mottled white/brown silty
		ML	
15			15 ft. Gray clayey silt, H/C odor
			19 ft. Water
20			
25			25 ft.(?) Gray clayey silt, H/C odor
			15-29 ft. No good indication of NAPL
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Measurement by ZRS on 10/11/91 found H/C TSTM

Location in Armstrong field southeast of tenant farmer house. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #21

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/08/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/08/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			
10			
			13 ft. Brown clayey loam, mottled
15		ML	
			17 ft. Wet caliche soil
20			
25			
30			
			Water no H/C odor, no NAPL
		GP	Gravel and sand
35			Notes:
			Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).
			Measurement by ZRS on 10/11/91 found no indication of H/C
40			Location in Armstrong field southeast of Diamond Shamrock station. Refinery workers plugged back hole with cuttings.
			DTW=Depth to water, H/C=Petroleum hydrocarbon NAPL=Non-aqueous phase liquid, TSTM=Too small to measure
45			

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LOG OF BORING OS #22

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/09/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/09/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			(no other soil descriptions)
10			
15		ML	
20			
25			
30			30 ft. Water, no H/C odor
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Measurement by ZRS on 10/11/91 found no indication of H/C

Location in Armstrong field approx. 550 ft. south of OS 91-16. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #23

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/09/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/09/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown/tan loam
10		ML	10 ft. Wet caliche soil
20			20 ft. Brown clay
25		CL	25 ft.(?) Gray mottled brown clay
30			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Measurement by ZRS on 10/11/91 found no indication of H/C

Location in Armstrong field approx. 500 ft. south of OS 91-17. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #24

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/09/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/09/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10		ML	(No soil descriptions above 21 ft.)
15			
20			
		GP	21 ft (?) Water, gravel, no H/C odor, no NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Measurement by ZRS on 10/11/91 found no indication of H/C

Location in Armstrong field approx. 550 ft. south of OS 91-18. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #25

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/09/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/09/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown/tan clayey loam
5			5 ft. White caliche soil
10		CL	Grades into tan/brown caliche soil
15			
20			20 ft. Water
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Measurement by ZRS on 10/11/91 found no indication of H/C

Location in Armstrong field approx. 550 ft. south of OS 91-18. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #26

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/09/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/09/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Silty loam, tan and brown
5			
10			12 ft. Caliche soils(gyp), tan and white
15			15 ft. Caliche soils, white
20			18 ft. H/C odor
		ML	Clayey silt, gray, H/C odor
25			24 ft.(?) NAPL
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 800 ft. south of KWB-10 midway between KWB-10 and highway 82. On 10/11/91 measured approx. 1/4 in. H/C product. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #27

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/09/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/09/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Loam, brown and tan
5			
10		ML	10 ft. Clayey silt, gray, rank(?) H/C odor
15			
20			19 ft.(?) NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 400 ft. north of KWB-10 along dirt road. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #28

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/11/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/11/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, brown
10			15 ft. Caliche soil, white, no H/C odor
15			(no further soil description)
20			19 ft.(?) Water, no NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 100 ft. south of KWB-1 wells along dirt road. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #29

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/11/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/11/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, brown Clayey loam, brown
10		FO	(no further soil description) 18 ft.(?) Water, no H/C odor or NAPL
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location approx. 700 ft. east of KWB-1 wells along dirt road midway between wells and Bolton Rd. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #30

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/11/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/11/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, brown
			3 ft. Caliche soil, white
5			
10			12 ft. Caliche soil, gray, silty, H/C odor
			(no further soil description)
15			17 ft.(?) Water and NAPL (lots of it !)
20			
			Wet zone to 28 ft.
25			28 ft. Caliche, white, dry
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location on west side Bolton Rd. at quarter section location approx. 1350 ft. north of highway 82.
Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #31

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/15/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/15/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, brown
5			
			8 ft. Caliche soil, tan and white
10			(no further soil description)
15			15 ft. Water, no odor, no NAPL
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location on west side Bolton Rd. approx. 600 ft. north of OS 91-30 and 1950 ft. north of highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #32

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/15/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/15/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, tan and brown
5			Caliche soil, white
10			(no further soil description)
15			15 ft. Water, no odor, no H/C
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located in pecan grove approx. 200 ft. east of OS 91-33. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #33

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/15/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/15/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, tan and brown
5			Caliche soil, white and tan
10			
15		ML	14 ft. Clayey silt, gray, H/C odor
20			
25			24 ft. Water, H/C odor, NAPL
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located on east side of Bolton Rd. approx. 175 ft. south of OS 91-30. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #34

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/15/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/15/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			(no soil descriptions given)
5			
10			
15			No odor, no NAPL
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located 1,075 ft. east of OS 91-33 and Bolton Rd. in pecan grove. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #35

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/15/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/15/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			(no soil descriptions given)
5			
10			
15			
20			18 ft.(?) No odor, no NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located in pecan grove approx 1,400 ft. east of Bolton Rd. adjacent to highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #36

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/15/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/15/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, brown and tan
5			Caliche soil, light tan
			Clayey silt, brown and tan
10		ML	
15			
			19 ft. Water, no H/C odor, no NAPL
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located approx. 200 ft. east of Bolton Rd. and highway 82 intersection in SW corner of pecan grove. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #37

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, brown and tan
5			Caliche soil, tan and white
10		ML	14 ft. Clayey silt, gray, H/C odor
15			18 ft. Water, trace NAPL, sheen
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located on east side of Bolton Rd. approx. 100 ft. north OS 91-30. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #38

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			(no soil descriptions given)
5			
10			
14 ft. H/C odor			
15			
18 ft. Trace NAPL, sheen, H/C odor			
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located on east side of Bolton Rd. approx. 375 ft. north of OS 91-30. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #39

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, tan and brown
12			12 ft. Caliche soil, brown and white
15			15 ft. Very faint H/C odor
18			18 ft. Water, no NAPL
20			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located on east side of Bolton Rd. approx. 500 ft. north OS 91-30. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #40

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, tan and brown
5			3 ft. Caliche soil, tan and white
10		CL	10 ft. Clayey soil, brown and red
15		ML	14 ft. Clayey silt, gray, trace odor (musty, very old)
20			18 ft. Water, trace H/C sheen, odor
25			
30			
35			
40			

Notes:
Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located in pecan grove approx. 100 ft. east of Bolton Rd. and 100 ft. north OS 91-30. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #41

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, tan and brown
5			
10			Caliche, tan and white
15		CL	16 ft. Clayey soil, gray and light tan 19 ft. Clean at total depth
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located in pecan gronve approx. 200 ft. east of Bolton Rd. and 150 ft. north OS 91-30. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #42

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	Loam, tan and brown
5			Caliche soil, white and brown
10			13 ft. Caliche soil, gray
15			19 ft.(?) Water
20			22 ft. Caliche soil, gray, no free water Trace H/C odor at total depth, no H/C sheen
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located in pecan grove approx. 100 ft. east of Bolton Rd. and OS 91-33. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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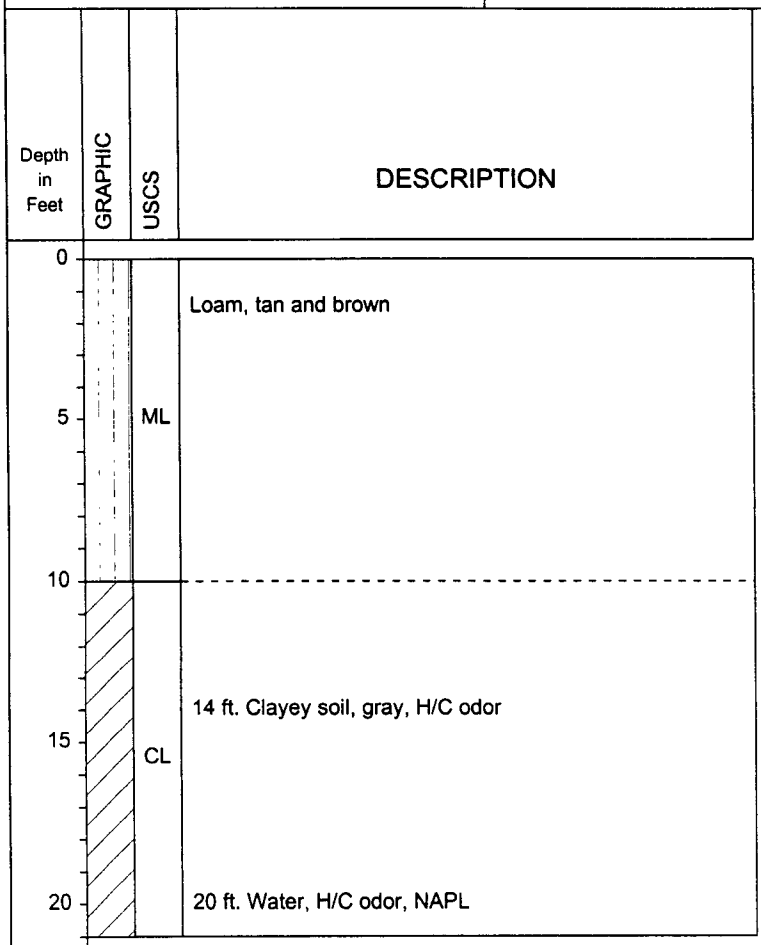
LOG OF BORING OS #43

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman



Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Located on east side of Bolton Rd. approx. 400 ft. south of OS 91-30. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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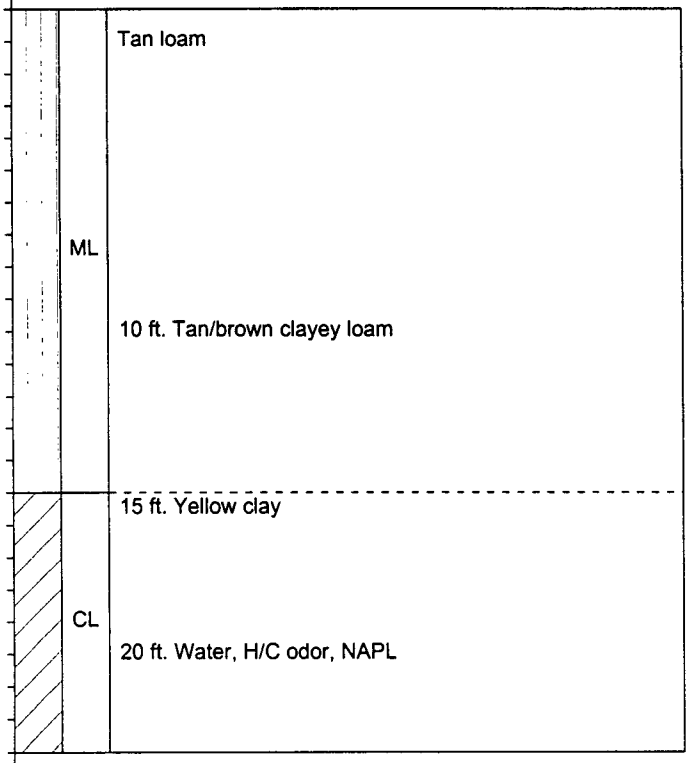
LOG OF BORING OS #44

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman



Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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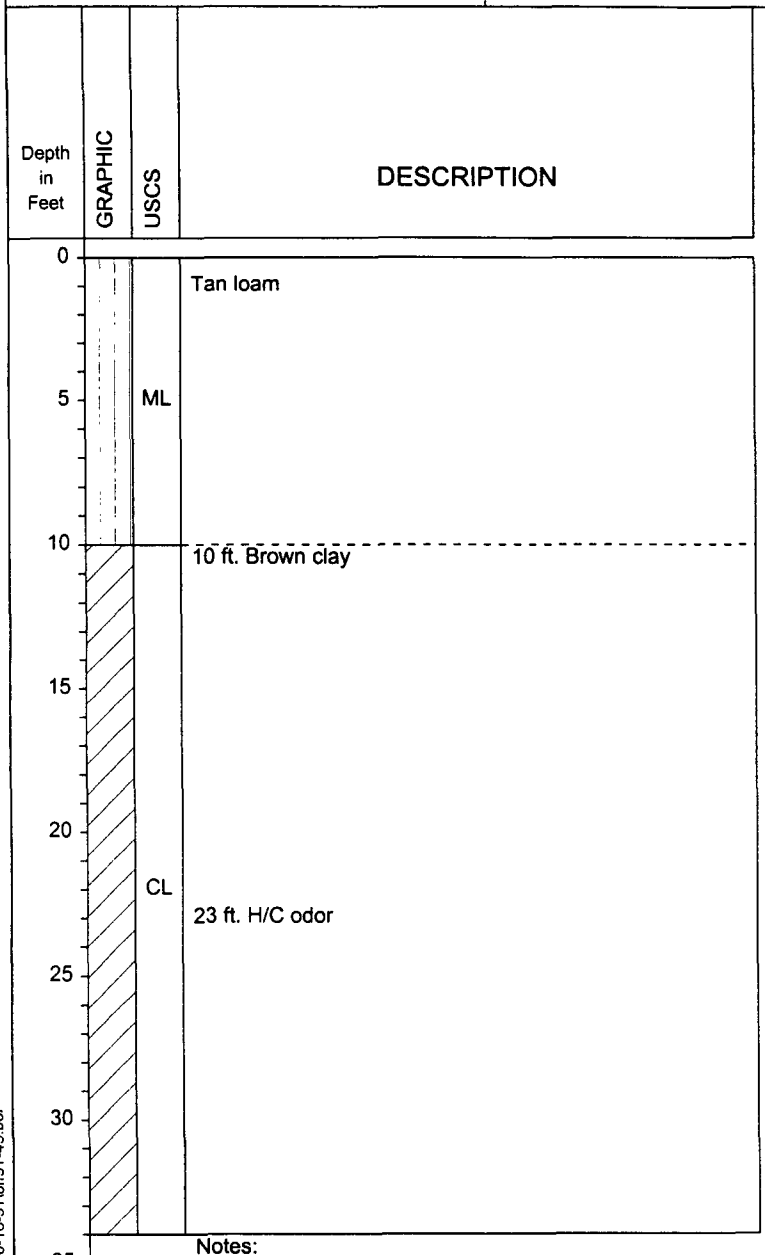
LOG OF BORING OS #45

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman



Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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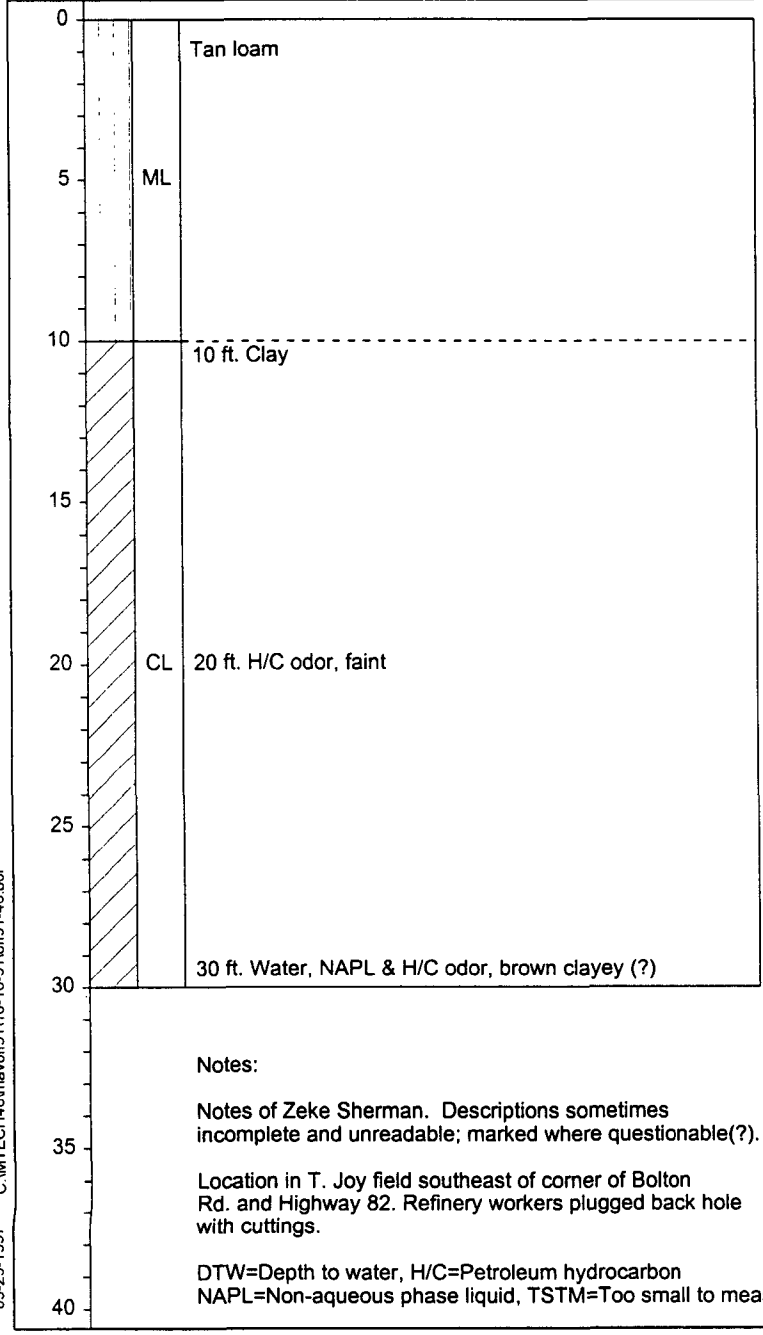
LOG OF BORING OS #46

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman



Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #47

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10			(No soil descriptions)
15			
20			
25			
30			30 ft. Water, No H/C odor, no NAPL
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #48

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5		ML	Tan Loam
10			
15		CL	White/tan caliche soil
20			
25			
30			30 ft. Water, no H/C odor, no(?) NAPL
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #49

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/16/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/16/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
		ML	Tan Loam
10			
		CL	Clayey
25			25 ft. H/C odor
			29 ft. Water 30 ft. H/C odor, NAPL
30			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #50

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown Loam
15		ML	
20			20 ft. Water, H/C odor, no NAPL
30			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #51

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			5 ft. Tan clayey silt
10		ML	
15			
20			22 ft.(?) Water, no H/C odor, no NAPL
25		SM	Tan, very fine to fine grain sand
			Total depth shown as 28 ft. (?)
30		CL	30 ft. Red clay
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #52

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			5 ft. Tan clayey silt
10		ML	
15			
20			20 ft. Water, no H/C odor, no NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #53

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Tan Loam (no other soil descriptions)
5			
10		ML	
15			
20			20 ft. Water, trace H/C odor, sheen
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #54

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown clayey loam
5			
10		ML	
15			
20			20 ft. Water, no H/C odor, no NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #55

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5		ML	3 ft. Tan clayey silt
10			10 ft. Red clay
15		CL	18 ft. Tan/white clayey soil
20			
25			25 ft. Water, no H/C odor, no NAPL
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #56

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			4 ft. White/tan caliche-like soil
10		ML	
15			
20			
		CL	21 ft. Gray clay, trace H/C odor 22 ft. Water, H/C odor, NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #57

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam (no other soil descriptions)
5			
10			
15		ML	
20			
25			26 ft. Water, No H/C odor, No NAPL
30			Notes: Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?). Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings. DTW=Depth to water, H/C=Petroleum hydrocarbon NAPL=Non-aqueous phase liquid, TSTM=Too small to measure
35			
40			

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LOG OF BORING OS #58

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam (no other soil descriptions)
5			
10			
15		ML	
20			
25			27 ft. Water, No H/C odor, No NAPL
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #59

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			5 ft. Tan silty/clayey loam
10			10 ft. Occassional gravel
15		ML	
20			23 ft. Water, No H/C odor, No NAPL
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #60

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			Brown loam
5			5 ft. Tan silty caliche soil
10		ML	
15			
20			
25			23 ft. Water, No H/C odor, No NAPL
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #61

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/22/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 10/22/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			(No soil descriptions)
10			
15			
20			
25			25 ft. Water, No H/C odor, No NAPL
30			
35			
40			

Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

Location in T. Joy field southeast of corner of Bolton Rd. and Highway 82. Refinery workers plugged back hole with cuttings.

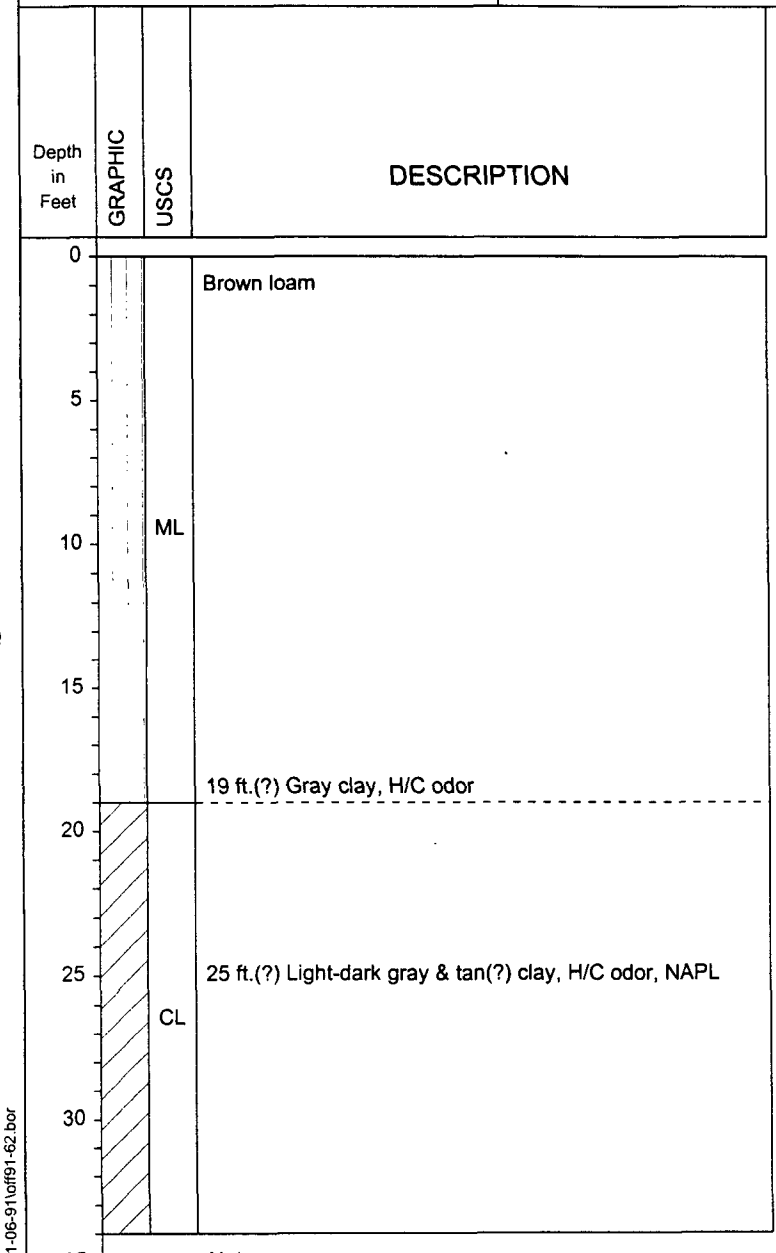
DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

09-29-1997 C:\MTECH46\navoff91\10-22-91\off91-61.bor

LOG OF BORING OS #62

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/06/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 11/06/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman



Notes:

Notes of Zeke Sherman. Descriptions sometimes incomplete and unreadable; marked where questionable(?).

On 11/08/91 measured fluid depth about 10 ft. with no estimate of NAPL thickness; field notes read "no top on water." Boring located at northwest corner of Bearing Supply yard south of Tank 415(?). Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #63

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/06/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 11/06/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10			
15			
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. No soil descriptions given for this borehole.

On 11/08/91 measured fluid depth about 16.4 ft. with approx. 9 in. NAPL.

Boring located at north end of Bearing Supply yard. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #64

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/06/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 11/06/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10			
15			
20			

Notes:

Notes of Zeke Sherman. No soil descriptions given for this borehole.

On 11/08/91 measured fluid depth about 16.8 ft. with H/C sheen TSTM

Boring located at northeast side of Bearing Supply yard. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

25
30
35
40

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LOG OF BORING OS #65

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/06/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 11/06/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10			
15			
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. No soil descriptions given for this borehole.

On 11/08/91 measured fluid depth about 19.8 ft. with approx. 2 in. NAPL.

Boring located at east center of Bearing Supply yard. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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LOG OF BORING OS #66

Offsite Borings 1991
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/06/91	Drilling Method:	: Solid Stem Auger
Time Started	: N/A	Sampling Method:	: Cuttings
Date Completed	: 11/06/91	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 10"	Logged By:	: Z.R. Sherman

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0			
5			
10			
15			
20			
25			
30			
35			
40			

Notes:

Notes of Zeke Sherman. No soil descriptions given for this borehole.

On 11/08/91 measured fluid depth about 20.9 ft. with approx. 1/4 to 1/2 in. NAPL.

Boring located at east center of Bearing Supply yard and north of water well RA-313. Refinery workers plugged back hole with cuttings.

DTW=Depth to water, H/C=Petroleum hydrocarbon
NAPL=Non-aqueous phase liquid, TSTM=Too small to measure

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BORING LOG

PROJECT: 622092001-237 (B67)
CLIENT: Navajo Refinery
BORING NUMBER: B67
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 27'
DATE COMPLETED: 03/03/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 29'

DESCRIPTION

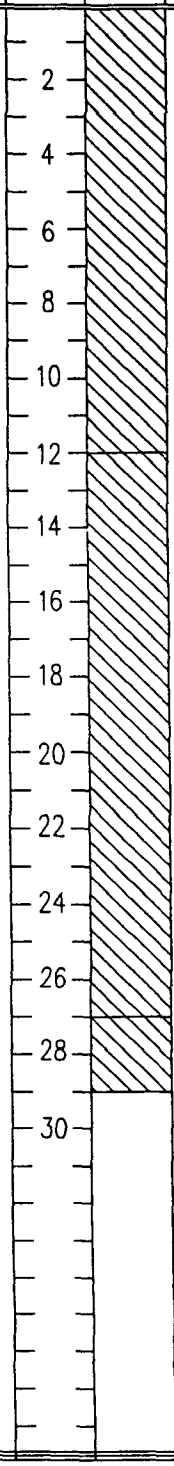
0-12' SANDY CLAY, dark brown to brown, moist to dry, increasing pebble content with depth, plastic to stiff.

12-27' SANDY CLAY, gray hydrocarbon staining beginning at 12' becoming a bluish-gray color in a zone from 14-16', strong hydrocarbon odor, moist, color becoming lighter gray after 16'.

27-29' SANDY CLAY, gray, saturated, strong hydrocarbon odor, some gravel.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Thickness
3/4/92	-	23.35'	film (<1/16")

DEPTH (ft.) | SYMBOL | SAMPLE | WELL DESIGN



KWBES

BORING LOG

PROJECT: 622092001-237 (B68)
CLIENT: Navajo Refinery
BORING NUMBER: B68
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 26'
DATE COMPLETED: 03/02/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 28'

DESCRIPTION

0-11' SANDY CLAY, dark brown to brown, moist to dry, increasing pebble content with depth, plastic to stiff.

11-16' CLAY, tan, with small pockets of fine white sand, moist, occasional small pebbles.

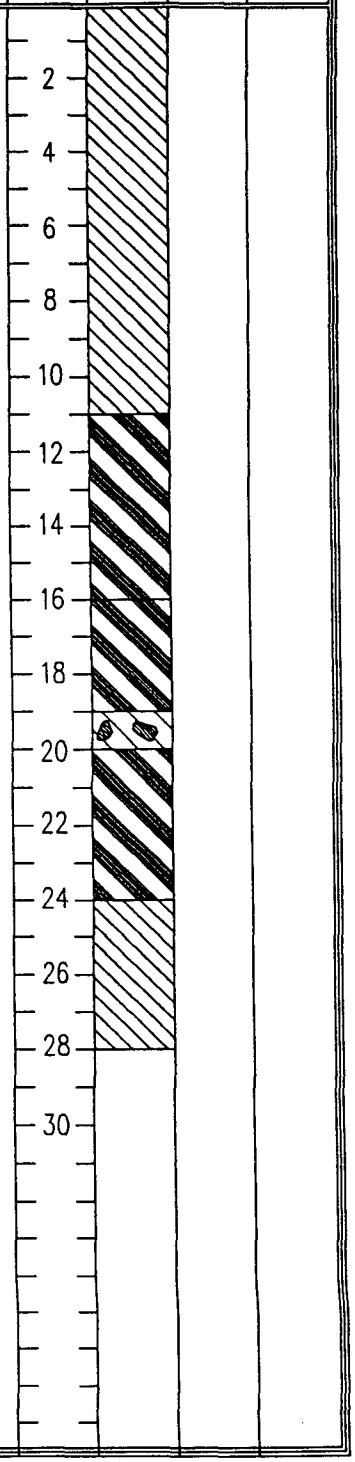
16-19' CLAY, brown, with small pockets of fine white sand and pebbles, moist.

19-20' GRAVEL with clay mix, gray hydrocarbon staining noticeable in clay, slight odor.

20-24' CLAY, progressively darker staining, increasing moisture content and odor.

24-28' CLAY TO SANDY CLAY, gray hydrocarbon staining, interspersed thin gravel seams, saturated sandy clay at 26'.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/4/92	-	22.79'	film (<1/16")



KWBES

BORING LOG

PROJECT: 622092001-237 (B69)
CLIENT: Navajo Refinery
BORING NUMBER: B69
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 28'
DATE COMPLETED: 03/03/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 29'

DESCRIPTION

0-8' SANDY CLAY, dark brown to brown, moist to dry, plastic to stiff.

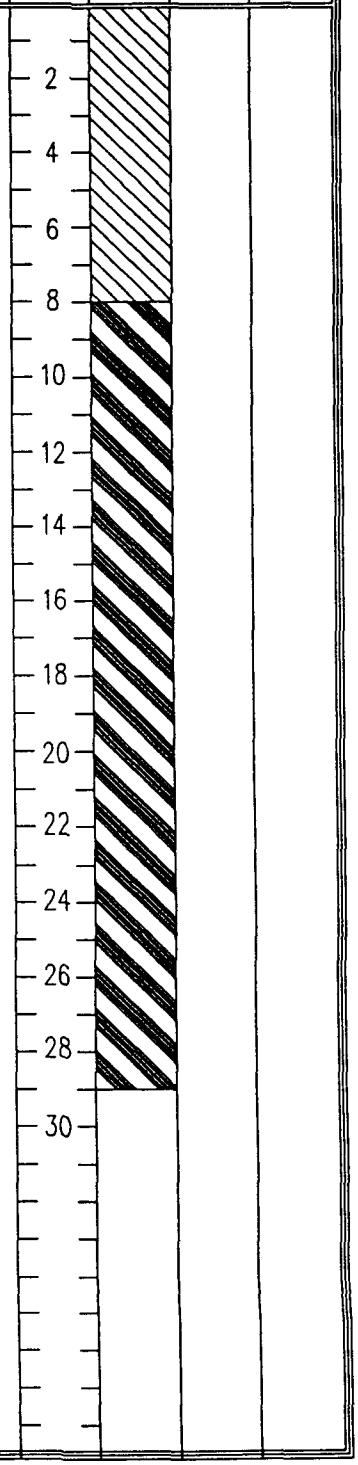
8-14' CLAY, tan, with small pockets of fine white sand, moist, occasional pebbles.

14-26' CLAY, brown, moist, plastic, some small pockets of fine white sand, occasional pebbles.

26-29' CLAY, brown, at 28', increasing pebble content and moisture, saturated, slight gray hydrocarbon staining and odor from 26-29',

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/4/92	22.27'	22.83'	0.56'

NOTE: When auger removed from hole, brownish *colored free product was on last flight.*



KWBES

BORING LOG

PROJECT: 622092001-237 (B70)
CLIENT: Navajo Refinery
BORING NUMBER: B70
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 26'
DATE COMPLETED: 03/02/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 29'

DESCRIPTION

0-10' SANDY CLAY, dark brown to brown, moist to dry, plastic to stiff.

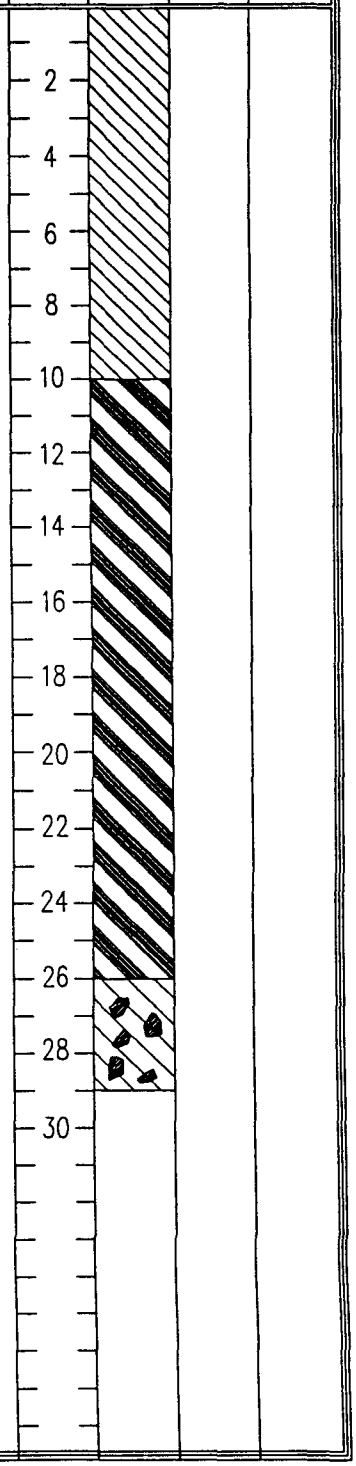
10-14' CLAY, reddish brown, with occasional small pockets of fine white sand, moist, plastic.

14-16' CLAY, tan, with small pebbles throughout, moist, plastic.

21-26' CLAY, brown, with occasional pockets of fine sand and pebbles, moist, plastic.

26-29' GRAVEL mixed with CLAY, gray hydrocarbon staining, saturated, rocks to 2 inches in diameter, strong odor.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/4/92	22.04'	22.08'	0.04'



KWBES

BORING LOG

PROJECT: 622092001-237 (B71)
CLIENT: Navajo Refinery
BORING NUMBER: B71
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 24'
DATE COMPLETED: 03/03/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 25'

DESCRIPTION

0-7' SANDY CLAY, dark brown to brown, moist to dry, plastic to stiff.

7-11' CLAY with SAND, tan, moist, plastic, occasional pebbles.

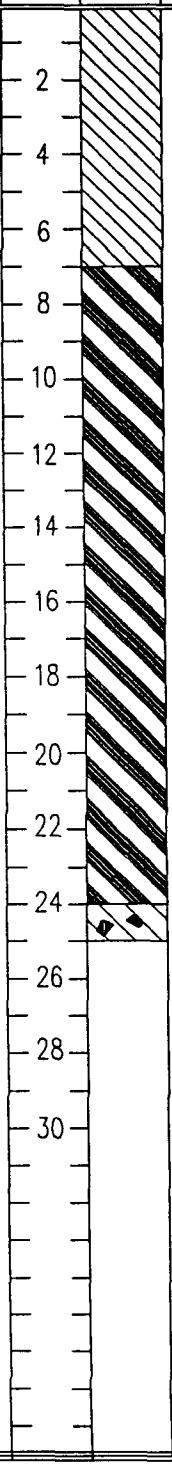
11-17' CLAY, brown, with some small pockets of fine white sand, moist, plastic.

17-24' CLAY, gray hydrocarbon staining, moist, color is darker with depth, some pebbles.

24-25' GRAVEL mixed with CLAY, gray staining, saturated.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/4/92	18.12'	20.34'	2.22'

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B72)
CLIENT: Navajo Refinery
BORING NUMBER: B72
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 24'
DATE COMPLETED: 03/03/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 25'

DESCRIPTION

0-8' SANDY CLAY, dark brown to brown, moist, plastic.

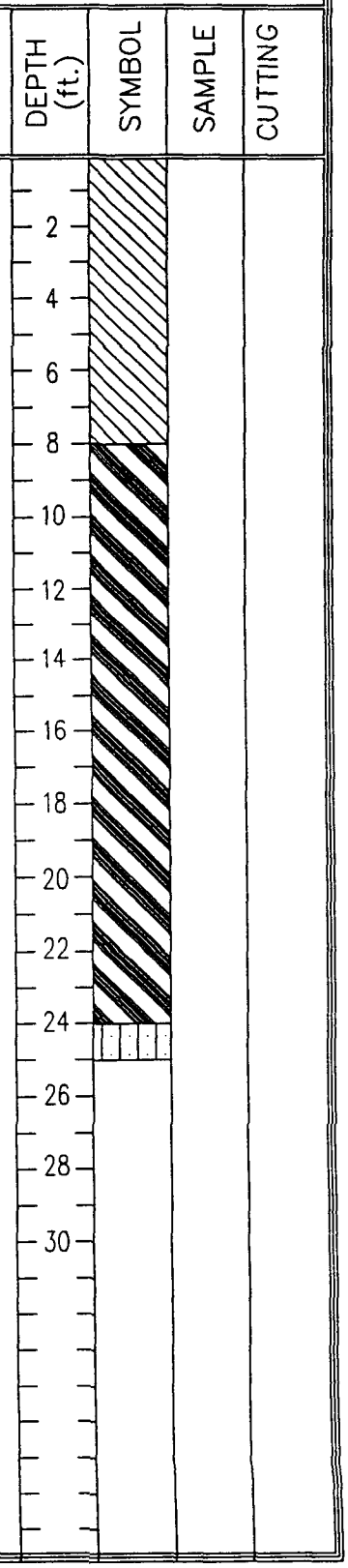
8-15' CLAY, tan, with some small pockets of fine white sand, moist, occasional small pebbles, plastic.

15-16' CLAY, brown, moist, plastic, occasional small pebbles.

16-24' CLAY, gray hydrocarbon staining, moist, plastic, occasional small pebbles, color becoming darker with depth.

24-25' SILTY SAND, gray hydrocarbon staining, saturated, strong odor.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/4/92	18.53'	18.55'	0.02'



KWBES

BORING LOG

PROJECT: 622092001-237 (B73)
CLIENT: Navajo Refinery
BORING NUMBER: B73
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20'
DATE COMPLETED: 03/03/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 24'

DESCRIPTION

0-7' SANDY CLAY, dark brown to brown, moist, plastic.

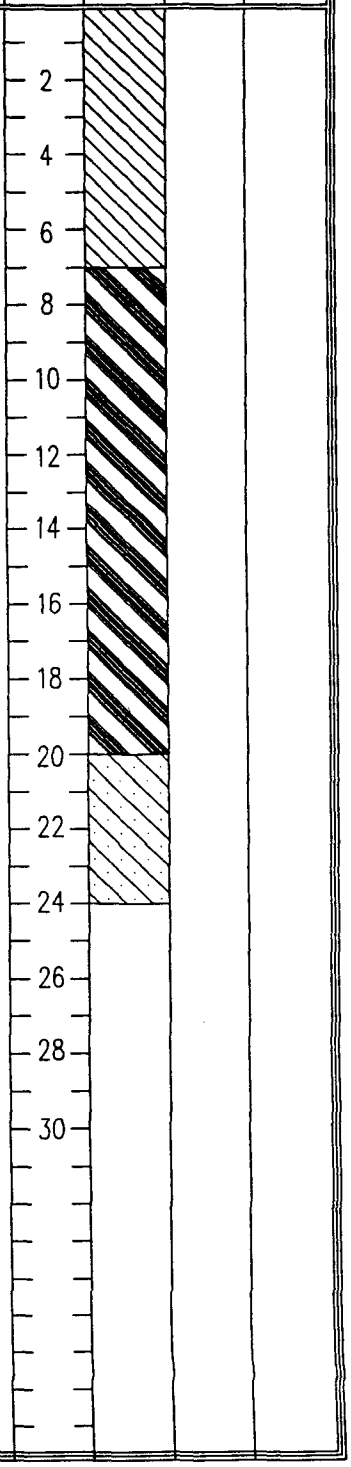
7-11' CLAY, tan, with some small pockets of fine white sand, moist, plastic.

11-20' CLAY, brown, with small pockets of fine sand and occasional pebbles, moist, plastic.

20-24' CLAYEY SAND, gray hydrocarbon staining, saturated, increasing odor with depth.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/4/92	-	19.34'	Film (<1/16")

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B74)
CLIENT: Navajo Refinery
BORING NUMBER: B74
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 19.5'
DATE COMPLETED: 03/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 22'

DESCRIPTION

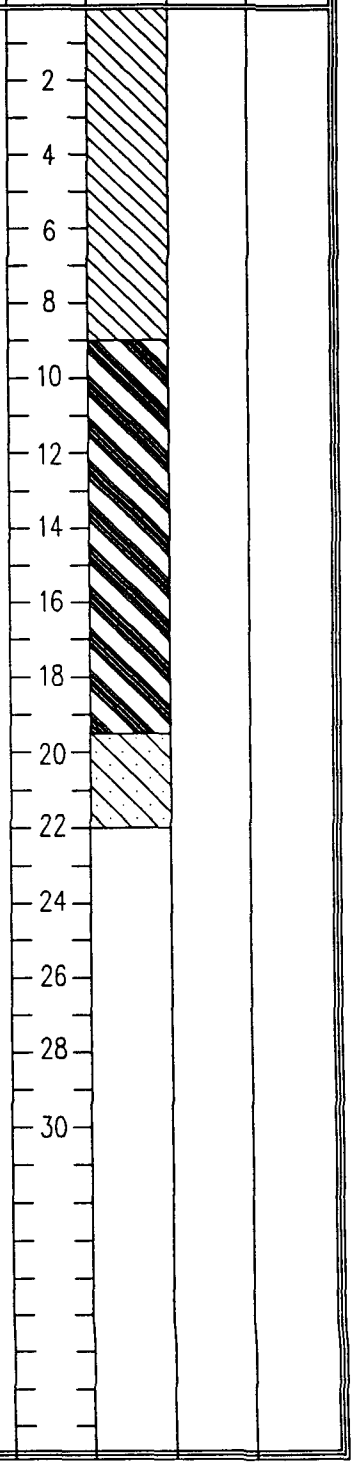
0-9' SANDY CLAY, dark brown to brown, moist to dry, plastic.

9-11' CLAY, tan, moist, plastic.

11-19.5' CLAY, gray hydrocarbon staining, moist, plastic, color becoming darker with depth, very strong hydrocarbon odor.

19.5-22' CLAYEY SAND, dark gray staining, saturated, brown colored free product coming to surface on auger flights.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/5/92	15.89'	18.80'	2.91'



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BORING LOG

PROJECT: 622092001-237 (B75)
CLIENT: Navajo Refinery
BORING NUMBER: B75
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 21'
DATE COMPLETED: 03/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 23'

DESCRIPTION

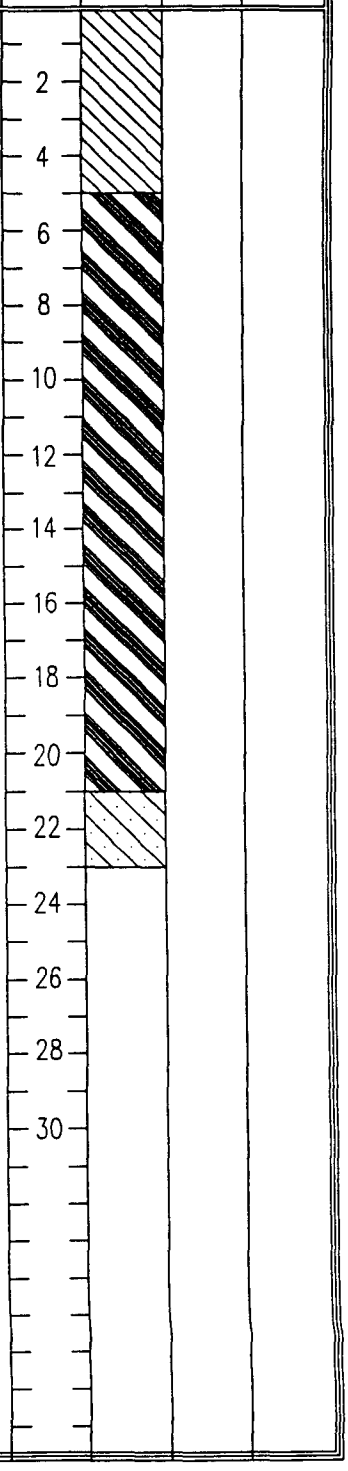
0-5' SANDY CLAY, dark brown to brown, moist to dry, plastic.

5-16' CLAY, tan, with occasional pockets of fine sand, moist, plastic.

16-21' CLAY, gray hydrocarbon staining, moist, plastic, color becoming darker with depth, pronounced odor increase with depth.

21-23' CLAYEY SAND, gray staining, saturated, strong hydrocarbon odor, brown colored free product evident on auger.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/5/92	16.42'	16.63'	0.21'



KWBES

BORING LOG

PROJECT: 622092001-237 (B76)
CLIENT: Navajo Refinery
BORING NUMBER: B76
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 22'
DATE COMPLETED: 03/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 23'

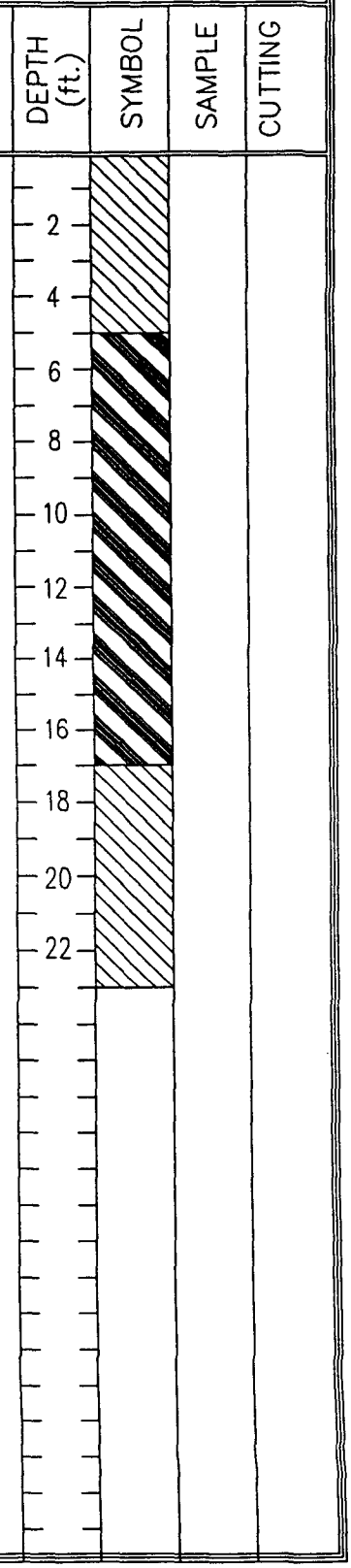
DESCRIPTION

0-7' SANDY CLAY, dark brown to brown, moist to dry, plastic.

7-17' CLAY, tan, with occasional small pockets of fine white sand, moist, plastic.

17-23' SANDY CLAY, tan, moist, saturated at 22', very faint hydrocarbon smell, no visible staining.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/5/92	17.26'	17.27'	0.01'



KWBES

BORING LOG

PROJECT: 622092001-237 (B77)
CLIENT: Navajo Refinery
BORING NUMBER: B77
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 26'
DATE COMPLETED: 03/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 27'

DESCRIPTION

0-6' SANDY CLAY, dark brown to brown, moist, plastic.

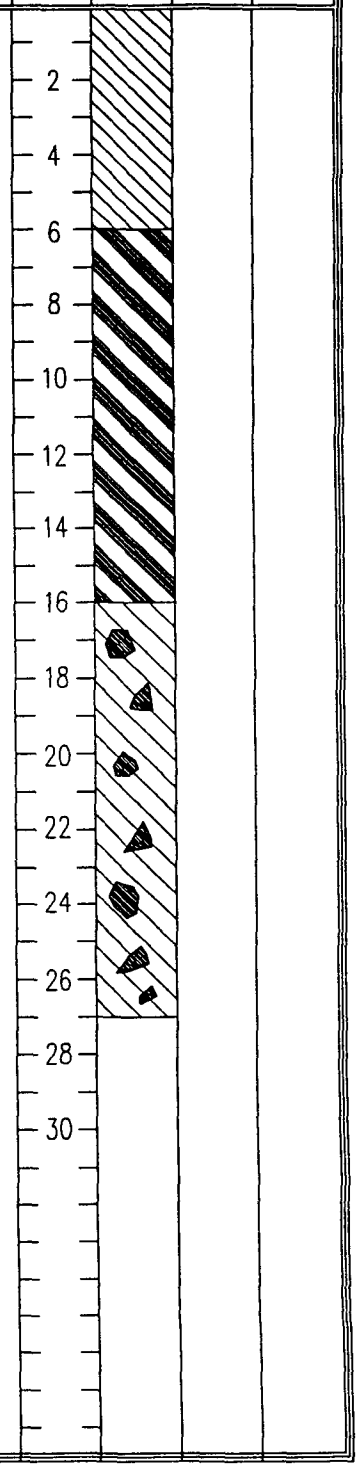
6-11' CLAY, tan, with occasional pockets of fine sand and small pebbles, moist, plastic.

11-13' CLAY, brown, with occasional pockets of fine sand and small pebbles, moist, plastic.

13-16' CLAY, gray hydrocarbon staining, moist, plastic, odor increasing with depth.

16-27' GRAVEL mixed with CLAY, gray staining, rock up to 3" diameter, moist until 26', saturated from 26-27'.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/5/92	-	19.72'	-



KWBES

BORING LOG

PROJECT: 622092001-237 (B78)
CLIENT: Navajo Refinery
BORING NUMBER: B78
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 17'
DATE COMPLETED: 03/05/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 21'

DESCRIPTION

0-8' SANDY CLAY, dark brown to brown, moist, plastic.

8-17' CLAY, gray hydrocarbon staining, moist, plastic, color becoming darker with depth, odor increasing.

17-21' CLAY, dark gray hydrocarbon staining, saturated, brown colored free product coating auger flights.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/6/92	13.03'	17.67'	4.64'

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING

KWBES

BORING LOG

PROJECT: 622092001-237 (B79)
CLIENT: Navajo Refinery
BORING NUMBER: B79
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 17'
DATE COMPLETED: 03/05/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 19'

DESCRIPTION

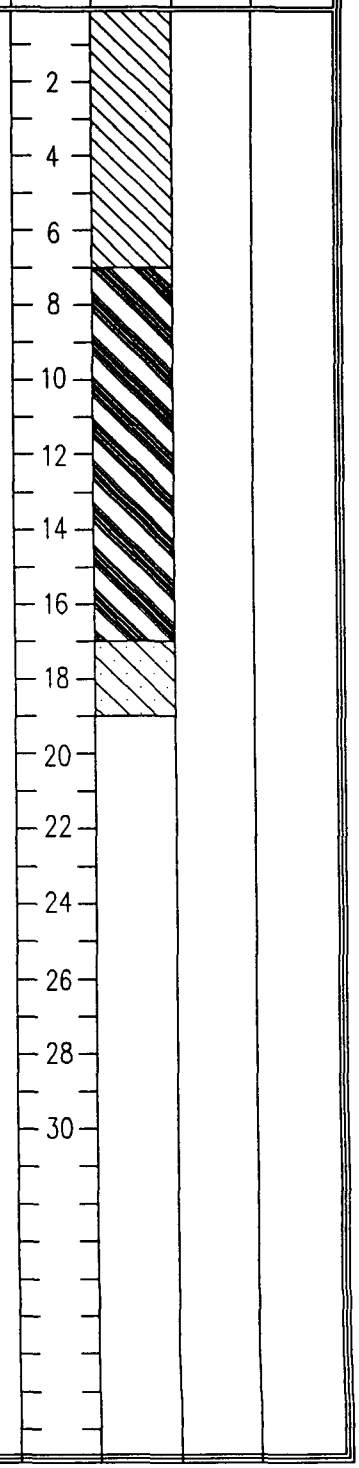
0-7' SANDY CLAY, dark brown to brown, moist, plastic.

7-17' CLAY, gray hydrocarbon staining, moist, plastic, odor and darker color increasing with depth.

17-19' CLAYEY SAND, gray staining, saturated.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/6/92	14.04'	16.51'	2.47'

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B80)
CLIENT: Navajo Refinery
BORING NUMBER: B80
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 17'
DATE COMPLETED: 03/05/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 19'

DESCRIPTION

0-4' SANDY CLAY, dark brown to brown, moist, plastic.

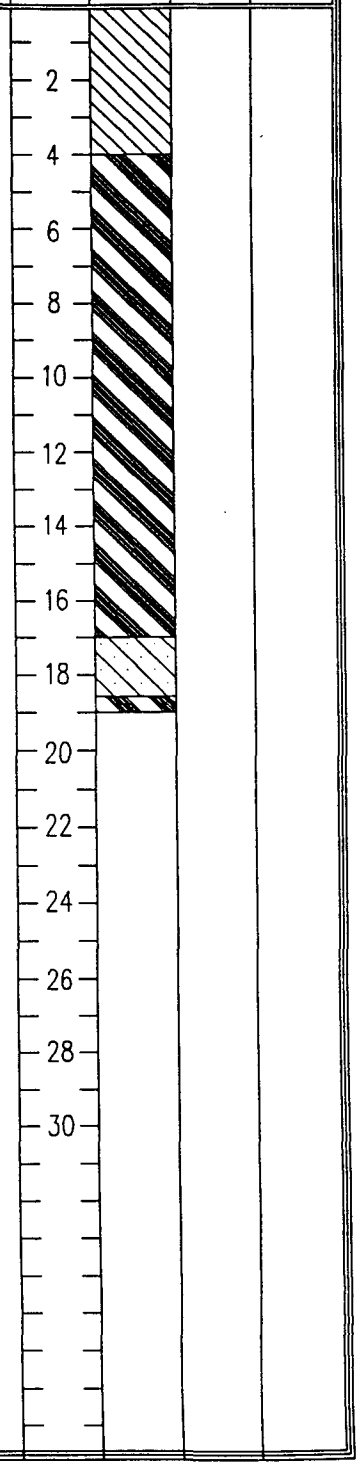
4-7' CLAY with SAND, moist, plastic.

7-17' CLAY, gray hydrocarbon staining, moist, plastic, color becoming darker with depth, blue-gray staining beginning at 10'.

17-18.5' CLAYEY SAND, saturated, blue-gray staining, strong odor.

18.5-19' CLAY, blue-gray staining, saturated at 19'.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/5/92	14.69'	17.25'	2.56'



KWBES

BORING LOG

PROJECT: 622092001-237 (B81)
CLIENT: Navajo Refinery
BORING NUMBER: B81
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 21'
DATE COMPLETED: 03/05/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 24'

DESCRIPTION

0-6' SANDY CLAY, dark brown to brown, moist, plastic.

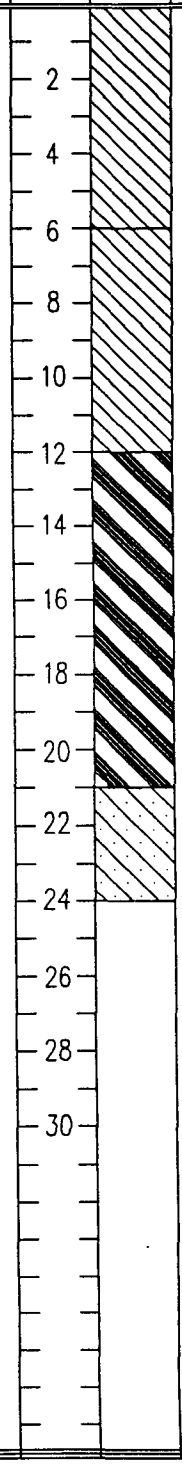
6-12' CLAY, tan, with occasional pockets of fine sand, moist, plastic.

12-21' CLAY, gray hydrocarbon staining, moist, plastic, odor and darker coloration increasing with depth.

21-24' CLAYEY SAND, saturated, brown colored free product on auger flights.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/6/92	15.62'	17.97'	2.35'

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B82)
CLIENT: Navajo Refinery
BORING NUMBER: B82
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 21'
DATE COMPLETED: 03/05/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 22'

DESCRIPTION

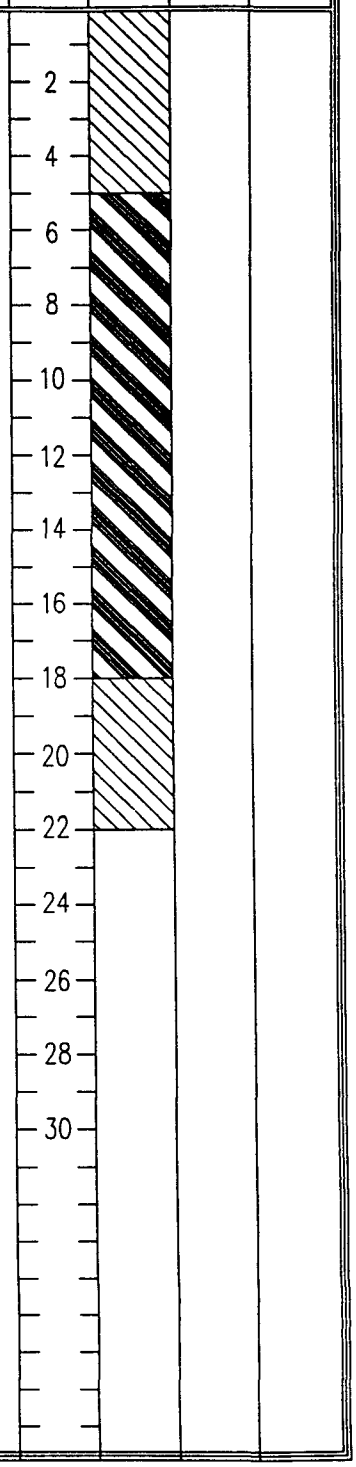
0-5' SANDY CLAY, brown, dry, stiff.

5-11' CLAY, brown, dry to moist, stiff to plastic, occasional lighter colored bands and small caliche pebbles.

11-18' CLAY, gray hydrocarbon staining, moist, plastic, odor and darker coloration increasing with depth.

18-22' SANDY CLAY, gray, moist to saturated by 21'.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/6/92	-	14.04'	Film (<1/16")



KWBES

BORING LOG

PROJECT: 622092001-237 (B83)
CLIENT: Navajo Refinery
BORING NUMBER: B83
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20'
DATE COMPLETED: 03/05/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 21'

DESCRIPTION

0-10' SANDY CLAY, brown, dry to moist, stiff to plastic.

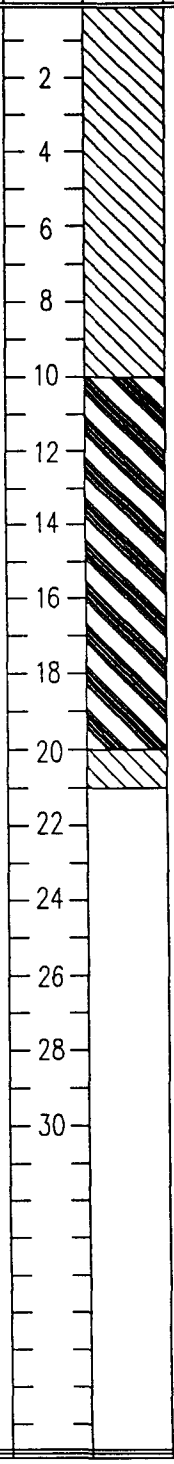
10-15' CLAY, tan, moist, plastic.

15-20' CLAY, gray hydrocarbon staining, moist, plastic.

20-21' SANDY CLAY, gray, saturated.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/6/92	-	13.34'	-

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B84)
CLIENT: Navajo Refinery
BORING NUMBER: B84
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 23'
DATE COMPLETED: 03/06/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 24'

DESCRIPTION

0-9' SANDY CLAY, dark brown to brown, moist, plastic.

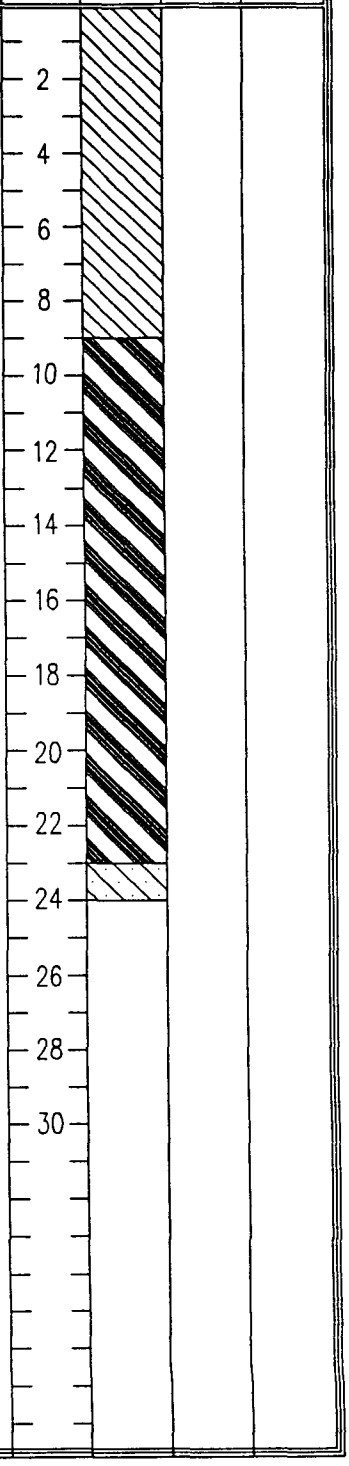
9-15' CLAY, tan, dryer, stiff to plastic, occasional small caliche nodules.

15-23' CLAY, gray hydrocarbon staining, moist, plastic, odor and darker coloration increasing with depth.

23-24' CLAYEY SAND, saturated, gray staining, strong odor.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/7/92	17.40'	20.33'	2.93'

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B85)
CLIENT: Navajo Refinery
BORING NUMBER: B85
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20'
DATE COMPLETED: 03/06/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 21'

DESCRIPTION

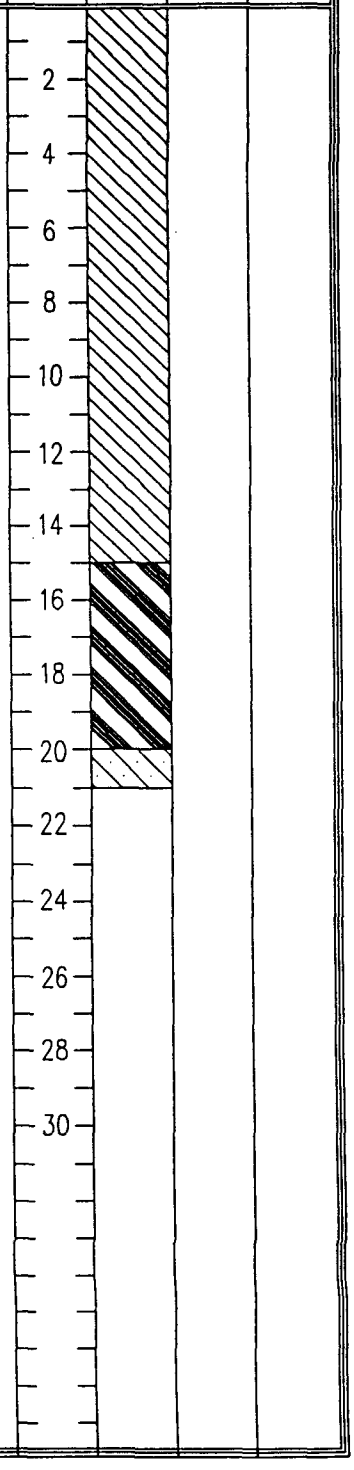
0-8' SANDY CLAY, dark brown to brown, moist, plastic.

8-15' CLAY with SAND, gray hydrocarbon staining, moist, plastic, odor and darker coloration increasing with depth.

15-20' CLAY, gray staining, moist, very sticky.

20-21' CLAYEY SAND, gray, saturated, strong odor, brown colored free product on augers.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/7/92	16.05'	19.82'	3.77'



KWBES

BORING LOG

PROJECT: 622092001-237 (B86)
CLIENT: Navajo Refinery
BORING NUMBER: B86
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 19'
DATE COMPLETED: 03/06/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 20'

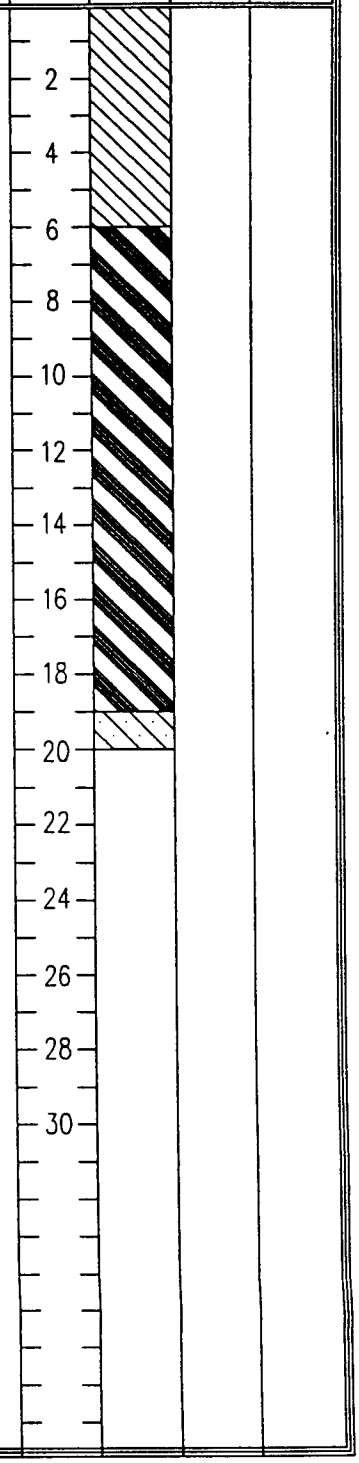
DESCRIPTION

0-6' SANDY CLAY, dark brown to brown, moist, plastic.

6-19' CLAY, gray hydrocarbon staining, moist, plastic, odor and darker discoloration increasing with depth.

19-20' CLAYEY SAND, gray, saturated, some gravel.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/7/92	14.99'	17.48'	2.49'



KWBES

BORING LOG

PROJECT: 622092001-237 (B87)
CLIENT: Navajo Refinery
BORING NUMBER: B87
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20'
DATE COMPLETED: 03/06/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 21'

DESCRIPTION

0-6' SANDY CLAY, dark brown to brown, moist, plastic, occasional pebbles and pockets of fine white sand.

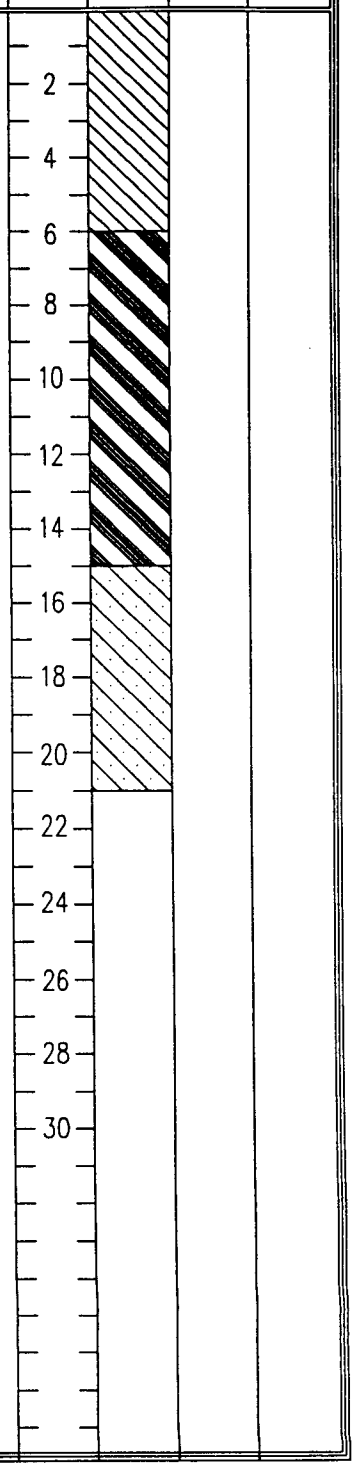
6-7' SANDY CLAY, gray hydrocarbon staining, strong odor, moist, plastic.

7-15' CLAY, gray to blue-gray, moist, strong odor, becoming lighter in color with depth.

15-20' CLAYEY SAND, gray, moist, thin gravel bed around 16, plastic.

20-21' CLAY with SAND, gray, saturated, occasional large gravel.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/7/92	14.68'	19.24'	4.56'



KWBES

BORING LOG

PROJECT: 622092001-237 (B88)
CLIENT: Navajo Refinery
BORING NUMBER: B88
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 23'
DATE COMPLETED: 03/07/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 25'

DESCRIPTION

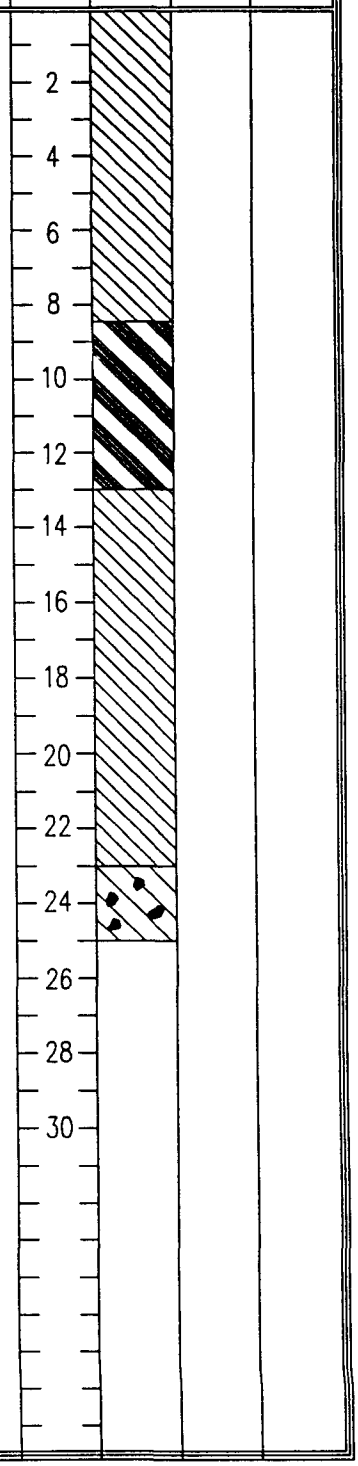
0-8.5' SANDY CLAY, dark brown to brown, dry to moist, stiff to plastic.

8.5-13' CLAY, gray hydrocarbon staining, moist, plastic, slight odor.

13-23' SANDY CLAY, gray, moist, plastic, strong hydrocarbon odor.

23-25' GRAVEL mixed with SANDY CLAY, saturated, gray discoloration.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/8/92	17.01'	19.59'	2.58'



KWBES

BORING LOG

PROJECT: 622092001-237 (B90)
CLIENT: Navajo Refinery
BORING NUMBER: B90
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20'
DATE COMPLETED: 03/07/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 21'

DESCRIPTION

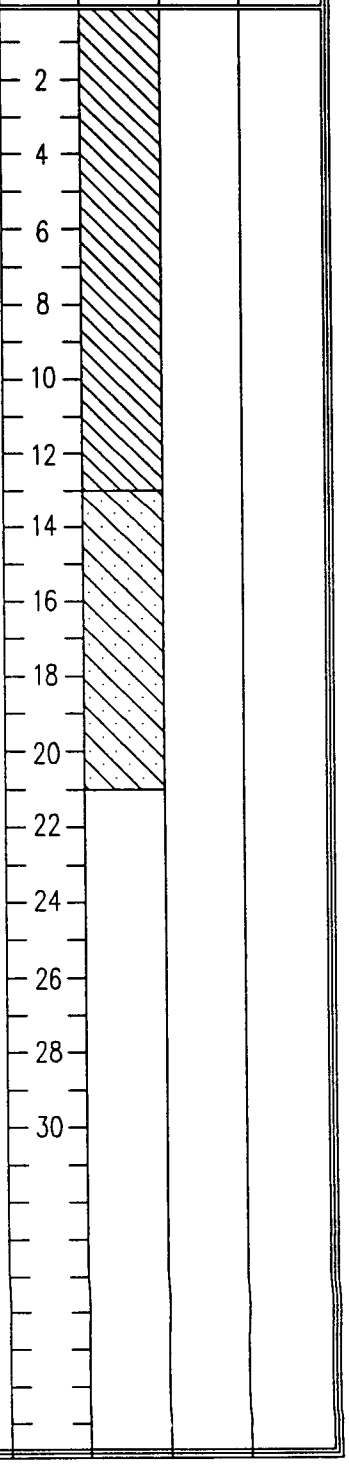
0-6' SANDY CLAY, dark brown to reddish brown, moist to dry, plastic to stiff with occasional caliche nodules.

6-13' CLAY with SAND, tan, moist, plastic.

13-21' CLAYEY SAND, gray, hydrocarbon staining, moist, plastic, strong odor, becoming darker in color with depth, saturated at 20'.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/8/92	-	14.11'	-

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B91)
CLIENT: Navajo Refinery
BORING NUMBER: B91
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20'
DATE COMPLETED: 03/07/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 22'

DESCRIPTION

0-4' SANDY CLAY, dark brown to brown, moist, plastic.

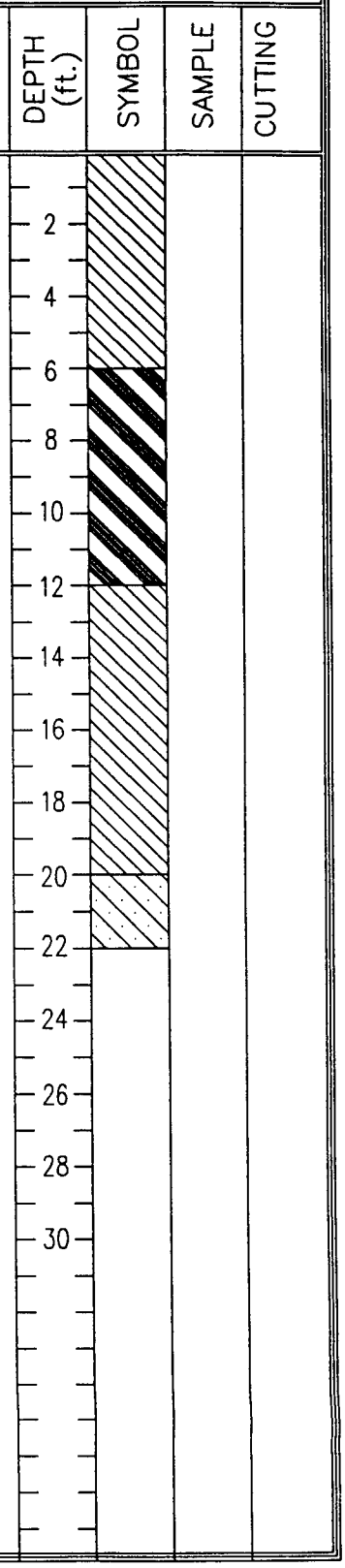
4-6' CLAY with SAND, reddish-brown, moist, plastic, occasional small white caliche nodules.

6-12' CLAY, tan, with occasional pockets of fine sand, moist, plastic.

12-20' SANDY CLAY, gray staining, strong hydrocarbon odor, moist, plastic, increasing gravel content with depth.

20-22' SAND with some CLAY, gray, saturated, strong odor.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/8/92	15.15'	16.19'	1.04'



KWBES

BORING LOG

PROJECT: 622092001-237 (B92)
CLIENT: Navajo Refinery
BORING NUMBER: B92
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20'
DATE COMPLETED: 03/07/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 21'

DESCRIPTION

0-5' SANDY CLAY, dark brown to brown, moist, plastic.

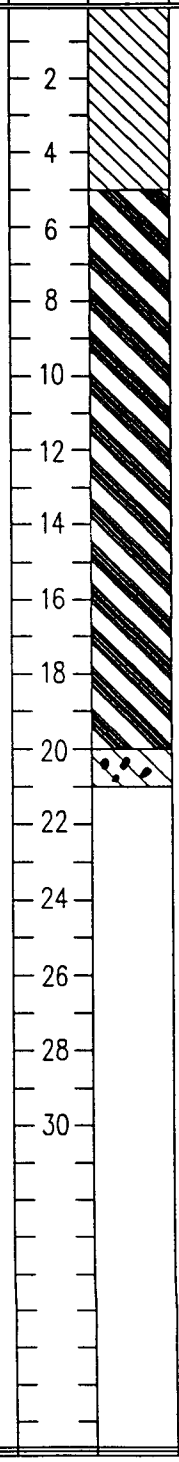
5-16' CLAY with SAND, tan, dry to moist, stiff to plastic, hydrocarbon odor detectable in soil at 12' but no color change.

16-20' CLAY with SAND, brown, moist, plastic, hydrocarbon odor stronger but no discoloration noted.

20-21' GRAVEL mixed with CLAY, saturated, odor, no color change.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/10/92	20.32'	21.10'	0.78'

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092001-237 (B93)
CLIENT: Navajo Refinery
BORING NUMBER: B93
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 22'
DATE COMPLETED: 03/09/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 23'

DESCRIPTION

0-3' SANDY CLAY, dark brown, moist, plastic.

3-8' SILTY SAND, tan, moist to dry.

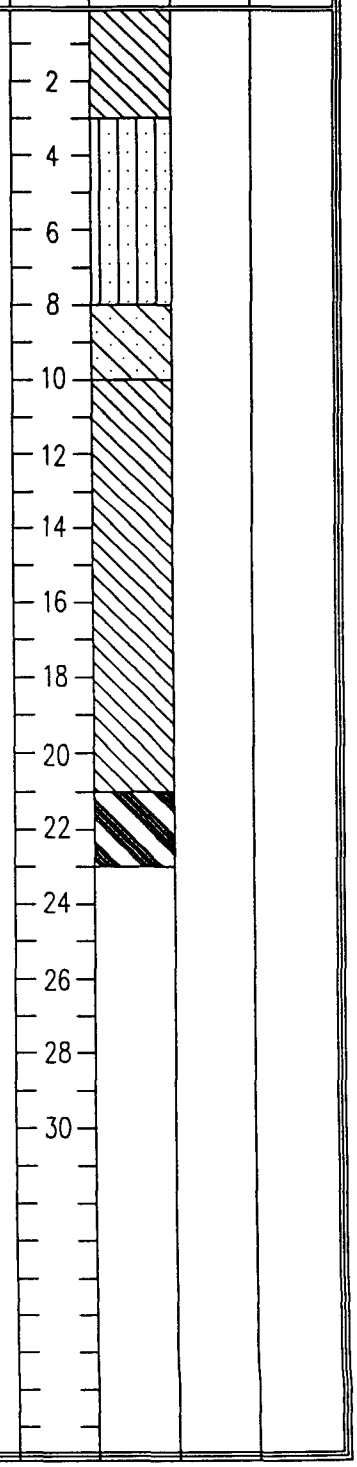
8-10' CLAYEY SAND, brown, moist, plastic.

10-19' SANDY CLAY, brown, moist, plastic, occasional small white caliche nodules.

19-21' CLAY, brown, very moist, plastic.

21-23' CLAY, gray hydrocarbon staining, saturated at 22', odor strong.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/10/92	21.1'	21.6'	0.5'



KWBES

BORING LOG

PROJECT: 622092001-237 (B94)
CLIENT: Navajo Refinery
BORING NUMBER: B94
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 25'
DATE COMPLETED: 03/09/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 26'

DESCRIPTION

0-3' SANDY CLAY, dark brown, moist, plastic.

3-8' CLAY with SAND, tan, moist, plastic.

8-17' CLAY, brown, moist, plastic.

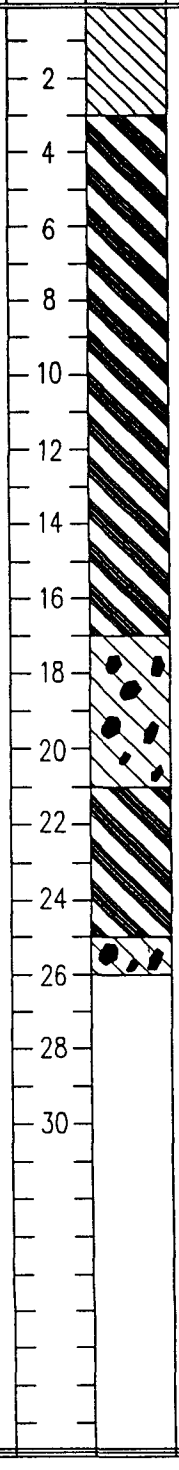
17-21' GRAVEL with CLAY, moist.

21-25' CLAY, reddish-brown, moist, plastic.

25-26' GRAVEL with CLAY, saturated, no odor or staining.

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
3/10/92	-	22.66'	-

DEPTH (ft.) | SYMBOL | SAMPLE | CUTTING



KWBES

BORING LOG

PROJECT: 622092003-237 (B-95)
CLIENT: Navajo Refinery
BORING NUMBER: B95
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 20.0'
DATE COMPLETED: 08/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 22.0'

DESCRIPTION

0-4.0' CLAY WITH SAND, dark brown to brown, moist, plastic.

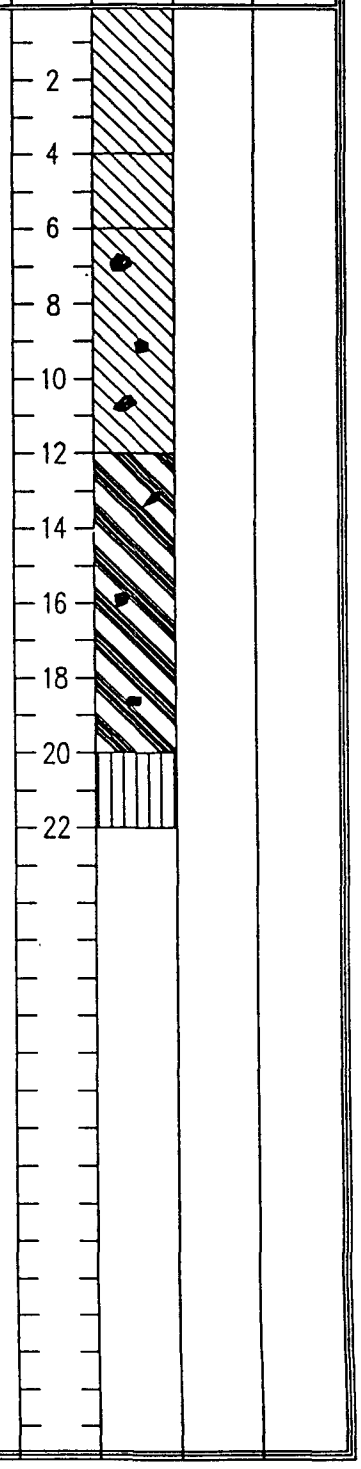
6.0-12.0' SANDY CLAY, tan, occasional gravel fragments, moist, plastic.

12.0-20.0' CLAY, light brown, small fragments of gravel, moist, plastic.

20.0-22.0' SILT, reddish-brown, saturated.

TD = 22.0'

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
08-05-92	--	15.4'	None



KWBES

BORING LOG

PROJECT: 622092003-237 (B-96)
CLIENT: Navajo Refinery
BORING NUMBER: B96
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 22.5'
DATE COMPLETED: 08/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 23.0'

DESCRIPTION

0-5.0' CLAY WITH SAND, dark brown to brown, moist, plastic.

5.0-7.0' CLAY, brown, moist, plastic.

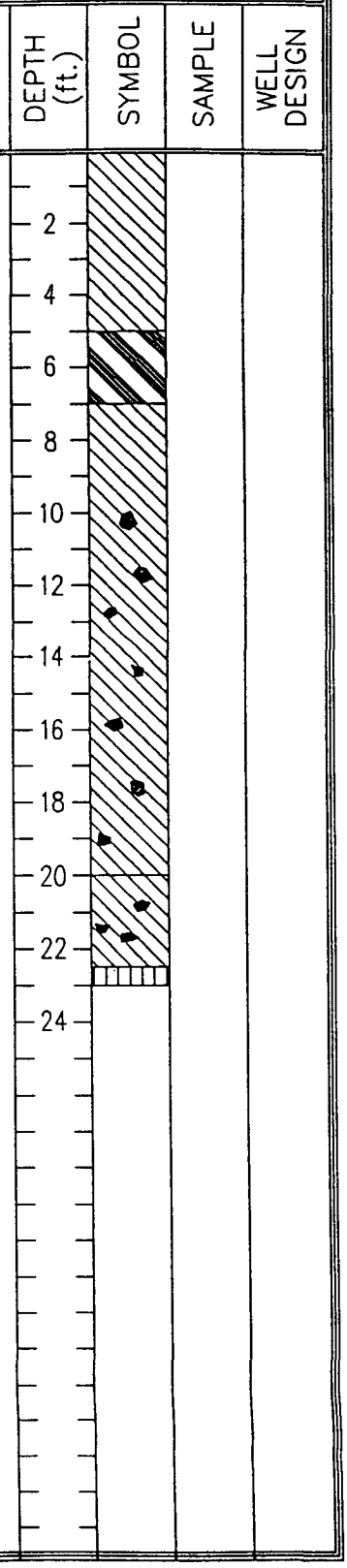
7.0-20.0' SANDY CLAY, tan, slightly moist, plastic, occasional fragments of gravel starting @ 10.0'

20.0-22.5' SANDY CLAY, light gray hydrocarbon staining, strong hydrocarbon odor, moist, gravel fragments up to 1" in diameter.

22.5-23.0' SILT, gray hydrocarbon staining,strong hydrocarbon odor, saturated.

TD = 23.0'

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
08-05-92	--	14.38'	<1.8" (film)



KWBES

BORING LOG

PROJECT: 622092003-237 (B-97)
CLIENT: Navajo Refinery
BORING NUMBER: B97
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 22.0'
DATE COMPLETED: 08/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 24.0'

DESCRIPTION

CLAY WITH SAND, dark brown to brown, moist, plastic.

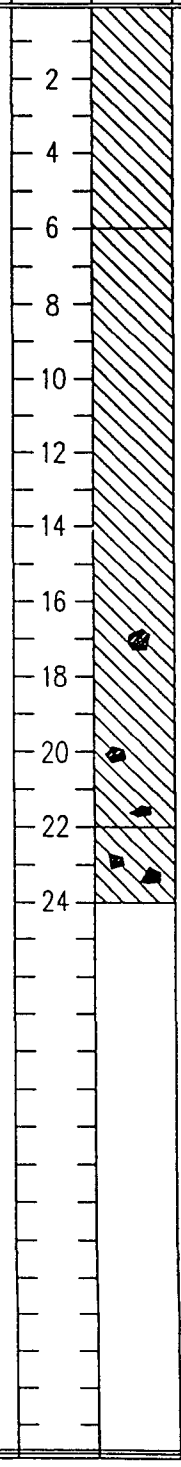
SANDY CLAY, tan, slightly moist to moist, plastic, occasional gravel fragments starting @ 15.0'.

SANDY CLAY, gray hydrocarbon staining, strong hydrocarbon odor, saturated, occasional small pockets of fine sand and gravel.

TD = 24.0'

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
08-05-92	--	15.55'	<1.8" (film)

DEPTH (ft.) | SYMBOL | SAMPLE | WELL DESIGN



KWBES

BORING LOG

PROJECT: 622092003-237 (B-98)
CLIENT: Navajo Refinery
BORING NUMBER: B98
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 19.0'
DATE COMPLETED: 08/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 20.0'

DESCRIPTION

0-12.0' CLAY WITH SAND, dark brown to brown, moist, plastic.
-gravel fragments starting to appear @ 10.0'

12.0-14.0' CLAY, light gray hydrocarbon staining, weak hydrocarbon odor, moist, plastic.

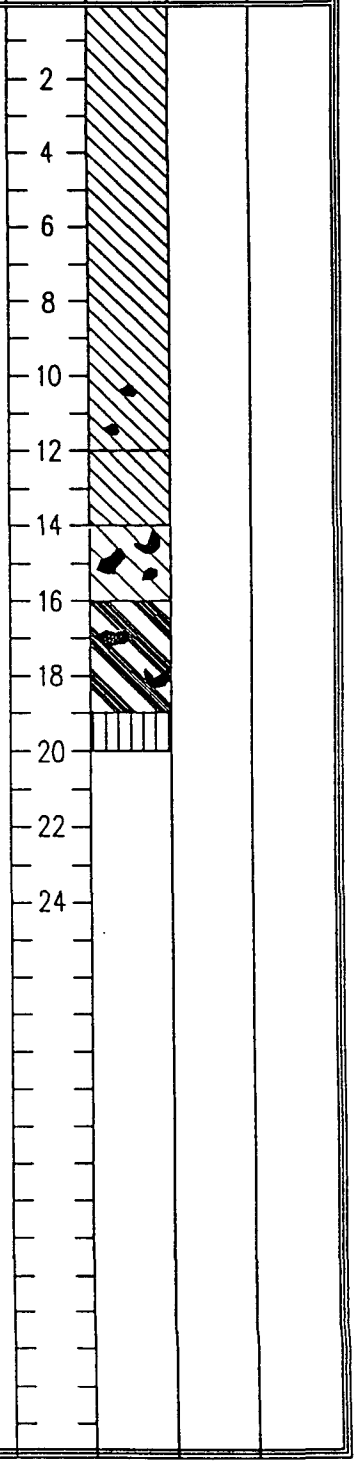
14.0-16.0' GRAVEL WITH CLAY, 1-2" diameter gravel mixed with moist clay.

16.0-19.0' CLAY AND GRAVEL, brown, moist, plastic.

19.0-20.0' SILT, gray hydrocarbon staining, strong hydrocarbon odor, saturated.

TD = 20.0'

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
08-05-92	--	12.30'	<1.8" (film)



KWBES

BORING LOG

PROJECT: 622092003-237 (B-99)
CLIENT: Navajo Refinery
BORING NUMBER: B99
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 19.0'
DATE COMPLETED: 08/04/92

SHEET: 1 of 1
DRILLED BY: Pool Envir.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 20.0'

DESCRIPTION

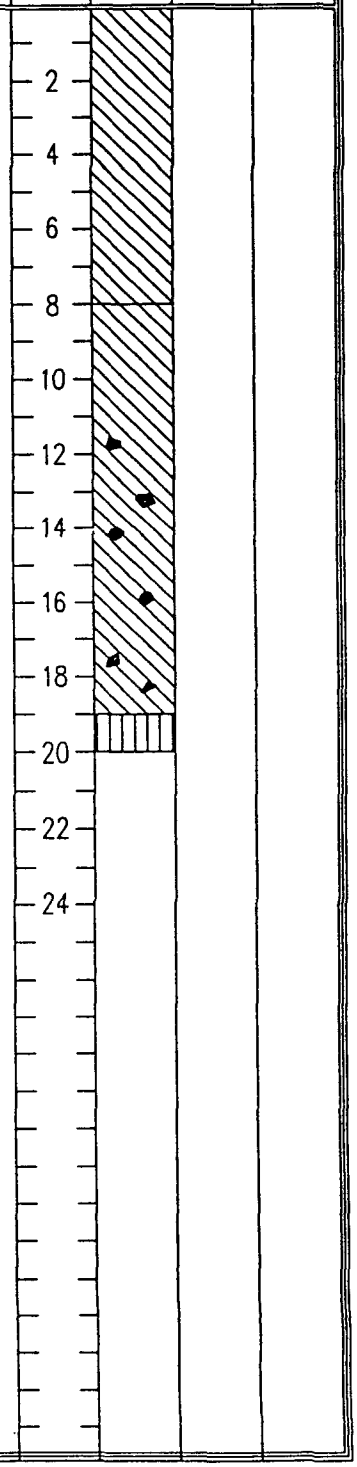
0-8.0' CLAY WITH SAND, dark brown to brown, moist, plastic.

8.0-19.0' SANDY CLAY, tan, moist, plastic
-occasional gravel fragments starting @ 11.0'

19.0-20.0' CLAYEY SILT, tan to gray hydrocarbon staining, strong hydrocarbon odor, saturated.

TD = 20.0'

Date	(D-T-P) Depth to Product	(D-T-W) Depth to Water	Product Thickness
08-05-92	--	13.02'	<1.8" (film)



KWBES

BORING LOG

PROJECT: 622092003 (B-100)
CLIENT: Navajo Refinery
BORING NUMBER: B100
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 5.0'
DATE COMPLETED: 10/06/92

SHEET: 1 of 1
DRILLED BY: Precision Eng.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 55.0'

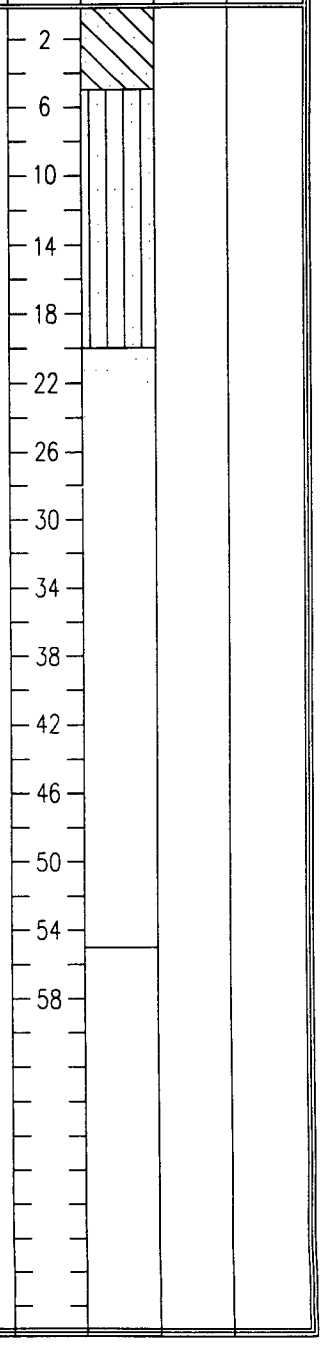
DESCRIPTION

0-5.0' CLAYEY SAND, dark brown to brown, moist to very moist, plastic.

5.0-20.0' SILTY SAND, reddish brown, saturated, occasional pockets of gravel.

20.0-55.0' SAND, tan, saturated, fine to medium grained, occasional thin lenses of high plasticity red clay.

TD = 55.0'



KWBES

BORING LOG

PROJECT: 622092003 (B-101)
CLIENT: Navajo Refinery
BORING NUMBER: B101
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 17.0'
DATE COMPLETED: 10/07/92

SHEET: 1 of 1
DRILLED BY: Precision Eng.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 50.0'

DESCRIPTION

0-8.0' SANDY CLAY, brown, moist, occasional pockets of fine white sand.

8.0-20.0' CLAYEY SAND, brown to tan, very moist to saturated at 17.0'.

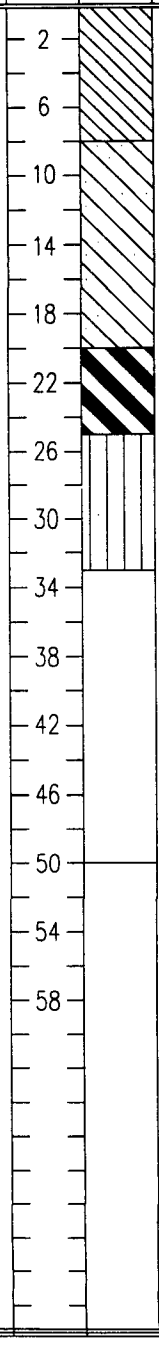
20.0-25.0' CLAY, red, very moist to saturated.

25.0-33.0' SILTY SAND, reddish brown, saturated.

33.0-50.0' SAND, tan, saturated, occasional thin seams of gravel.

TD = 50.0'

DEPTH (ft.) | SYMBOL | SAMPLE | WELL DESIGN



KWBES

BORING LOG

PROJECT: 622092003 (B-102)
CLIENT: Navajo Refinery
BORING NUMBER: B102
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 10.0'
DATE COMPLETED: 10/07/92

SHEET: 1 of 1
DRILLED BY: Precision Eng.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 50.0'

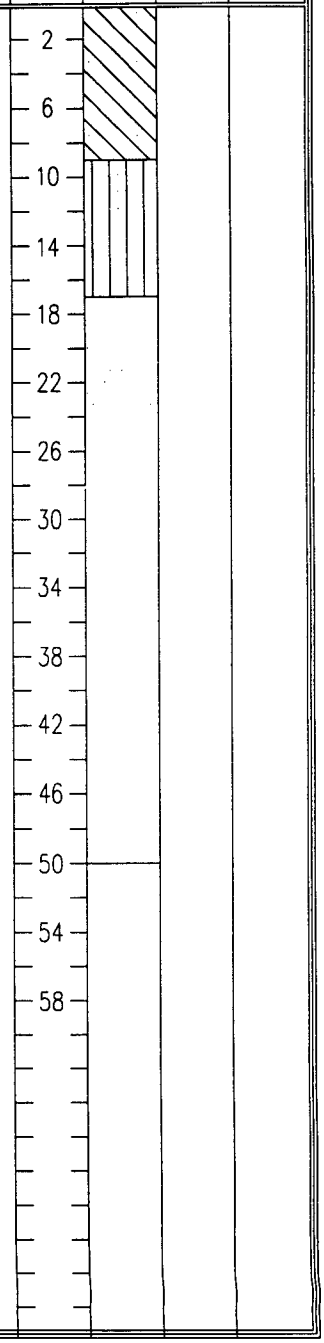
DESCRIPTION

0-9.5' CLAYEY SAND, tan to white, dry to moist, thin gravel zone at 2.5'.

9.5-17.0' SILTY SAND, reddish brown, very moist to saturated at 10.0'

17.0-50.0' SAND, tan, saturated, fine to medium grained.

TD = 50.0'



KWBES

BORING LOG

PROJECT: 622092003 (B-103)
CLIENT: Navajo Refinery
BORING NUMBER: B103
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 33.0'
DATE COMPLETED: 10/07/92

SHEET: 1 of 1
DRILLED BY: Precision Eng.
LOGGED BY: PWC
SURF. ELEV: N/A
TOTAL DEPTH: 50.0'

DESCRIPTION

0-5.0' SAND WITH CLAY, tan, dry to slighty moist, clay content increasing with depth, occasional gypsum crystals.

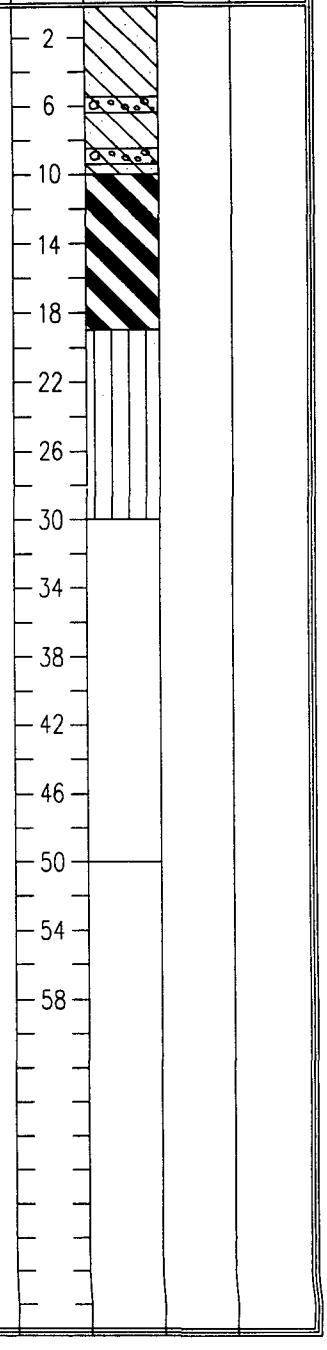
5.0-10.0' CLAYEY SAND, tan to gray, dry to slightly moist, 1" river rock seams at 6.0' and 8.5'

10.0-19.5' CLAY, alternating bands of greenish-gray and red color (reduced and oxidized), blocky, stiff, moist
-sharp contact between color changes

19.5-30.0' SILTY SAND, reddish brown, very moist

30.0-50.0' SAND, tan, very moist to saturated a 33.0', fine to medium grain.

TD = 50.0'



KWBES

BORING LOG

PROJECT: 622092003-253 (B-104)
CLIENT: Navajo Refinery
BORING NUMBER: B104
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 24'
DATE COMPLETED: 01/24/93

SHEET: 1 of 1
DRILLED BY: Pool Env.
LOGGED BY: PWC
SURF. ELEV:
TOTAL DEPTH: 26'

DESCRIPTION

0-6' CLAYEY SAND, brown, moist, friable

6-21' SANDY CLAY, brown to 7' then gray, hydrocarbon staining and odor noted, moist to dry, friable to stiff

-gray discoloration varies in shade from dark a 13' to light at 18'

21-26' CLAYEY GRAVEL, clay is gray with a strong hydrocarbon odor, gravel is up to 1-1.5" diameter and well rounded, moist to saturated at ~~42'~~ 24'

TD=26'

DATE	(D-T-P) DEPTH TO PRODUCT	(D-T-W) DEPTH TO WATER	PRODUCT THICKNESS
1-25-93	19.6'	20.69'	1.09'

DEPTH (ft.) | SYMBOL | SAMPLE | WELL DESIGN

KWBES

BORING LOG

PROJECT: 622092003-253 (B-105)
CLIENT: Navajo Refinery
BORING NUMBER: B105
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 23'
DATE COMPLETED: 01/24/93

SHEET: 1 of 1
DRILLED BY: Pool Env.
LOGGED BY: PWC
SURF. ELEV:
TOTAL DEPTH: 24'

DESCRIPTION

0-7' SANDY CLAY, brown, moist, plastic

7-18' CLAY, gray hydrocarbon discoloration and odor, moist, plastic

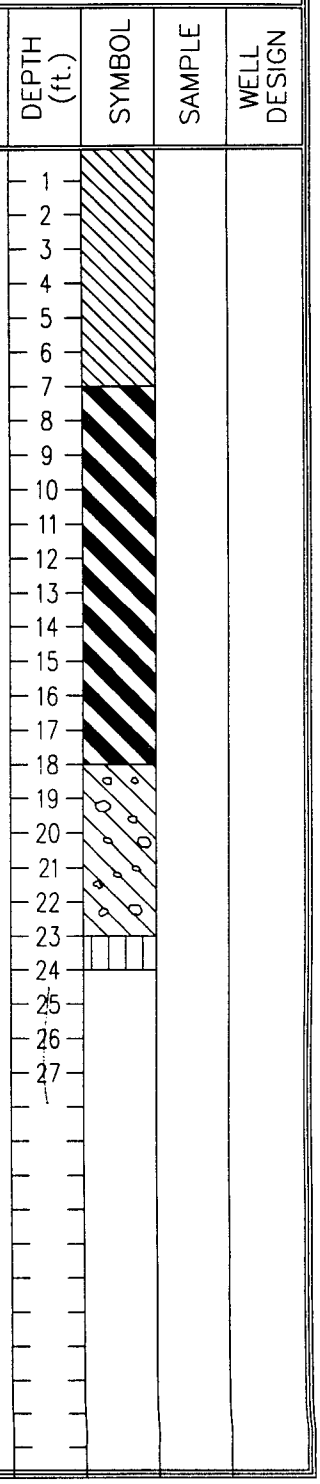
↑ -gray discoloration varies in shade from dark at 9' to light at 13'

18-23' CLAYEY GRAVEL, clay is gray, moist, gravel is up to 2" in diameter and well rounded

23-24' SILTY SAND, gray, saturated, gray hydrocarbon staining, strong hydrocarbon odor

TD=24'

DATE	(D-T-P) DEPTH TO PRODUCT	(D-T-W) DEPTH TO WATER	PRODUCT THICKNESS
1-25-93	18.27'	19.76'	1.49'



KWBES

BORING LOG

PROJECT: 622092003-253 (B-106)
CLIENT: Navajo Refinery
BORING NUMBER: B106
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 19'
DATE COMPLETED: 01/24/93

SHEET: 1 of 1
DRILLED BY: Pool Env.
LOGGED BY: PWC
SURF. ELEV:
TOTAL DEPTH: 19'

DESCRIPTION

0-8' SANDY CLAY, brown, moist, friable to plastic, clay content increasing with depth

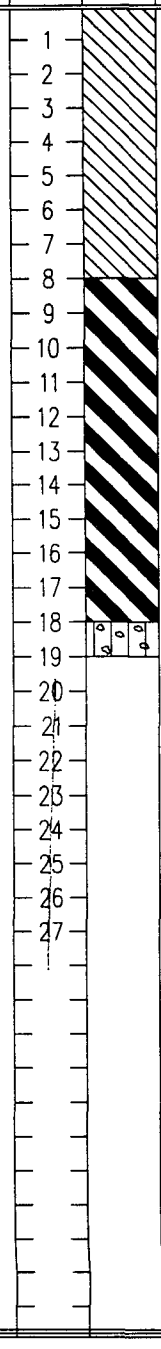
8-18' CLAY, gray hydrocarbon staining with hydrocarbon odor, moist, plastic

18-19' SILTY GRAVEL, sand and silt are tan, saturated, gravel is up to 2" in diameter, well-rounded

TD=19'

DATE	(D-T-P) DEPTH TO PRODUCT	(D-T-W) DEPTH TO WATER	PRODUCT THICKNESS
1-25-93	-	- *	-

* NOTE: Hole collapsed back to 18.86' - dry



KWBES

BORING LOG

PROJECT: 622092003-253 (B-107)
CLIENT: Navajo Refinery
BORING NUMBER: B107
EXCAVATED POND:
FIRST ENCOUNTERED WATER: 29'
DATE COMPLETED: 01/24/93

SHEET: 1 of 1
DRILLED BY: Pool Env.
LOGGED BY: PWC
SURF. ELEV:
TOTAL DEPTH: 29'

DESCRIPTION

0-9'	SANDY CLAY, brown, moist, friable, clay content increases with depth
9-16'	CLAY, gray hydrocarbon staining and hydrocarbon odor, moist, plastic
16-24'	CLAYEY GRAVEL, sand and clay, moist, gravel is up to 2" in diameter and well rounded
24-28'	SANDY CLAY, gray hydrocarbon staining and hydrocarbon odor, moist, ~~satruated~~ plastic
28-29'	SILTY SAND, gray hydrocarbon staining and hydrocarbon odor, satruated
	TD=29'

DATE	(D-T-P) DEPTH TO PRODUCT	(D-T-W) DEPTH TO WATER	PRODUCT THICKNESS
1-25-93	21.10'	21.12'	0.02'

DEPTH (ft.) | SYMBOL | SAMPLE | WELL DESIGN

KWBES

Offsite Borings

1995-1997

Offsite Borings
1995 - 1997

LOG OF BORING OS 95-01

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0905	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-5 ft. Surface soil, sandy silt with clay, brown
5			CL	5-10 ft. Clay, brown
10				10-12 ft. Clay, white, increasing moisture and caliche grains, no H/C odor
				12-14 ft. Clay, white, dry, caliche grains, no H/C odor
15				14-18 ft. Clay, white, moist, caliche grains, no H/C odor; water at 18 ft.
20				18-25 ft. Clay, sticks on auger, light brown
25			ML	25-30 ft. Clay with increasing sand; small gravel seen at 30 ft., auger fairly clean
30				
35				
40				

Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-01 located 200 ft. south of the east-west fence on south bank of Eagle Creek.

Upon completion, water depth in hole at 14 ft. At 1800, hole caved to 15.1 ft., DTW 11.3 ft., no apparent product. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-01.ge3

LOG OF BORING OS 95-02

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0940	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-5 ft. Surface soil, sandy silt with clay, brown
5				5-11 ft. Clay, moist but dry at base, no H/C odor
10				12 ft. Clay with small gravel, caliche clay
15			CL	
20				19 ft. Water, fast entry to hole 20-21 ft. Clay with some small gravel (approx. 1/2") and sand
25				21-28 ft. Clay with some silt, no gravel
30				
35				
40				

Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-02 located 300 ft. south of the east-west fence on south bank of Eagle Creek.

At 1800, hole caved to 11.8 ft., DTW 11.3 ft., no apparent product. Refinery workers plugged back hole with cuttings.

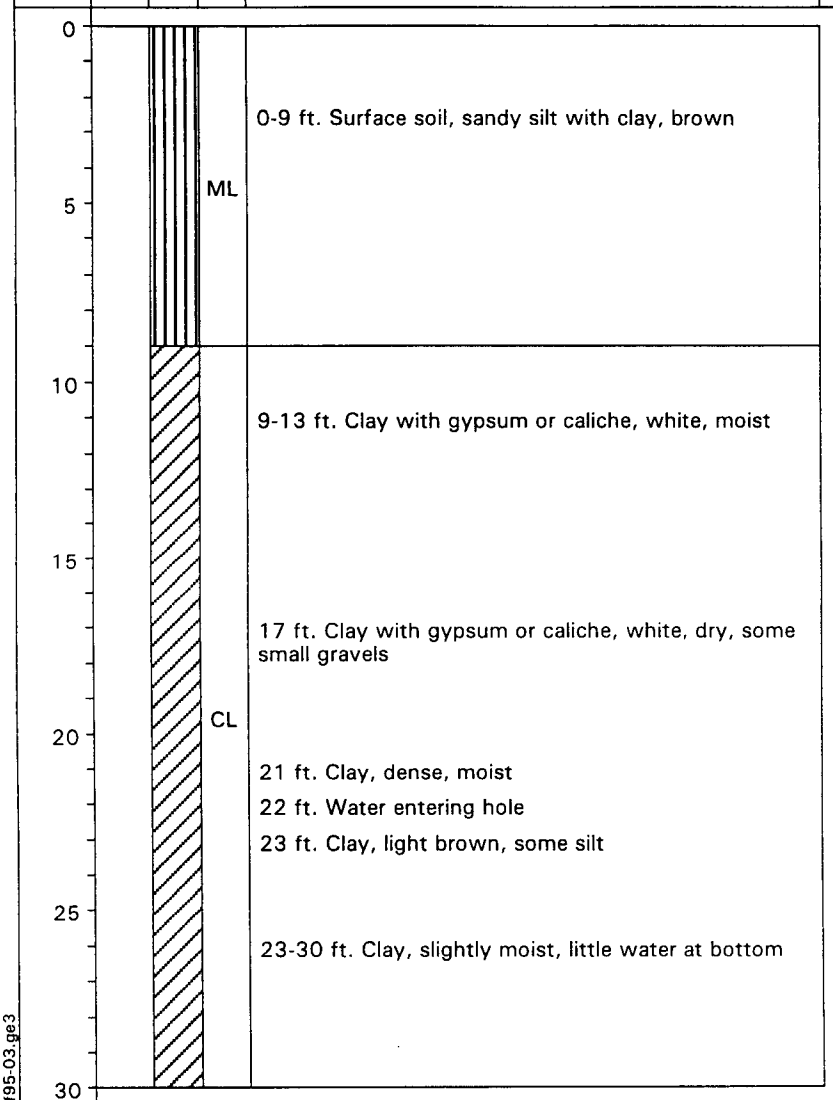
DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-02.ge3

LOG OF BORING OS 95-03

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1000	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-03 located 400 ft. south of the east-west fence on the south bank of Eagle Creek.

At 1800, hole caved to 16.4 ft., DTW 11.4 ft., no apparent product. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-03.ge3

LOG OF BORING OS 95-04

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1025	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-10 ft. Surface soil, sandy silt with clay, brown
10			CL	10-12 ft. Clay with small gravels, slightly moist 14 ft. Clay, stiff 16 ft. Gravely clay, water from 12 to 16 ft 17 ft. Clay, brown, stiff 17-26 ft. Clay, brown, stiff 26-30 ft. Clay, brown, stiff, some fine grained sand, light reddish-brown.
30				
40				

Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-04 located 500 ft. south of the east-west fence on the south bank of Eagle Creek.

Upon completion, water level in hole at 14 ft. At 1800, hole caved to 16.4 ft., DTW 11.4 ft., no apparent product. Refinery workers plugged back hole with cuttings.

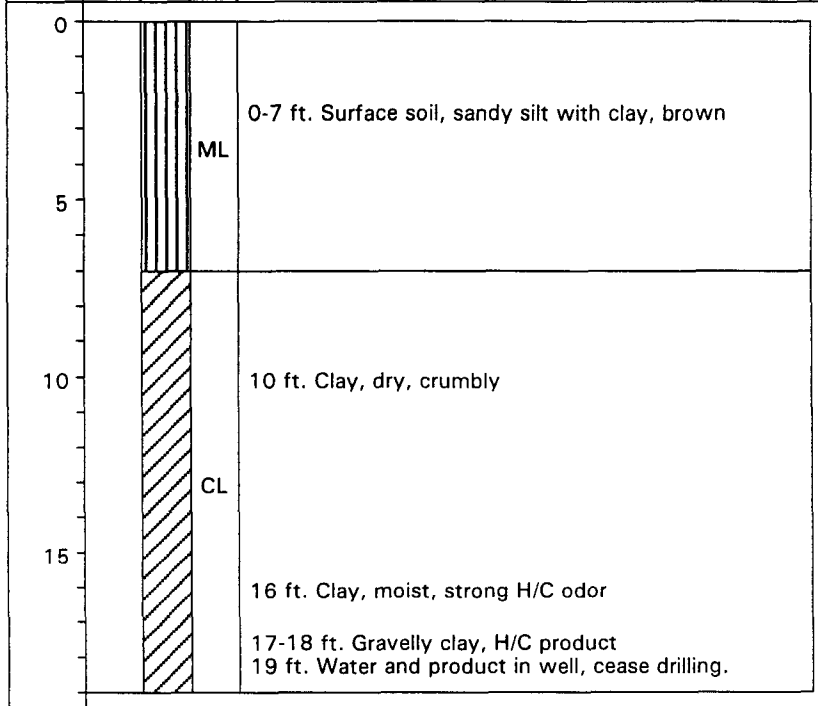
DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-04.ge3

LOG OF BORING OS 95-05

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1050	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-05 located 600 ft. south of the east-west fence on the south bank of Eagle Creek.

At completion of drilling, water and product fluid level rose to 14 ft. At 1800, hole caved to 16 ft., DTW 11.1 ft., 0.6 ft. of product measured. Refinery workers plugged back hole with cuttings.

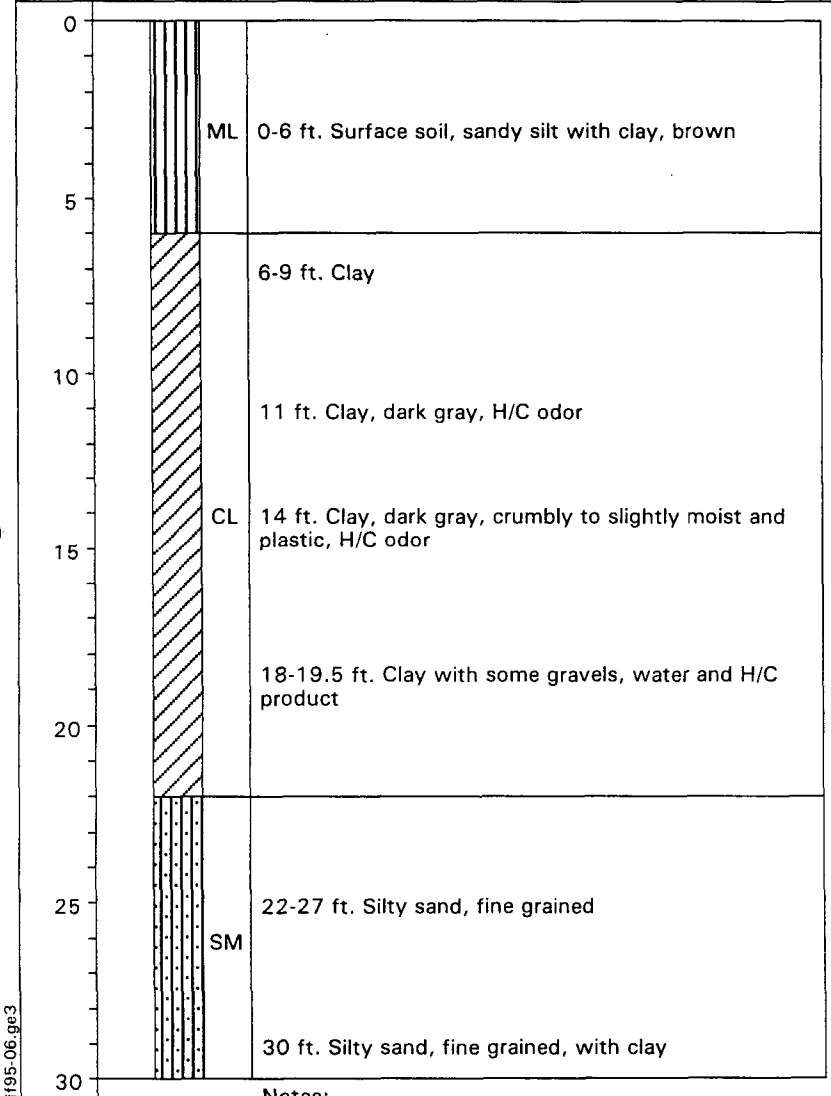
DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-05.ge3

LOG OF BORING OS 95-06

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1110	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-06 located 700 ft. south of the east-west fence on the south bank of Eagle Creek.

At completion of drilling, water level at 12 ft. with product on water.
At 1800, hole caved to 14.3 ft., DTW 11.1 ft., 0.2 ft. of product measured. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-06.ge3

LOG OF BORING OS 95-07

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1130	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Surface soil, brown and dry to approx. 6 ft.
5			CL	6-9 ft. Caliche clay, crumbly, white
10				11 ft. Caliche clay, grading to light brown, crumbly, no H/C odor 12-13 ft. Gray clay, H/C odor.
15				13-16 ft. Caliche clay, dry, crumbly but some slightly moist, H/C odor.
20				16-19 ft. Caliche clay with less odor and lighter color with depth 21 ft. Water, slight product sheen
25			SM	22 ft. Clayey silt at 22 ft., soft wet 22-27 ft. Sandy silt to silty sand
			GC	28 ft. Gravel to 2 in. diameter at 28 ft.
			CL	28-29 ft. Clay, stiff.
30				Notes: Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-07 located 800 ft. south of the east-west fence on the south bank of Eagle Creek. At completion of drilling, water level at 13 ft. with product on water. At 1800, hole caved to 18.9 ft., DTW 10.5 ft., 0.1 ft. of product measured. Refinery workers plugged back hole with cuttings. DTW = Depth to water, H/C = Petroleum hydrocarbon
35				
40				

4-25-1996 \mtech3\navajo\10-13-95\off95-07.ge3

LOG OF BORING OS 95-08

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1200	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Surface soil, brown and dry to approx. 6 ft.
5				
10			CL	6-13 ft. Caliche clay, crumbly, white
15				13-15 ft. Clay, light gray, slight hydrocarbon (H/C) odor 15-17 ft. Clay, brownish gray, dry, slight H/C odor
20				18-19 ft. Clay, gray, strong H/C odor 20 ft. Gravely clay, stiff
25			SW	21-24 ft. Gravelly sand, saturated, gravel to 2 in. diameter at 24 ft.
30			CL	24-30 ft. Clay, stiff
35				
40				

Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-08 located 900 ft. south of the east-west fence on the south bank of Eagle Creek.

At completion of drilling, water level at 10.5 ft. with no apparent product. At 1800, hole caved to 20 ft., DTW 10.5 ft., 0.25 ft. of product measured. Refinery workers plugged back hole with cuttings.

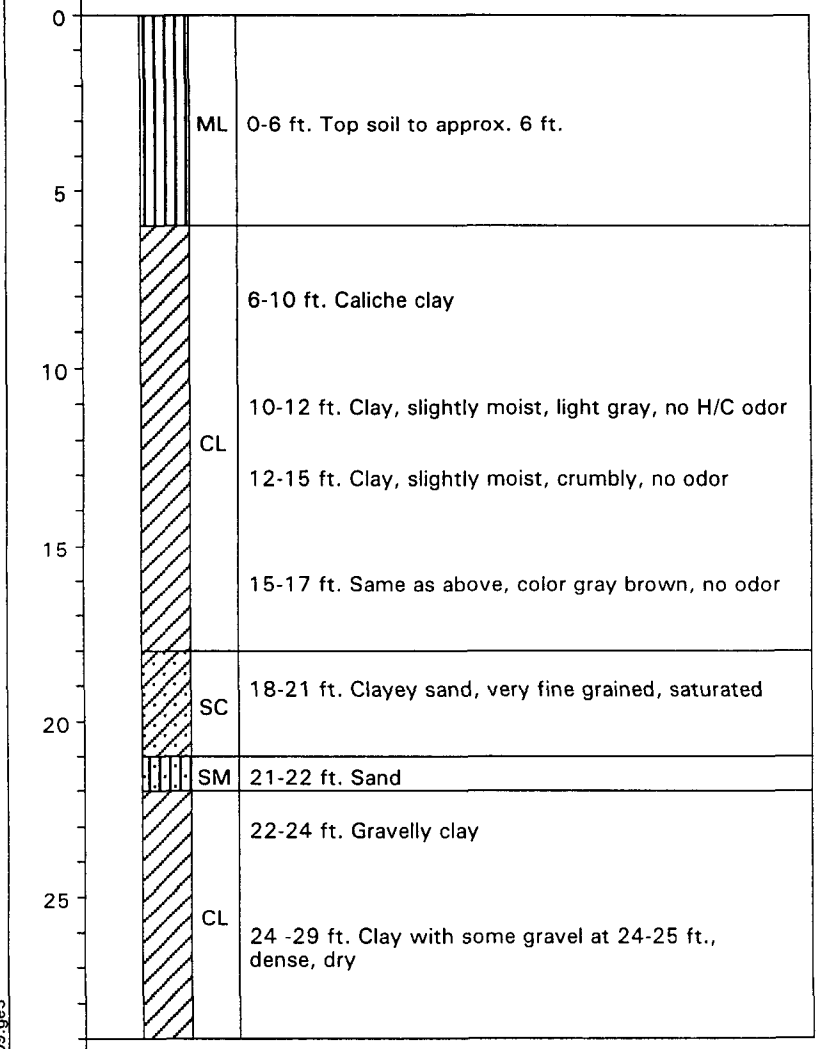
DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \\tech3\navajo\10-13-95\off95-08.ge3

LOG OF BORING OS 95-09

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1350	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-09 located 1000 ft. south of the east-west fence on the south bank of Eagle Creek.

At completion of drilling, water level at 17 ft. with possible product sheen.
At 1800, hole caved to 22.9 ft., DTW 9.5 ft., light product sheen. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-09.ge3

LOG OF BORING OS 95-10

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1420	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approx. 6 ft.
5				
10				6-13 ft. Caliche clay
15				13 ft. Caliche clay, whitish-gray, stiff, no H/C odor 15 ft. Caliche clay, whitish-gray, very stiff 17 ft. Caliche clay, whitish-gray, very stiff 18 ft. Caliche clay, grading to light brown, very stiff
20			CL	18-19 ft. Gravelly clay, slightly moist 20-22 ft. Clay with some gravel, dry
25				24 ft. Clay, dry, stiff 26 ft. Same as above, water entering hole from about 20 ft. 26-29 ft. Clay,stiff 29-30 ft. Sandy clay
30				30-32 ft. Clay, hard
35				
40				

Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-10 located 1100 ft. south of the east-west fence on the south bank of Eagle Creek.

At 1800, hole caved to 25 ft., DTW 9 ft., light product sheen. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

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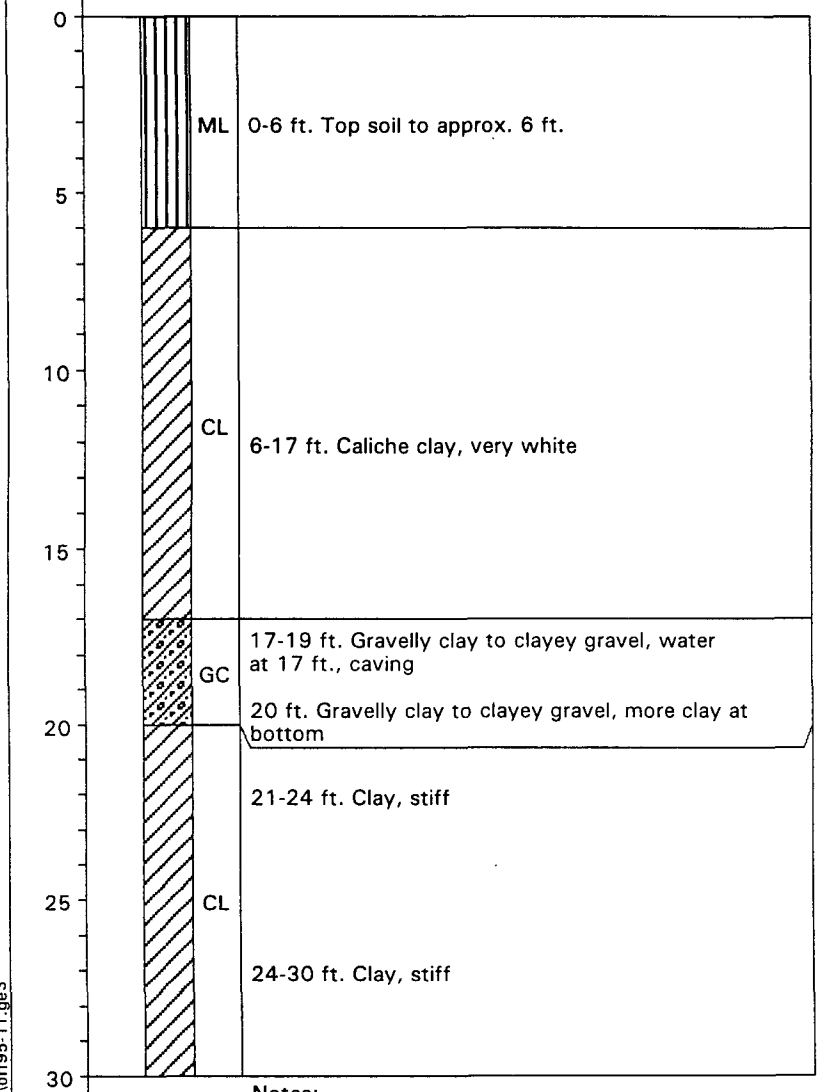
4-25-1996

LOG OF BORING OS 95-11

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1500	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings located in field east of old city wastewater treatment plant along a north-south line approx. 290 ft. east of refinery security fence. Boring 95-11 located 1200 ft. south of the east-west fence on the south bank of Eagle Creek.

At completion no apparent product or H/C odor. At 1800, hole caved to 16.1 ft., DTW 9.7 ft., light product sheen. Refinery workers plugged back hole with cuttings.

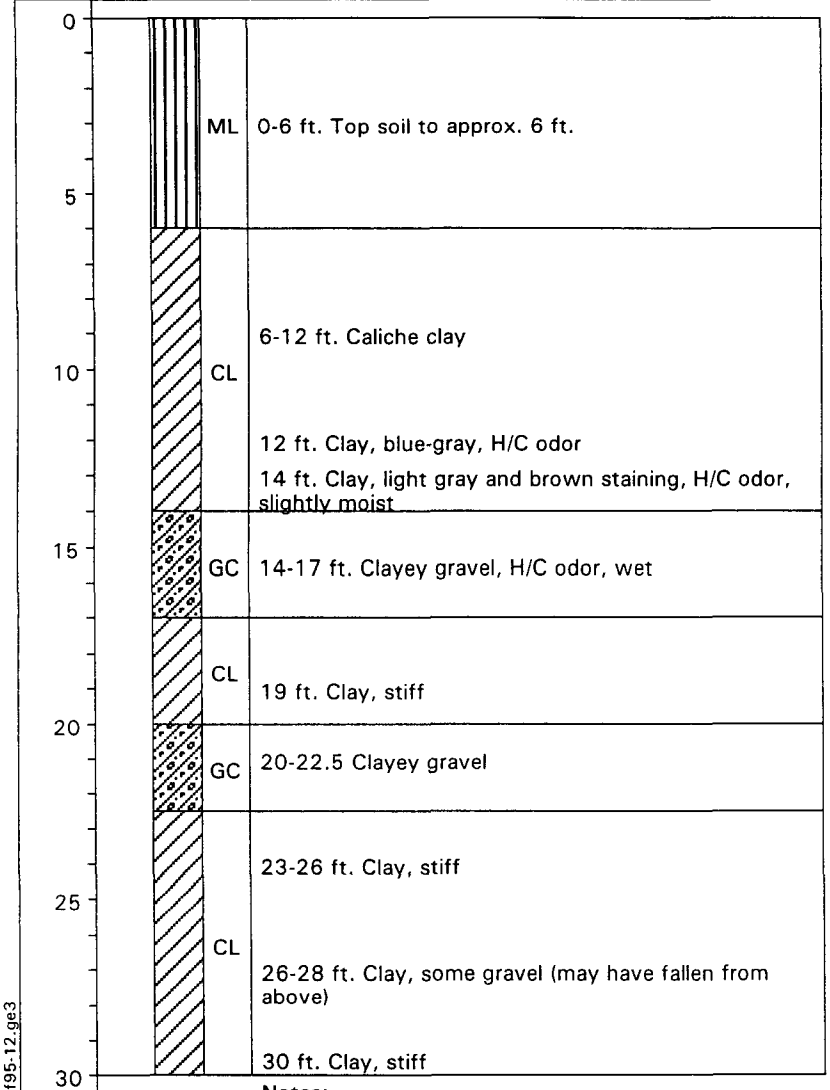
DTW = Depth to water, H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\10-13-95\off95-11.ge3

LOG OF BORING OS 95-12

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1600 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-12 is located 100 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

At completion water and product seen near surface. At 1800, hole caved to 17.1 ft., DTW 7.8 ft., light product sheen. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\of95-12.ge3

LOG OF BORING OS 95-13

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1625	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approx. 6 ft.
5			CL	6-10 ft. Caliche clay 11 ft. Clay, possible H/C odor 14 ft. Clay, white to black, stiff, dry, strong H/C odor in some samples 15 ft. Clay, darker gray, stronger H/C odor. 18 ft. Gravelly clay, water and product, dry above.
10			GC	18-21 ft. Gravel with clay, water and H/C product
15			CL	21-25 ft. Clay, dry, brown, no product
20				
25				
30				
35				
40				

Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-13 is located 200 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

At completion DTW 12.6 ft, 0.8 ft H/C product. At 1800, hole caved to 18.7 ft., DTW 12.2 ft., 0.8 ft. product measured. Refinery workers plugged back hole with cuttings.

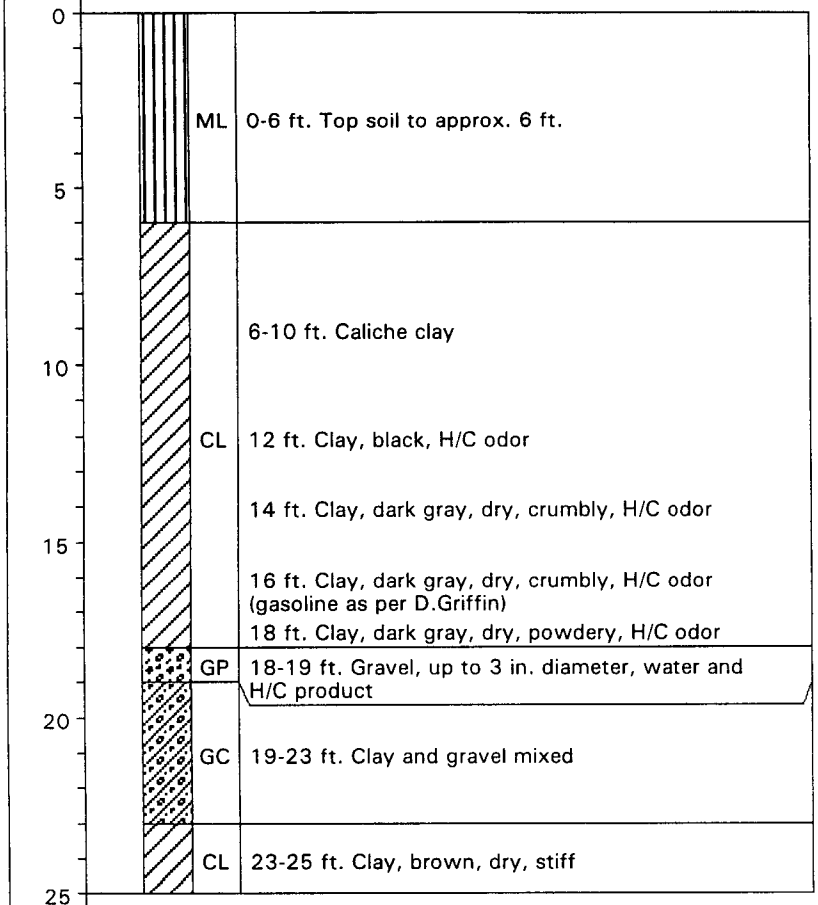
DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\off95-13.ge3

LOG OF BORING OS 95-14

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1640	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-14 is located 300 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

At completion water and product in hole.
At 1800, hole caved to 22.4 ft., DTW 18.3 ft., 0.3 ft product measured. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-13-95\olf95-14.ge3

LOG OF BORING OS 95-15

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/13/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1740	Sampling Method:	: Cuttings
Date Completed	: 10/13/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approx. 6 ft.
5				
10			CL	6-9 ft. Caliche clay 9 ft. Clay, dark gray, H/C odor 9-13 ft. Clay, light blue gray, dry, crumbly, very strong H/C odor 13 ft. Clay, moist at 13 ft., less H/C odor
15				13-18 ft. Clay, slightly moist, water entering hole at approximately 17 ft.
20				18-20 ft. Gravelly clay, moist, not saturated 20-21 ft. Clay, gray, dry with gravel and H/C odor 22-23 ft. Clay, light brown, stiff
25				
30				
35				
40				

Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-15 is located 400 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

At completion water entering hole slowly.
At 1800, hole depth 25(?) ft., DTW 16.3 ft., light sheen on surface. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \\mtech3\navajo\10-13-95\off95-15.ge3

LOG OF BORING OS 95-16

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0730	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approx. 6 ft.
5			CL	6-10 ft. Clay 10-12 ft. Silty clay, light gray-blue, dry, crumbly, H/C odor and stain 13 ft. Silty clay, light gray-blue, dry, less H/C odor 13.5-15 ft. Silty clay, light gray-blue, dry, crumbly, H/C odor, increasing staining 15-19 ft. Silty clay becoming more gravelly at 19 ft.
10				
15				
20			GC	19-22 ft. Clayey gravel, saturated at 19 ft. 22 ft. Increasing clay, brown, slightly moist 22-24 ft. Clayey gravel
25			CL	24-29 ft. Clay, brown, slightly moist, occassional gravel in clay
30				
35				
40				

Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-16 is located 500 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

At completion water and gasoline (?) product seen at depth of 15 ft. At approximatey 1800 hrs., hole caved to 21.3 ft., DTW 10.2 ft., 1.7 ft.product. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

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LOG OF BORING OS 95-17

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0845 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-9 ft. Top soil to approx. 9 ft.
10			CL	9-11 ft. Silty clay, dry, light blue, H/C odor
15			GC	11 ft. Clay with small gravels (pea gravel size), water, H/C product (gasoline?) 11-15 ft. Clayey gravel, water, H/C product (gasoline?)
20			CL	15-17 ft. Clay with occassional gravel, gray-blue, H/C odor 17-19 ft. Clay grading to silt at 19 ft., large gravel at 19 ft.
25			GC	19-23 ft. Clayey gravel with occassional sand zone, some clay (not saturated), gravels through out
30			CL	23 ft. Clay, brown, dry, dense, stiff, occassional small gravel or pebble, no H/C 28 ft. Clay, brown, dry, stiff, no H/C
35				
40				

Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-17 is located 600 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

At approximatey 1800 hrs., hole caved to 20.2 ft., DTW 11.7 ft., 0.8 ft.product. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-18-95\off95-17.ge3

LOG OF BORING OS 95-18

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0930	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-5 ft. Top soil to approx. 5 ft.
5			CL	5-10 ft. Clay, light brown, dry, crumbly
10				11 ft. Clay, small pebbles, moist 11-13 ft. Gravelly clay, pea gravel size, moist, H/C odor, hard drilling
15				13-18 ft. No recovery, saturated
20			GC	18-20 ft. Clayey gravel, H/C odor
25			CL	22 ft. Clay, gray, H/C odor 22-24 ft. Gravelly, silty clay, light brown, saturated, no H/C odor 24-27 ft. Silty clay
30				
35				
40				

Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-18 is located 700 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

Upon completion, water and product in hole at 12 ft. At approximatey 1800 hrs., hole caved to 21.3 ft., DTW 11.6 ft., 0.3 ft. product. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

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LOG OF BORING OS 95-19

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1015 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-5 ft. Top soil to approx. 5 ft.
5				5-9 ft. Clay, white, slightly moist, brown staining, no odor
10				9-11 ft. Clay, light brown, crumbly, occasional small gravel
				11-16 ft. Clay with increasing gravel, moist, plastic, H/C odor
15			CL	16-19 ft. Clay, reddish brown, some moisture and gravel, very stiff
20				19-24 ft. Clay, reddish brown, some moisture and gravel, very stiff, trace of water at 24 ft.
25				24-27 ft. Clay, light brown
				27-30 ft. Clay, light brown to brown
30				
35				
40				

Notes:

Borings located in "boneyard" east of Truck By-Pass Road and along a north-south line approximately 290 ft. east of the refinery security fence running south from Eagle Creek. Boring 95-19 is located 921 ft. south of the east-west quarter-section fence separating the "boneyard" from the pasture to the north.

Upon completion, water in hole at 21 ft. No product seen. At approximatey 1800 hrs., hole reported caved to 23.4 ft., with water at 11.1 ft., 0.2 ft. product. However, water/product measurements may be for hole OS 95-20 due to possible recording mixup. Refinery workers plugged back hole with cuttings.

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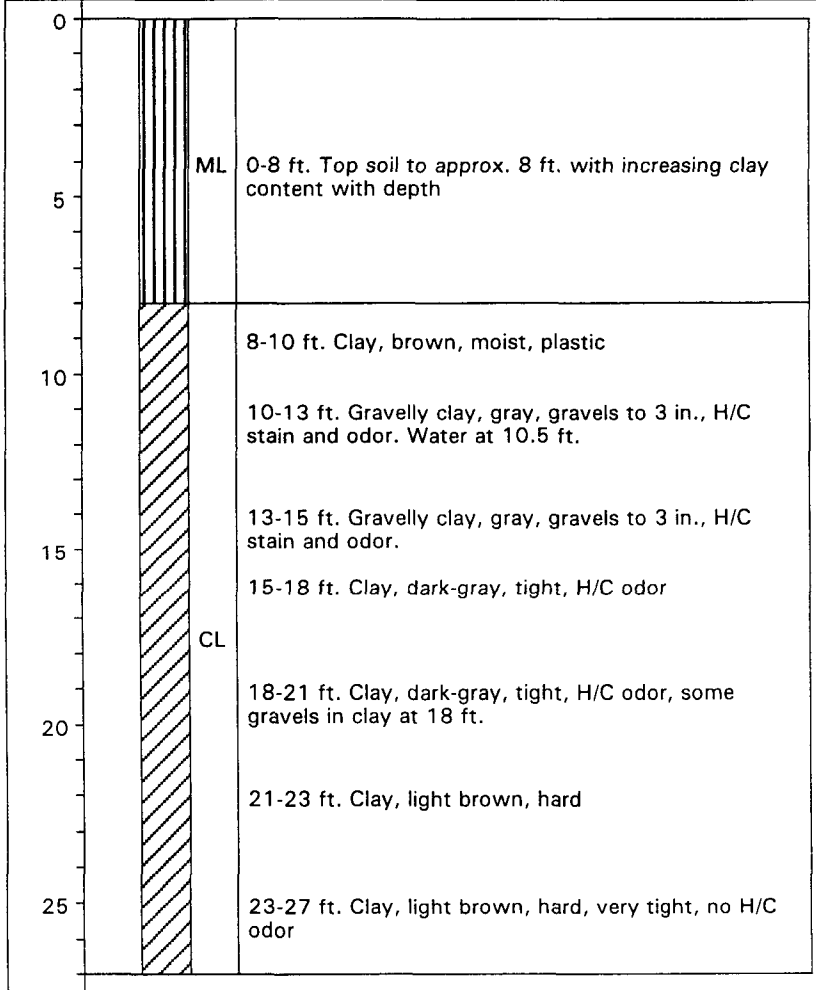
LOG OF BORING OS 95-20

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1110	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Boring 95-20 drilled in pasture east of "boneyard" and fire training area. Hole located in northwest corner approximately 50 ft. south of east-west concrete irrigation ditch and 25 ft. east of "boneyard" fence.

At approximatey 1800 hrs., hole reported caved to 23.4 ft., with DTW 11.1 ft., 0.2 ft. product. However, water/product measurements may be for hole OS 95-19 due to possible recording mixup. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

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LOG OF BORING OS 95-21

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1200	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Sample Type	GRAPHIC	USCS	DESCRIPTION
0				
5	Cuttings		ML	
10	Cuttings		CL	8-10 ft. Clay, light brown, moist 10-12 ft. Gravelly clay, light gray, stiff, slightly moist, strong H/C odor 12-14 ft. Same as above with less gravel, stiff
15				14-18 ft. Clay, light brown, occasional gravel, stiff, strong H/C odor
20				18-19 ft. Gravelly clay, gray, saturated, very strong gasoline odor 19-20 ft. Clay, light gray to light brown, some gravel, tight, 20-22 ft. Clay, very tight, slight odor
25				
30				
35				
40				

Notes:

Boring 95-21 drilled in pasture east of "boneyard" and fire training area. Hole located in north center pasture area, approximately 50 ft. south of east-west concrete irrigation ditch and 419 ft. west of corner post at N-S road by KWB-1 wells.

At approximatey 1800 hrs., hole reported caved to less than 10 ft. No H/C product measured. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 95-22

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1330 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-8 ft. Top soil to approx. 8 ft. grading to light brown clay, moist
10			CL	8-13 ft. Clay, light brown, moist, stiff, no odor
15				13-16 ft. Clay, light brown, increasing gravel in clay, stiff, no odor, moisture at bottom of hole.
20				16-18 ft. Clay, light brown, stiff, caliche clay at 18 ft., water entering hole at 18 ft.
25				18-23 ft. Clay, tight, some gravel at top, less at 23 ft.
				23-26 ft. Clay, light to dark brown, stiff, tight
				26-28 ft. Same as above, very stiff, only slightly moist, no H/C odor
30				
35				
40				

Notes:

Hole located 50 ft. south of monitor well KWB-1B inside pasture.

At approximatey 1800 hrs., hole reported caved to approximately 10 ft. No H/C product measured. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 95-23

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1425	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-10 ft. Top soil to approx. 8 ft. grading to brown clay, stiff
10			CL	10-13 ft. Clay, grading to caliche clay with small gravels in clay matrix. 13-14 ft. Clay and caliche clay with small gravels in clay matrix. 14-18 ft. Clay with less gravel and caliche 18-20 ft. Clay with increasing moisture and small gravels, no H/C odor 20-22 ft. Gravelly clay, chalk gray, gravel pea sized, saturated, no odor
20				
25				22-24 ft. No recovery, hard at 24 ft. (suspect 2 to 2.5 in. gravel, ref. Frank)
			CL	24-27 ft. Clay with gravel at top decreasing with depth, no H/C odor.
30				
35				
40				

Notes:

Hole located 150 ft. south of monitor well KWB-1B inside pasture.

At approximatey 1800 hrs., hole reported caved to less than 10 ft. No H/C product measured. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 95-24

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1450 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-9 ft. Top soil to approx. 8 ft. grading to clay
10			CL	9 ft. Clay, light brown, slightly moist, stiff 10-12 ft. Caliche clay, occasional small gravel
15				12-17 ft. Clay, occasional caliche, very stiff
20				17-19 ft. Clay, occasional caliche, very stiff, water entering at bottom 19-20 ft. Clay with gravel (small pebbles, clay matrix predominates)
25				22-24 ft. Clay as above, same or less small gravel (pea gravel size) 24-27 ft. Clay, brown, little or no gravel, very stiff
30				
35				
40				

Notes:

Hole located 250 ft. south of monitor well KWB-1B inside pasture.

At approximatey 1800 hrs., hole reported caved. No H/C product measured. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-18-95\of95-24.ge3

LOG OF BORING OS 95-25

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1510	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-8 ft. Top soil grading to brown clay
10			CL	8-10 ft. Clay and caliche clay, light brown and white 10-13 ft. Clay and caliche clay, light brown and white with occasional small gravel and iron staining 13-14 ft. Clay and caliche clay, no H/C odor 14-16 ft. Caliche and gravelly clay 16-18 ft. Caliche and gravelly clay, increasing gravel, saturated 18-20 ft. Gravelly clay 20-23 ft. Gravelly clay, gravel decreasing with depth 23-26 ft. Clay, very stiff, no H/C odor
40				

Notes:

Hole located 350 ft. south of monitor well KWB-1B inside pasture.

At approximatey 1800 hrs., hole reported caved. No H/C product measured. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-25-1996 \mtech3\navajo\10-18-95\off95-25.ge3

LOG OF BORING OS 95-26

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1543	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil
5				6-8 ft. Clay. Water entering hole at approximately 7 ft. from field drainage or irrigation pipe, no H/C odor noted
10				8-13 ft. Clay, light brown, moist, stiff
15				13-15 ft. Caliche clay, some gravel, very stiff
			CL	15-19 ft. Caliche clay, very stiff
20				19-23 ft. Caliche clay, some gravels
25				23-28 ft. Caliche clay, some gravels
30				
35				
40				

Notes:

Hole located 50 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-18-95\off95-26.ge3

LOG OF BORING OS 95-27

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1615	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil, moist at 6 ft.
5				
10			CL	6-12 ft. Clay, light brown, moist
				12-15 ft. Clay, light brown, moist
15				15-17 ft. Clay, light brown, moist, softer at 16 ft.
				17-20 ft. Clay, light brown, stiff
20				20-25 ft. Clay, light brown, stiff
25				
30				
35				
40				

Notes:

Hole located 150 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

At completion DTW water approximately 7 ft. No H/C odor noted. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-18-95\off95-27.ge3

LOG OF BORING OS 95-28

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1630	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil, moist at 6 ft.
5				
10			CL	6-12 ft. Clay, light brown, moist, no H/C odor noted
15				12-15 ft. Clay, light brown, moist 15-17 ft. Clay, light brown, moist, softer at 16 ft.
20				17-20 ft. Clay, light brown, stiff 20-25 ft. Clay, light brown, stiff
25				
30				
35				
40				

Notes:

Hole located 300 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-18-95\of95-28.ge3

LOG OF BORING OS 95-29

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1650	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil
5				6-10 ft. Clay, brown
10				10-12 ft. Clay with increasing gravel, saturated, no H/C odor noted
				12-14 ft. Clay with caliche gravel
15			CL	14-17 ft. Clay, very stiff, no gravel
				17-21 ft. Clay, very stiff, no gravel
20				21-24 ft. Clay, brown
25				
30				
35				
40				

Notes:

Hole located 450 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-18-95\off95-29.ge3

LOG OF BORING OS 95-30

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1715	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil
5			CL	6-10 ft. Clay, brown, moist
10				10-11 ft. Clay with river gravels, saturated, no H/C odor noted
			GP	11-15 ft. River gravel, large (2-3 in. diameter)
15			GC	15-18 ft. Gravel with some clay
			GP	18-20 ft. Gravel, can not drill deeper due to auger binding by gravel
20				
25				
30				
35				
40				

Notes:

Hole located 600 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

At completion water depth at 12 ft. with caving. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-18-95\off95-30.ge3

LOG OF BORING OS 95-31

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/18/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1735	Sampling Method:	: Cuttings
Date Completed	: 10/18/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil
5			CL	6-10 ft. Clay, light brown, stiff
10				10 ft. Auger refusal, check for metal, none 10-13 ft. Clay with caliche gravel, some water, no H/C odor noted
15			GC	13-14 ft. Gravel and clay (river gravels) 14-18 ft. Clayey gravel
20			CL	18-22 ft. Gravelly clay (but auger may be dragging down gravel)
25				22-26 ft. Gravelly clay (but auger may be dragging down gravel)
30				
35				
40				

Notes:

Hole located 750 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-18-95\off95-31.ge3

LOG OF BORING OS 95-32

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0845	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approximately 6 ft.
5				
10			CL	6-10 ft. Caliche clay, water at approximately 8 ft. 10-13 ft. Clay, light brown, moist, no gravel, no H/C odor
15				13-16 ft. Clay, light brown, plastic, very stiff 16-18 ft. Clay, light brown 18-19 ft. Clay, light brown, increasing small caliche gravel
20				19-21 ft. Clay, light brown, very stiff, small caliche gravel 21-25 ft. Clay, light brown, less gravel (occasional caliche gravel)
25				
30				
35				
40				

Notes:

Hole located 900 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-32.ge3

LOG OF BORING OS 95-33

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0925	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil
5			CL	6-10 ft. Clay, brown, stiff, moist, occasional caliche gravel
10			CL	10-13 ft. Clay, brown, stiff, moist, caliche gravel increasing in size and frequency
15			CL	13-15 ft. Gravelly clay, water at 13 ft. No H/C odor noted.
			GC	15-16 ft. Clayey gravel, river gravels to 3 in. diameter
			GC	16-18 ft. Clayey gravel, gravel smooth, well rounded
20			GC	18-20 ft. Clayey gravel, increasing clay at 20 ft.
			CL	20-21 ft. Clay, stiff, no gravel
			CL	21-24 ft. Clay, light brown, very stiff
25				
30				
35				
40				

Notes:

Hole located 675 ft. north of KWB-1 monitor wells, 13 ft. east of electric fence along dirt road.

Refinery workers plugged back hole with cuttings.

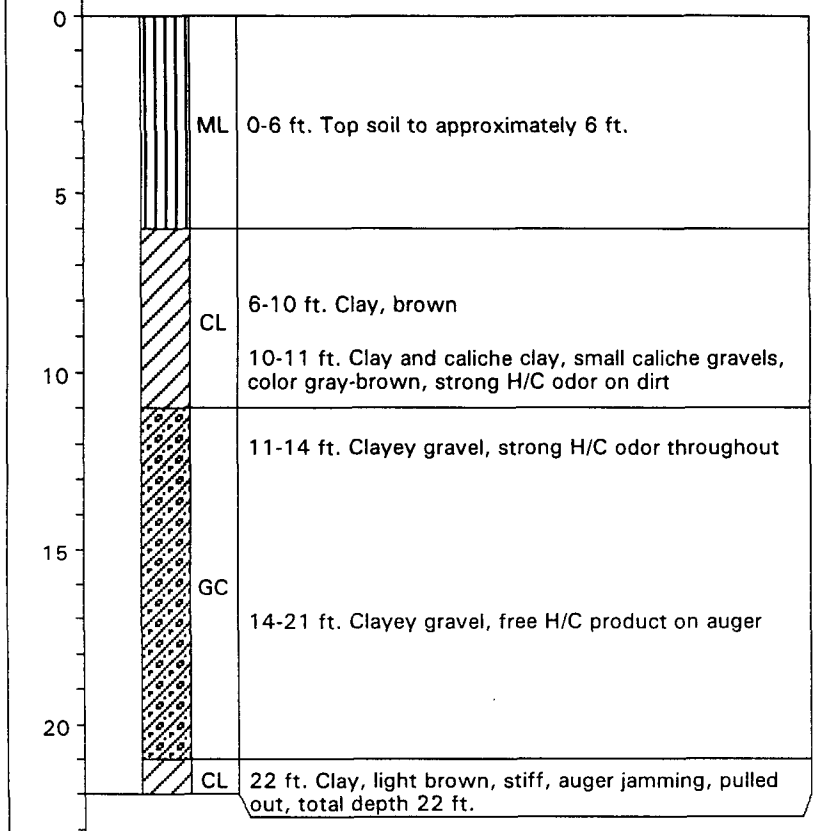
H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\of95-33.ge3

LOG OF BORING OS 95-34

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0945	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Hole located 525 ft. north of monitor well KWB-1 wells, 13 ft. east of electric fence along dirt road.

At 1400 hrs., measured 0.5 ft. of gasoline. Refinery workers plugged back hole with cuttings.

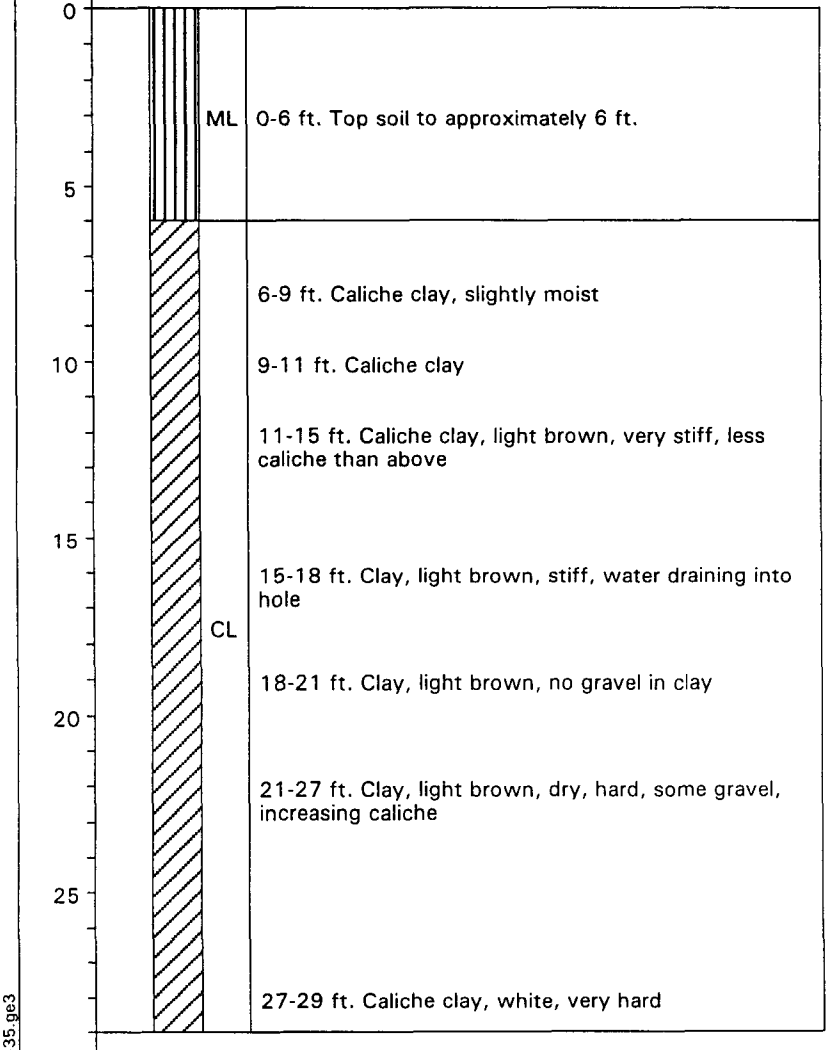
H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\10-19-95\off95-34.ge3

LOG OF BORING OS 95-35

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1300	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-35 located 55 ft. north of east-west fence on the north bank of Eagle Creek.

At approximately 1700 hrs., hole caved to 14.3 ft., DTW 10.8 ft., no H/C product or odor detected. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\of195-35.ge3

LOG OF BORING OS 95-36

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1340	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approximately 6 ft.
5				6-9 ft. Clay, calcite(?) crystals at 9 ft.
10				9-14 ft. Clay, light brown, slightly moist, plastic, very stiff, segments of caliche clay
15				14-17 ft. Clay, light brown, slightly moist, plastic, very stiff, some caliche clay, no gravel
			CL	17-20 ft. Clay, light brown, slightly moist, plastic, very stiff, some caliche clay, some iron staining
20				20-22 ft. Caliche clay with some gravel, brown staining
				22-26 ft. Caliche clay, saturated, poor recovery
25				26-30 ft. Clay, brown to chalk color, dry, hard
30				
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-36 located 155 ft. north of east-west fence on the north bank of Eagle Creek.

At approximately 1700 hrs., hole caved to 22.3 ft., DTW 10.9 ft., no H/C product or odor detected. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-36.ge3

LOG OF BORING OS 95-37

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1405	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-8 ft. Top soil
10			CL	8-12 ft. Caliche clay, white
				12-14 ft. Clay, light brown, brown staining, stiff
15				14-18 ft. Clay, light brown, brown staining, stiff
				18-20 ft. Gravelly clay, mixed caliche gravels and small river gravels
20				20-23 ft. Clay grading from brown to chalk white, little or no gravel
25				23-27 ft. Clay, brown and chalk white, little or no gravel
30				
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-37 located 250 ft. north of east-west fence on the north bank of Eagle Creek.

At approximately 1700 hrs., hole caved to 21.3 ft., DTW 11.8 ft., no H/C product or odor detected. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\of95-37.ge3

LOG OF BORING OS 95-38

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1440	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-7 ft. Top soil
10				7-11 ft. Clay, light brown, very stiff
				11-14 ft. Clay, light brown
15				14-16 ft. Clay, light brown, very stiff
				16 ft. Gravelly clay, saturated, small river gravel (3/4 in.) and caliche gravel
			CL	17-18 ft. Clay, DTW 16.5 ft.
20				18-22 ft. Clay, light brown to light green, no H/C odor, very stiff
25				22-26 ft. Clay and caliche clay, mottled brown and white, very stiff, occasional small gravels
				26-29 ft. Clay and caliche clay, mottled brown and white, very stiff, occasional small gravels
30				
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-38 located 350 ft. north of east-west fence on the north bank of Eagle Creek.

At approximately 1700 hrs., hole caved to 16.1 ft., DTW 10.8 ft., no H/C product or odor detected. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-38.ge3

LOG OF BORING OS 95-39

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1505	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-8 ft. Top soil
10				8-13 ft. Clay, light brown, stiff
15				13-16 ft. Clay, very stiff
				16 ft. Clay, some silt, plastic
				16-17 ft. Gravelly clay, small gravels, saturated
			CL	17-18 ft. Clay with some silt
20				18-24 ft. Clay, light brown, very stiff
25				24-28 ft. Clay, light brown, very stiff
30				
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-39 located 450 ft. north of east-west fence on the north bank of Eagle Creek.

At approximately 1700 hrs., hole caved to 19.5 ft., DTW 10.7 ft., no H/C product or odor detected. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-39.ge3

LOG OF BORING OS 95-40

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1530	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-7 ft. Top soil
10			CL	7-15 ft. Clay, light brown, very stiff, some calcite(?) and iron staining
15			CH	15-17 ft. Clay, light brown, very stiff, clay swelling with auger sticking 17-18 ft. Clay, light brown, very stiff, clay swelling
20			CL	18-19 ft. Clay with gravels in clay matrix 19-20 ft. Clay, stiff, plastic 20-23 ft. Clay, stiff, plastic, some small caliche gravels at 20 ft. 23-26 ft. Clay, stiff, plastic, caliche gravels, clay mottled brown and chalk coloring
25				
30				
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-40 located 550 ft. north of east-west fence on the north bank of Eagle Creek.

At approximately 1700 hrs., hole caved to 25 ft., DTW 12 ft., no H/C product or odor detected. Refinery workers plugged back hole with cuttings.

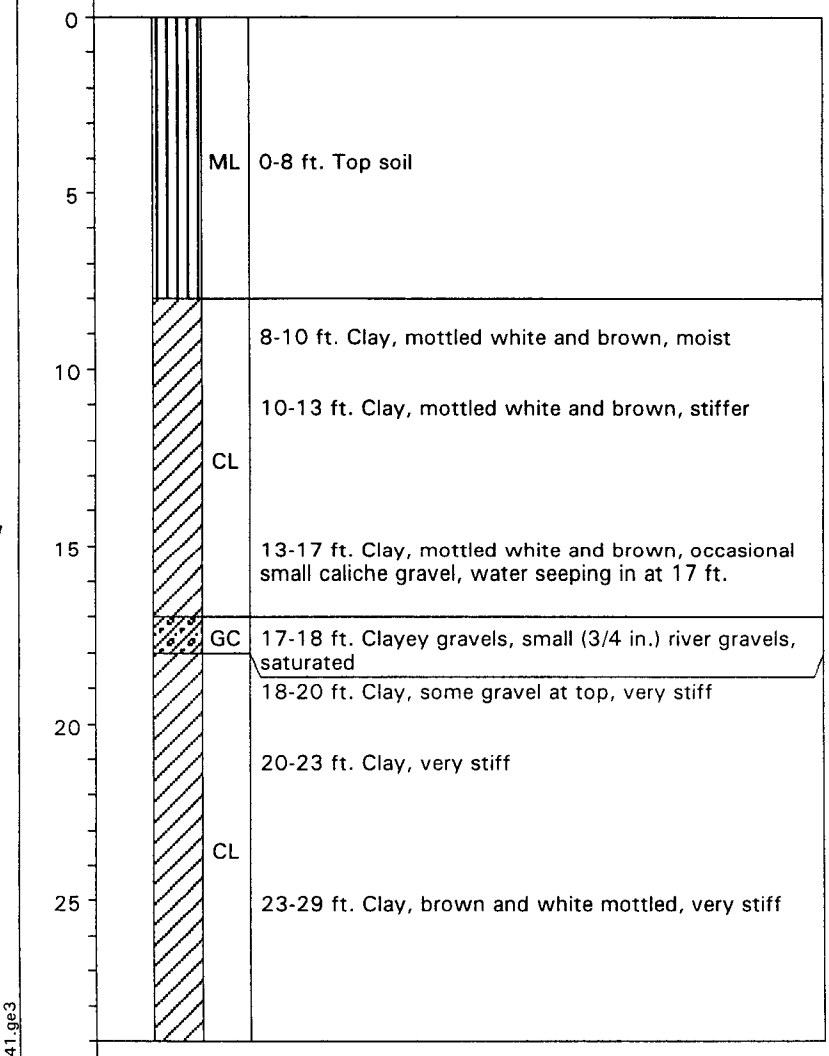
DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-40.ge3

LOG OF BORING OS 95-41

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1600	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-41 located 650 ft. north of east-west fence on the north bank of Eagle Creek.

At completion of hole, DTW 17 ft.
At approximately 1700 hrs., hole caved to 22.4 ft., DTW 13.3 ft., no H/C product or odor detected.
Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-41.ge3

LOG OF BORING OS 95-42

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1630	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil
5				
10			CL	6-13 ft. Clay and caliche clay, mottled brown and white, iron staining, slightly moist at 11 ft.
15				13-17 ft. Clay and caliche clay, mottled brown and white, iron staining
20				17-19 ft. Clay and caliche clay, mottled brown and white, iron staining 19-20 ft. Clay with some caliche gravels, moist 20-24 ft. Clay with some caliche gravels
25				24-25 ft. Clay, some small caliche gravel in clay matrix
30				25-30 ft. Clay, some small caliche gravel in clay matrix
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-42 located 750 ft. north of east-west fence on the north bank of Eagle Creek.

At approximately 1700 hrs., DTW 13.8 ft., no H/C product or odor detected. Refinery workers plugged back hole with cuttings.

DTW = Depth to water, H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-42.ge3

LOG OF BORING OS 95-43

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1655	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approximately 6 ft.
5			CL	6-8 ft. Clay
10			CH	8-14 ft. Clay, brown and white mottled, plastic, very stiff, slightly moist, auger sticking
15				14-18 ft. Clay, brown and white mottled, plastic, very stiff, moisture seeping at 14 ft.
20				18-26 ft. Clay, brown and white mottled, plastic, very stiff
25				26-28 ft. Clay, brown and white mottled, plastic, very stiff, some moisture seen seeping at 20 to 21 ft.
30				
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-43 located 850 ft. north of east-west fence on the north bank of Eagle Creek.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-43.ge3

LOG OF BORING OS 95-44

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/19/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1730	Sampling Method:	: Cuttings
Date Completed	: 10/19/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	Samples	GRAPHIC	USCS	DESCRIPTION
0			ML	0-6 ft. Top soil to approximately 6 ft.
5				
				6-8 ft. Clay
10				8-13 ft. Clay, white, crumbly, plastic
15			CL	13-17 ft. Clay, white, crumbly, plastic
				17-19 ft. Clay, white, crumbly, plastic, moist at 19 ft.
20				19-21 ft. Clay, white, crumbly, plastic, some caliche gravel
				21-23 ft. Clay, white, crumbly, plastic, water seeping into hole
25				23-26 ft. Clay, white, crumbly, plastic, some caliche gravel at 24 ft.
30				
35				
40				

Notes:

Borings placed in field north of Eagle Creek. Borings located along a continuation of the north-south line defined by borings OS 95-01 to 95-19 south of Eagle Creek. Boring 95-44 located 950 ft. north of east-west fence on the north bank of Eagle Creek.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

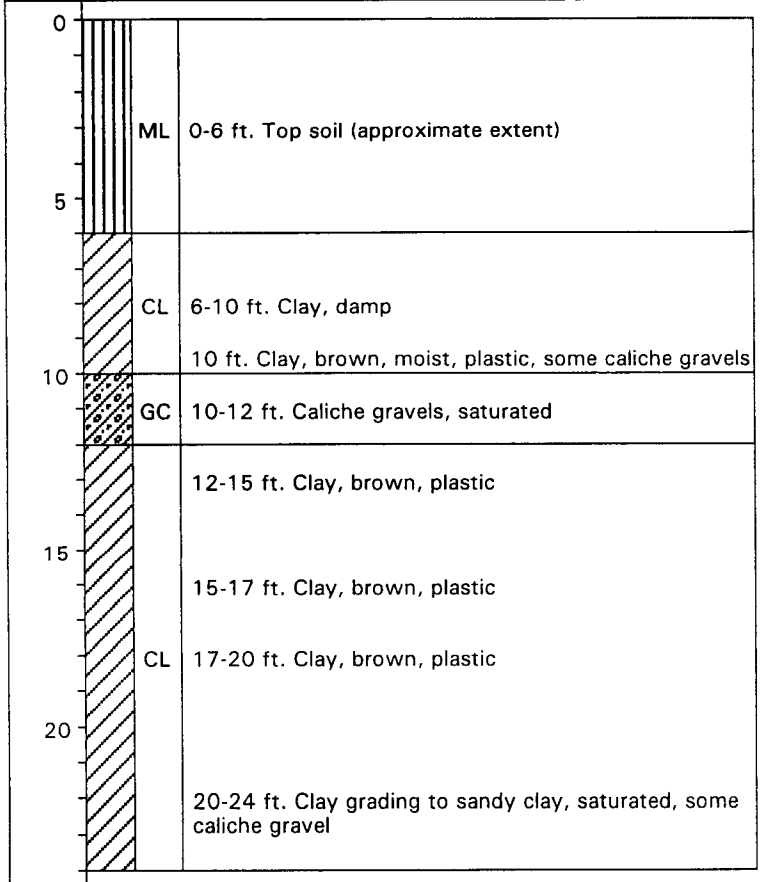
H/C = Petroleum hydrocarbon

4-26-1996 \mtech3\navajo\10-19-95\off95-44.ge3

LOG OF BORING OS 95-45

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0900 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-45 located 600 ft. north of east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-45.ge3

LOG OF BORING OS 95-46

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0935	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
			6-8 ft. Clay, light brown, plastic, soft
10			8-13 ft. Clay, light brown, plastic, soft, some small caliche gravels, water at approximately 11 ft.
			13-16 ft. Clay, light brown with some silt, plastic, soft
15		CL	
			16-19 ft. Clay, light brown with some silt, plastic, soft, small caliche gravels at 17 ft.
20			19-26 ft. Clay, soft, saturated, no gravels, no H/C odor
25			
30			
35			
40			

Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-46 located 700 ft. north of east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-46.ge3

LOG OF BORING OS 95-47

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0955	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
			6-9 ft. Clay, brown and white mottled, caliche gravels at 9 ft.
10			9-13 ft. Clay, light brown and white, frequent small caliche pebbles and gravel, water at approx. 11 ft.
15			13-17 ft. Clay, light brown and white, less gravel with depth
		CL	17-20 ft. Clay and silty clay, occasional caliche gravel
20			20-24 ft. Silty clay, soft
25			24-28 ft. Silty clay, soft (drilling with weight of drill stem), occasional caliche gravel
30			
35			
40			

Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-47 located 500 ft. north of east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-47.ge3

LOG OF BORING OS 95-48

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1015	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			6-8 ft. Clay, brown and white mottled
10		CL	8-11 ft. Clay, brown and white mottled, soft, small caliche gravels, black staining, no H/C odor, water at approximately 11 ft.
15			11-15 ft. Clay, brown and white mottled, soft
20			15-18 ft. Clay, brown and white mottled, soft
25			18-21 ft. Silty clay
			21-26 ft. Clay and silty clay, small caliche gravel at 24 ft.
30			
35			
40			

Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-48 located 400 ft. north of east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-48.ge3

LOG OF BORING OS 95-49

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	:	Drilling Method:	:
Time Started	:	Sampling Method:	:
Date Completed	:	Drilled By:	:
Hole Diameter:	:	Logged By:	: D.G. Boyer

Depth in Feet	DESCRIPTION
0	

Notes:

Boring designated as OS 95-49 was not drilled. It is listed to maintain numbering sequence.

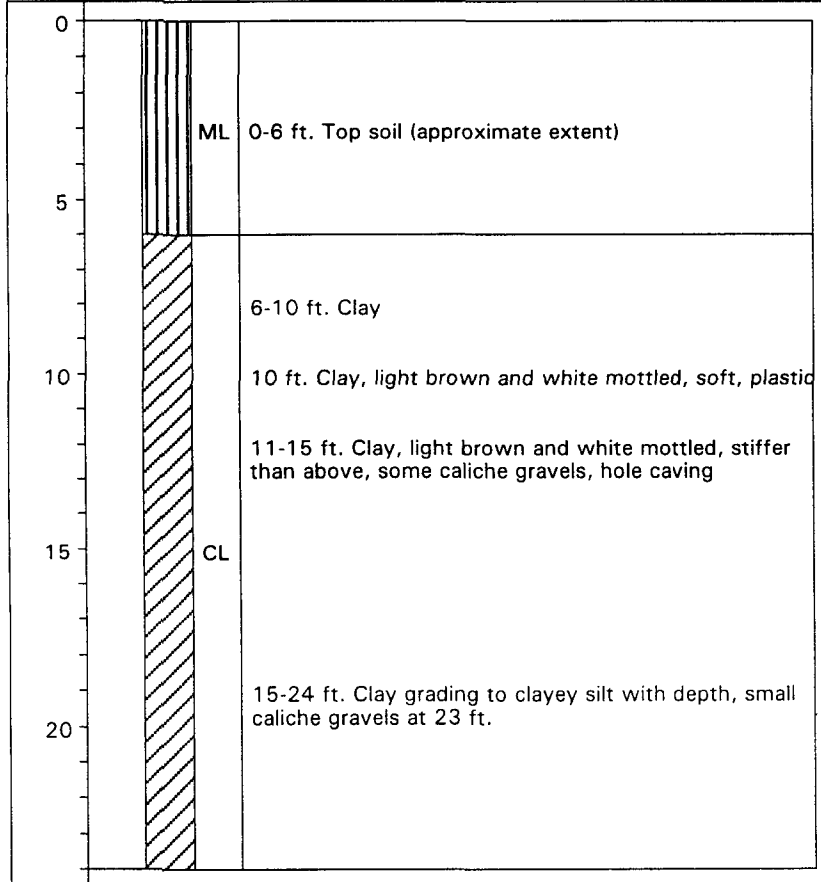
5
10
15
20
25
30
35
40

5-3-1996 \mtech3\navajo\10-20-95\off95-49.ge3

LOG OF BORING OS 95-50

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1040	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-50 located 300 ft. north of east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-50.ge3

LOG OF BORING OS 95-51

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1100	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
10		CL	6-10 ft. Clay 10-14 ft. Clay, brown and white mottled, stiff
15			14-15 ft. Clay, small caliche gravel, saturated, soft zone at 14 ft. 15-19 ft. Clay, increasing silt
20			19-24 ft. Clay, mottled, stiff, some small caliche gravels
25			
30			
35			
40			

Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-51 located 200 ft. north of east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-51.ge3

LOG OF BORING OS 95-52

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1120	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
10		CL	6-10 ft. Clay 10-12 ft. Clay and silty clay
15			12-16 ft. Clay, silty, gravelly, medium river gravel
20			16-22 ft. Clay
25			
30			
35			
40			

Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-52 located 50 ft. north of east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-52.ge3

LOG OF BORING OS 95-53

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1140	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
10		CL	6-9 ft. Clay 9-14 ft. Clay, light brown, stiff, some small caliche pebbles
15		SP	14-15 ft. Sand, fine-grained, saturated
		CL	15-16 ft. Clay 16-19 ft. Clay, sandy, gravelly, light brown, iron staining, small river gravels, no H/C odor
20			19-22 ft. Clay, silty, stiff
25			
30			
35			
40			

Notes:

Borings placed in field 250 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-53 located at corner of trees and east-west dirt road to fields.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-53.ge3

LOG OF BORING OS 95-54

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1200 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-8 ft. Top soil
10		CL	8-11 ft. Clay, brown, mottled, soft, moist, large areas of iron staining, no H/C odor 11-15 ft. Clay, brown, stiff 15-17 ft. Clay, gravels at bottom
20		GP	17-19 ft. Gravels, river gravel to 2 in., flat, rounded, limited auger recovery, saturated 19-21 ft. Gravels as above, possible gravelly clay at bottom, auger refusal, ceased boring

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-54 located 213 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\of95-54.ge3

LOG OF BORING OS 95-55

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1220	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-8 ft. Top soil (approximate extent)
10		CL	8-10 ft. Clay 10-11 ft. Clay, light brown, very stiff, iron staining 11-15 ft. Clay, stiff, small caliche gravels, soft and saturated at 14 ft. 15-20 ft. Clay, gravels at base 20-24 ft. Gravelly clay, medium gravels, saturated

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-55 located 288 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

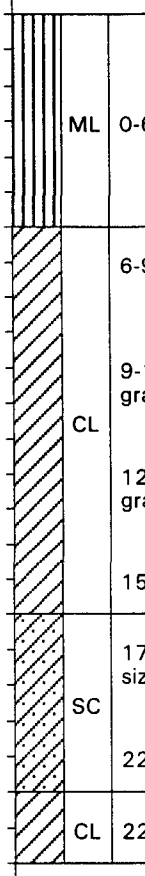
H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-55.ge3

LOG OF BORING OS 95-56

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/20/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1235	Sampling Method:	: Cuttings
Date Completed	: 10/20/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer



Depth in Feet	USCS	DESCRIPTION
0	ML	0-6 ft. Top soil (approximate extent)
5	CL	6-9 ft. Clay
10		9-12 ft. Gravelly clay, light brown to white, caliche gravel, saturated
15		12-15 ft. Gravelly clay, gravels grading to small river gravels
		15-17 ft. Gravelly clay, limited recovery
20	SC	17-20 ft. Gravelly sand and clay, gravels are medium sized river gravels
		22-22 ft. Gravelly sand and clay
	CL	22-24 ft. Clay, stiff
25		
30		
35		
40		

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-56 located 138 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-3-1996 \mtech3\navajo\10-20-95\off95-56.ge3

LOG OF BORING OS 95-57

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/01/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0820	Sampling Method:	: Cuttings
Date Completed	: 11/01/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-7 ft. Top soil
10		CL	7-11 ft. Caliche clay and gravel, saturated; clay, light gray, gravels are caliche gravels 11-14 ft. Clay, light gray and brown, plastic, moist, gravels at 14 ft., no H/C odor.
15		GC	14-18 ft. Clayey gravel, river gravel to 3 in., eliptical, smooth, rounded
		CL	18-19 ft. Clay, light brown, dry, stiff, gravels at top
20		GC	19-21 ft. Gravels, medium sized (river?), some clay, water rising to ground surface (caving?) 21-25 ft. Gravels as above, auger refusal at 25 ft.
25			
30			
35			
40			

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-57 located 175 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\11-01-95\off95-57.ge3

LOG OF BORING OS 95-58

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/01/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0900	Sampling Method:	: Cuttings
Date Completed	: 11/01/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil
5		CL	6-8 ft. Clay 8-10 ft. Clay, light gray, damp
10			10-11 ft. Caliche clay with small caliche gravels 11-13 ft. Caliche clay with small caliche, moist, saturated
15			13-17 ft. Clay becoming gravelly clay at 16 ft. Gravels are river gravels with caliche coating
20		GC	19-22 ft. Clayey gravel, increasing clay with depth
25			22-26 ft. Clayey gravel, increasing clay
		CL	26-28 ft. Clay, chalk color, soft
30			
35			
40			

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-58 located 250 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-6-1996 \mtech3\navajo\11-01-95\off95-58.ge3

LOG OF BORING OS 95-59

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/01/95	Drilling Method:	: Solid Stem Auger
Time Started	: 0930	Sampling Method:	: Cuttings
Date Completed	: 11/01/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil
5			
		CL	6-9 ft. Clay, light gray, dry, hard 9-10 ft. Clay, chalk color, slightly moist
10			10-15 ft. Clay, gray and white, soft, plastic, water at approx. 11 ft.
15			15-18 ft. Soft, no recovery
20		GC	18-21 ft. Gravels and gravelly clay 21-24 ft. Gravels and gravelly clay
25			24-30 ft. Gravels, auger may be pulling up material that has sloughed into hole, possible 7-8 ft. total gravel thickness
30		CL	30-31 ft. Clay, brown and white, no gravels
35			
40			

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-59 located 325 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-6-1996 \mtech3\navajo\11-01-95\off95-59.ge3

LOG OF BORING OS 95-60

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/01/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1000	Sampling Method:	: Cuttings
Date Completed	: 11/01/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil
5			
10		CL	6-11 ft. Clay, light gray to light brown, mottled
15			11-15 ft. Clay with caliche gravels, chalk white and light brown, soft 15-17 ft. Clay, gravels at 17 ft.
20			17-19 ft. Gravelly clay with river gravels, rough with caliche coating 19-21 ft. Gravelly clay, small (to 0.5 in.) gravels at 21 ft.
25		GC	21-24 ft. Gravels and clayey gravel, gravel size to 4 in. 24-26 ft. Gravels and clayey gravel, grading to gravelly clay and clay at 26 ft.
		CL	26-27 ft. Clay, brown, very stiff
30			
35			
40			

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-60 located 400 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-6-1996 \mtech3\navajo\11-01-95\of95-60.ge3

LOG OF BORING OS 95-61

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 11/01/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1025	Sampling Method:	: Cuttings
Date Completed	: 11/01/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil
5			
		CL	6-8 ft. Clay, light brown and gray, mottled, damp
10			8-10 ft. Clay and caliche clay with caliche gravels, saturated, no H/C odor
			10-14 ft. Clay and gravelly clay, very soft, gravel size to 2 in., caliche nodules on gravels
15			14-18 ft. Gravelly clay, soft, gravels pea sized
			18-20 ft. Gravelly clay
20			20-22 ft. Clay, brown, plastic, stiff, occasional caliche inclusions
			22-27 ft. Clay with caliche, mottled, very stiff
25			
30			
35			
40			

Notes:

Borings placed in field 125 ft. west of Bolton Road, south of Eagle Draw, and along north-south fenceline separating crops from wooded area. Boring 95-61 located 475 ft. south of Eagle Creek east-west fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

5-6-1996 \mtech3\navajo\11-01-95\off95-61.ge3

LOG OF BORING OS 95-BR-01

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: a.m.	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-8 ft. Top soil
10		CL	8-13 ft. Clay, gray brown, damp
15			13-18 ft. Clay grading to clayey silt, saturated
20			18-22 ft. Silty clay grading to clay, light brown, stiff, no gravels or H/C odor
25			22-25 ft. Clay, brown, stiff, plastic, occasional 3/4 in. caliche gravels at 23 ft.
			25-28 ft. Clay, brown, stiff, plastic
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-01 located 13 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-01.ge3

LOG OF BORING OS 95-BR-02

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: a.m.	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
			6-8 ft. Clay
10		CL	8-12 ft. Clay, damp, saturated
			12-15 ft. Clay, brown,
15		ML	15-18 ft. Sandy silt, light brown, sand very fine-grained
20		SC	18-23 ft. Sand, light brown, fine-grained with some clay, saturated
25		SP	23-27 ft. Sand, light brown, fine-grained, small gravels at 27 ft.
		CL	27-29 ft. Clay, brown
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-02 located 88 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-02.ge3

LOG OF BORING OS 95-BR-03

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: a.m.	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil, clayey
5			
			6-9 ft. Clay and gravelly clay, water at 9 ft.
10		CL	9-13 ft. Clay, brown to light gray, no H/C odor
15			13-17 ft. Silty clay with some sand, soft
		ML	17-20 ft. Clayey silt, light brown, dry
20			20-23 ft. Clay with some caliche clay, dry at 23 ft.
25		CL	23-26 ft. Clay, light brown to light gray, hard, dry
			26-29 ft. Clay, light brown to light gray
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-03 located 163 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navotf95\bolton\offbr-03.ge3

LOG OF BORING OS 95-BR-04

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: a.m.	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-7 ft. Top soil, clayey
5			
10		CL	8-9 ft. Clay with small pebbles, saturated 9-11 ft. Clay, light gray, moist, very plastic, no H/C odor
15			11-19 ft. Clay, light gray to brown, very stiff except soft at 19 ft.
20			19-21 ft. Clay, gray to brown, stiff 21-23 ft. Clay, gray to greenish gray
25			23-29 ft. Clay, gray, chalk-colored caliche at bottom
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-04 located 238 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-04.ge3

LOG OF BORING OS 95-BR-05

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: a.m.	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil, clayey
5			
			6-9 ft. Clay, gray and brown, soft at 7 ft.
10			9-13 ft. Clay, gray and brown, no water
15		CL	13-17 ft. Clay, gray and brown, plastic, swelling, no water
			17-19 ft. Gravelly clay, gravel to 1.5 in, smooth, damp, *slightly sandy and saturated at 19 ft.*
20			19-21 ft. Gravelly clay with increasing small gravels
			21-23 ft. Clay, light brown
			23-26 ft. Gravelly clay, gravels present in silty-clay matrix, stiff
25			26-27 ft. Caliche clay, chalk color, hard, dry to damp
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. *Boring* 95-BR-05 located 313 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-05.ge3

LOG OF BORING OS 95-BR-06

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1110	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-7 ft. Top soil, clayey
5			
10		CL	7-9 ft. Clay, light gray and brown, damp at 7 ft. 9-14 ft. Clay, light gray and brown, wet at 13 ft.
15			14-17 ft. Clay, light gray and brown, no free water
20			17-22 ft. Clay, light gray and brown, some gravel imbedded in matrix at 21 ft.
25			22-25 ft. Clay, soft from 22-24 ft., saturated 25-28 ft. Clay, chalk color, small caliche gravel at 25 ft.
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-06 located 388 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-06.ge3

LOG OF BORING OS 95-BR-07

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1125	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
10		CL	6-8 ft. Clay with caliche gravels 8-10 ft. Clay, light gray, very stiff, dry, no H/C odor 10-14 ft. Clay and caliche clay with small caliche gravels and crystals, no water
15			14-17 ft. Caliche clay, grading to clay at 15 ft., light brown, very stiff, dry
20			17-19 ft. Clay and caliche clay, moisture in borehole 19-20 ft. Caliche clay, very hard 20-23 ft. Caliche clay, saturated in places
25			
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-07 located 463 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-07.ge3

LOG OF BORING OS 95-BR-08

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1145 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5		CL	6-8 ft. Clay, saturated at 8 ft.
10			8-12 ft. Clay with caliche gravels in matirx
15			12-16 ft. Clay, soft at 16 ft.
			16-18 ft. Clay
20			18-20 ft. Caliche, white, hard
		GC	20-22 ft. Caliche gravels, saturated
25		CL	22-26 ft. Clay, gray and brown, stiff
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-08 located 538 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navof95\bolton\offbr-08.ge3

LOG OF BORING OS 95-BR-09

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1400	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil
5		CL	6-10 ft. Clay with small caliche gravels, saturated at 10 ft.
10			10-14 ft. Gravelly clay, caliche gravels in clay matrix, some up to 3 in.
15			14-17 ft. Clay, brown, stiff, very few gravels
			17-20 ft. Caliche clay with caliche gravels, saturated
20			20-24 ft. Caliche clay, hard, dry
25			24-27 ft. Caliche clay, very hard
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-09 located 613 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-09.ge3

LOG OF BORING OS 95-BR-10

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1430	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5			
10		CL	6-12 ft. Clay
			12-14 ft. Caliche clay with caliche gravel, soft
15			14-17 ft. Silty clay
			17-20 ft. Clay and caliche clay, dry
20			20-24 ft. Clay and caliche clay
25			24-27 ft. Clay and caliche clay, occasional caliche gravel
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-10 located 688 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

6-24-1996 \mtech3\navoff95\bolton\offbr-10.ge3

LOG OF BORING OS 95-BR-11

Offsite Borings 1995
Hydrocarbon Study
Navajo Refining Company
Artesia, New Mexico

Date Started:	: 10/31/95	Drilling Method:	: Solid Stem Auger
Time Started	: 1500 (approx.)	Sampling Method:	: Cuttings
Date Completed	: 10/31/95	Drilled By:	: Frank's Rathole Srv.
Hole Diameter:	: 13"	Logged By:	: D.G. Boyer

Depth in Feet	GRAPHIC	USCS	DESCRIPTION
0		ML	0-6 ft. Top soil (approximate extent)
5		CL	6-9 ft. Clay, caliche gravels at 8 ft., saturated
10			9-14 ft. Clay, light brown, hard
15			14-17 ft. Caliche clay, hard, dry
			17-20 ft. Clay and caliche clay
20			20-24 ft. Clay and caliche clay, occasional gravel
25			24-28 ft. Clay and caliche clay
30			
35			
40			

Notes:

Borings placed in field east of Bolton Road and south of Eagle Draw. Borings located along north-south line approximately 200 ft. east of Bolton Rd. and intermediate between piezometers NP-1 and NP-2. Boring 95-BR-11 located 763 ft. north of south boundary fence.

No H/C product or odor detected. Refinery workers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-01

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/29/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1320, 1700	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #3, 135 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Sample From:	Sample Taken?	Sample Interval (ft)	Blow Count per foot	Recvy. (ft)	USCS	DESCRIPTION
0	CT						0-5 ft. Surface soil, silty clay, light brown, slightly moist, very plastic, sample from cuttings, no H/C odor
5	SS	No		8/12	2		5-7 ft. Silty clay, very light brown, slightly moist, some crystals (gypsum?) in clay, softer at 7 ft, no H/C odor
	SS	Bagged	7-9	8/15	2		7-9 ft. Silty clay, dark brown, becoming light brown at 9', frequent small crystals, no H/C odor
10	SS	No		11/18	2	CL	9-11 ft. Clay, mottled light brown to light gray, dry, crumbly, small crystals in clay, no H/C odor
	SS	No		10/21	2		11-11.5 ft. SAA w/increasing clay and lighter color 11.5-13 ft. Clay and crystals, no H/C odor
	SS	No		5/11	1		13-15 ft. Clay, light brown, plastic, less crystals, no H/C odor
15	SS	No		5/7	1.6		15-17 ft. Silty clay (1.2'), brown, slightly moist, plastic Clay (0.4'), white & gray mottled, moist, plastic, no H/C odor, water at approx. 16 ft.
	SS	No		5/6	2		17-18 ft. Clay, soft, moist, w/gray caliche gravel 1/2-3/4" at 18' 18-19 ft. Clay, dry, brown, no H/C odor
20	SS	No		7/31	1.8		19-20.8 ft. Clay, brown, stiff, slightly moist, no H/C odor
						GP	20.8-21 ft, Gravel, gray (limestone), sized 1/4-1"
	SS	Bagged	21-22	14/27	2	SM	21-22 ft. Silty sand, brown, very fine grained
			22-23			GC	22-23 ft. Clayey gravel, sized 1/4-1.5", no H/C odor
	SS	No		11/33	1.4	GM	23-25 ft. Gravel, varying sizes as above, silty sand matrix, no H/C odor
25	SS	No		19/50	1.1		25-27 ft. Gravel with silt and very fine grained sand, some clay, no H/C odor
	SS	No		45/9	1.3	GC	27-28.4 ft. Clayey gravel (0.7')
30	SS	No		7/9	1.8	CL	Clay (0.6'), brown, stiff no H/C odor 29-31 ft. Clay, brown, some silt, slightly moist, caliche gravel at 30.5', no H/C odor
35							

Notes:
Boring 96-01 located in field northeast of well KWB-1, 155 ft. south of the Eagle Creek fence and 424 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-02

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/30/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0710, 0945	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #5, 250 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Sample From:	Sample Taken?	Sample Interval (ft)	Blow Count per foot	Recvy. (ft)	USCS	DESCRIPTION
0			~~22-23~~				
5	CT						0-14 ft. Silty clay, moist at 14 ft., log from cuttings, no H/C odor
10						CL	
15	SS	No		5/7	1.6		14-16 ft. Silty clay, light brown, moist, soft, plastic, single caliche gravels (cemented) at 15.5 and 16', water at approx. 16', no H/C odor
	SS	No		3/4	2		16-18 ft. Siltly clay to clay, brown, slightly moist to moist, caliche gravel and clay zone from 16.6-16.8', wet where gravels, no H/C odor
	SS	No		4/9	2		18-20 ft. Clay, light brown, slightly moist, plastic, some silt and very fine-grained sand, single gravel in matix at 19.5', no H/C odor
20	SS	No		7/11	1.5		20-22 ft. Clay, brown, stiff, plastic, occasional single gravel, gravelly clay at 21.8', no H/C odor
	SS	No		10/4	0.6	GC	22-23 ft. Clayey gravel (0.4'), gravel chips may be due to hammering, no H/C odor
							Clay (0.2'), brown, stiff, very plastic, no H/C odor
25	SS	No		6/9	1.4		24-26 ft. Silty clay(0.7'), light brown, moist. Clay(0.7') brown, stiff, very plastic, no H/C odor
	SS	No		5/9	2	CL	26-28 ft. Clay, brown, stiff, plastic, single caliche gravel at 28', no H/C odor
	SS	No		7/8			28-30 ft. Same as above, occasional caliche gravels, no H/C odor
30							
35							

Notes:

Boring 96-02 located in field northeast of well KWB-1, 270 ft. south of the Eagle Creek fence and 700 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-03

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/30/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1020, 1500	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #6, 180 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Sample Taken?	Sample Interval (ft)	Blow Count per foot	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0									
5		CT						CL	0-16 ft. Silty clay to clay, thin caliche zone reported by driller at approx. 13 ft., log from cuttings, no H/C odor
10									
15									16-18 ft. Clay (1.2'), soft, plastic, occassional single gravel, caliche clay (0.4'), chalk color, soft, gravelly, no H/C odor
		SS	No		3/4	1.6			18-20 ft. Clay, brown, soft, plastic at top, becoming stiff, dry at bottom, some white streaking, no H/C odor
20		SS	No		4/10	1.5			20-21 ft. Clay (0.8'), brown, no H/C odor
		SS	No		9/26	1.6		SM	21-22 ft. Silty sand, brown, sand v. fine-grained, little clay, single gravel at interface, saturated, no odor
		SS	Yes	22-24	9/16	1.6		SP	22-24 ft. Sand, brown, very fine-grained, little clay, clean, no H/C odor
25		SS	No		21/60	2			24-25.3 ft. Sand, same as above, no H/C odor 25.3-25.5 ft. Sandy clay, no H/C odor
								GC	25.5-26 ft. Clayey gravel, sand/clay matrix, no odor
		SS	No		11/41	2		SP	26-28 ft. Sand, brown, very fine-grained (may be backflow), gravel in tip, no H/C odor
		SS	No		36/34	2			28-29 ft. Sand, same as above (backflow?), no odor
30		SS	No		35/50	1.5		GC	29-30 ft. Gravel, as above with cobbles, no HC odor 30-32 ft. Gravel, same as above with broken cobble pieces, no H/C odor
		SS	No		33/69	1.5		GP	32-34 ft. Gravel, same as above, gravel cleaner, less clay, variable sized, smaller gravels well rounded, no H/C odor, blow count 33-34 ft. for 10" interval
35		SS	No		5/48	0.6			34-36 ft. Hole filled in 1', fine to medium sand inside spoon to 1.4', gravels (0.6'), gravel lodged in spoon tip, no H/C odor
		SS	No		31/47	1.5		CH	36-38 ft. Gravels (0.1'), clay (1.4'), chalk color, very stiff ("fat" clay), no H/C odor
40									
45									

Notes:

Boring 96-03 located in field northeast of well KWB-1, 200 ft. south of the Eagle Creek fence and 849 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-04

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/30/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1551, 1615	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					0-5 ft. Silty clay, brown, no H/C odor
5		CT		CL	5-11 ft. Clay and silty clay, light brown; small, rounded gravels at 7 ft.
10		CT		GC	11-12 ft. Gravels
		CT		CL	12-15 ft. Clay, soft, plastic
15		CT		GW	15-19 ft. River gravels, limestone, to 3" diameter, water at 15 ft., no H/C odor
20		CT		CL	19-27 ft. Silty Clay, saturated, no H/C odor
25					
30					

Notes:

Boring 96-04 located in field northeast of well KWB-1, 670 ft. south of the Eagle Creek fence and 150 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.
H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-05

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/30/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1630, 1650	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					
					0-5 ft. Silty clay, dry
5		CT		CL	
					5-10 ft. Clay, light brown, damp at 10 ft., no H/C odor
10					
					10-13 ft. Clay, light brown
					13-15 ft. Gravel at approx. 13 ft., no H/C odor
15		CT		GC	
					15-19 ft. Gravel, clay matrix(?), not making as much water as 96-03, no H/C odor
20		CT		CL	20-23 ft. Clay, some water, no H/C odor
25					
30					

Notes:

Boring 96-05 located in field northeast of well KWB-1, 620 ft. south of the Eagle Creek fence and 300 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-06

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/31/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0730, 0810	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					0-5 ft. Topsoil, silty clay, brown, no H/C odor
5		CT		CL	5-10 ft. Clay, light brown to chalk color, no H/C odor
10		CT		GW	10-15 ft. Gravel, river gravel 2-3" diameter, water at approx. 12 ft., no H/C odor
15		CT		GC	15-20 ft. Gravel, matrix uncertain (clay?), no H/C odor
20		CT		CL	20-24 ft. Gravel, no H/C odor
25					24-25 ft. Clay, no H/C odor
30					

Notes:

Boring 96-06 located in field northeast of well KWB-1, 620 ft. south of the Eagle Creek fence and 150 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-07

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/31/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0820, 0840	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					0-5 ft. Topsoil, clay and silty clay, brown
5		CT		CL	5-12 ft. Clay, light brown to chalk color, no H/C odor
10		CT		GC	12-13 ft. Gravel, no H/C odor
15		CT		CL	13-18 ft. Clay, saturated, no H/C odor
20					
25					
30					

Notes:

Boring 96-07 located in field northeast of well KWB-1, 720 ft. south of the Eagle Creek fence and 150 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-08

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/31/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0850, 0910	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					0-5 ft. Topsoil, clay and silty clay, brown
5		CT		CL	5-10 ft. Clay, small caliche gravels at approx. 10 ft., no water, no H/C odor
10					10-15 ft. Clay, light brown, stiff, plastic, no H/C odor
15					15-18 ft. Clay, same as above, no H/C odor
20					
25					
30					

Notes:

Boring 96-08 located in field northeast of well KWB-1, 770 ft. south of the Eagle Creek fence and 150 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-09

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification
Navajo Refining Company
Artesia, New Mexico

Date Drilled	: 10/31/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0920, 0950	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					
5		CT		CL	0-5 ft. Topsoil, clay, brown, small caliche gravels
10					5-11 ft. Clay, brown, darker at approx. 7 ft., no H/C odor
15		CT		GW	11-17 ft. River gravels, moderate H/C odor, stronger from 15-17 ft.
20					17-25 ft. Clay, saturated, gravels at 23 ft., no evidence of free product on auger, water, or clays, but H/C odor
25		CT		CL	25-30 ft. Clay, gravel at approx. 27 ft., occasional sheen on clay slurry from augers, H/C odor
30					30-33 ft. Clay, occasional gravel felt by driller, clay slurry lighter color, no sheen, no odor
35					
40					

Notes:

Boring 96-09 located in field northeast of well KWB-1, 720 ft. south of the Eagle Creek fence and 85 ft. east of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-10

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/31/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1010, 1040	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					0-5 ft. Topsoil and clay, brown, no H/C odor
5		CT		CL	5-10 ft. Clay, light brown, slightly moist, plastic, small caliche gravel at approx. 9 ft., no H/C odor
10					10-11 ft. Clay as above
					11-15 ft. Gravel, water at approx. 11 ft., no H/C odor
15		CT		GC	15-20 ft. Gravels, no odor
20					20-23 ft. Gravel, H/C odor on clays returned to surface on auger, no water/slurry returned to surface
25					
30					

Notes:

Boring 96-10 located in field northeast of well KWB-1, 670 ft. south of the Eagle Creek fence and 85 ft. east of electric fence. At completion, spotted H/C sheen on water in hole. Drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-11

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/31/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1050, 1115	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:	Sample From:
Remoulded	SS Split Spoon
Undisturbed	ST Shelby Tube
Lost	CT Auger Cuttings
Rock Core	CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					
5		CT		CL	0-9 ft. Topsoil and clay, brown, no H/C odor
10					9-11 ft. Caliche clay, light brown, no H/C odor
15		CT		GC	11-18 ft. Gravel and clay, no H/C odor
20		CT		GW	18-22 ft. Gravel, no H/C odor
		CT		CL	22-23 ft. Clay, no H/C odor on soil or clay slurry
25					
30					

Notes:

Boring 96-11 located in field northeast of well KWB-1, 620 ft. south of the Eagle Creek fence and 85 ft. east of electric fence. At completion drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-12

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 10/31/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1125, 1155	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: Not Applicable	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0		CT		CL	0-6.5 ft. Topsoil, brown
5					6.5-8 ft. Clay, light brown, very soft, very plastic
		CT		GC	8-9 ft. Gravel
10		CT		CL	9-11 ft. Clay, no H/C odor
		CT		GW	11-17 ft. Gravel, no H/C odor
15					
20		CT		CL	17-23 ft. Clay, no H/C odor in hole
25					
30					

Notes:

Boring 96-12 located in field northeast of well KWB-1, 685 ft. south of the Eagle Creek fence and 107 ft. east of electric fence. At completion drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-13

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date, Time Started	: 11/19/96, 0830	Drilling Method	: Hollow Stem Auger
Date, Time Finish	: 11/20/96, 1145	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #20, 550 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Sample From:	Recvy. (ft)	Sample Taken?	USCS	DESCRIPTION
0	CB	1.7	No		0-5 ft. Clay, brown, stiff, plastic, some silt at top, no H/C odor
5	CB	2.7	No		5-10 ft. Clay, light brown to 6.4, then light gray,soft, moist at top, hard, dr, crumbly at bottom with gray caliche and crystals at tip.
10	CB	1	No	CL	10-15 ft. Clay, brown, dry hard with light gray caliche at tip. Water at 14 ft. on outside of core barrel; driller to slow auger for better recovery.
15	CB	4.2	No		15-20 ft. Silty clay, light brown to brown, slightly moist, plastic, light gray streaks at 17 ft., small gravels in clay at tip. Water in barrel at top. Sample from 23.8 ft.
20	CB	1	No		20-24 ft. Clay, light brown; poor recovery due to core barrel being 6-8 in. ahead of auger; removed core-barrel swivel. 24-24.4 ft. Slough & clayey backflow.
25	CB	2.7	No	GC	24.4-24.8 ft. Clayey gravel, saturated, gravel size variable to 2 in. 24.8-25.0 ft. Gravelly clay. 25.0-26.9 ft. Silty clay, light brown, occasional gravel, no H/C odor.
30	CB	1.4	No	CL	29-34 ft. Clay, light brown, dry, still, hard. Auger refusal at 32 ft. Tip of core barrel has thick lip due to heat rotation and no water. Small gravels imbedded in core.
35					
40					

Notes:

Boring 96-13 located in field northwest of well KWB-1, 556 ft. south of the Eagle Creek fence and 1450 ft. west of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-14

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date, Time Started	: 11/19/96, 1230	Drilling Method	: Hollow Stem Auger
Date, Time Finish	: 11/20/96, 1400	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #16, 200 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	Sample Taken?	Sample Interval (ft)	GRAPHIC	USCS	DESCRIPTION
0								
5		CB	0	No				0-14 ft. No sample, plug in barrel
10								
15		CB	3	No			GC	14-16.2 ft. Saturated backflow material, clay and gravel (variable size, some fine grained sand), surface soil (from auger going back down hole).
								16.2-17 ft. Clay, light brown, hard, dry.
20		CB	1.2	No			CL	19-24 ft. Clay, light brown, stiff, plastic, white streaks
								24-27 ft. Clay, light brown, soft, plastic to 27, some silt.
25		CB	4	No			GC	Clayey gravel, thin saturated zone
							CL	27.2-28 ft. Clay, light gray and white, some small gravels, no H/C odor
30								
35								
40								

Notes:

Boring 96-14 located in field northwest of well KWB-1, 220 ft. south of the Eagle Creek fence and 850 ft. west of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-15

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date, Time Started	: 11/19/96, 1500	Drilling Method	: Hollow Stem Auger
Date, Time Finish	: 11/20/96, 0815	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #14, 775 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	Sample Taken?	Sample Interval (ft)	GRAPHIC	USCS	DESCRIPTION
0								
5		CT		No				0-9 ft. Clay, brown, soft, moist, plastic, from cuttings
10		CB	1.7	No			CL	9-14 ft. Clay, light brown, dry, very stiff, some caliche and crystals, no H/C odor
15		CB	0.5	No				14-19 ft. No recovery except 6" slough material
							GC	18 ft. Driller reports small gravels, water on auger cuttings, no H/C odor
20		CB	1.8	No				19-21 ft. Clay, brown, dry; put 4" swivel on drill string, auger refusal at 21 ft., hard, dry clay in tip; removed swivel, added 6" piece to and rotated tip
		CB	1.7	No				21-23.5 ft. Caliche clay, chalk white, hard, dry, auger refusal, no H/C odor
		CB	1.7	No			CL	23-24 ft. Same as above with small gravel inclusions
25		CB	3	No				24-26 ft. Clay, light brown with white streaking, stiff, very plastic, occasional caliche seam and small gravel, no H/C odor
								26-29 ft. Clay and caliche clay, light gray, hard, dry, occasional gravel, no H/C odor
30								
35								

Notes:

Boring 96-15 located in field northwest of well KWB-1, 795 ft. south of the Eagle Creek fence and 550 ft. west of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-16

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification
Navajo Refining Company
Artesia, New Mexico

Date Drilled	: 11/20/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0830, 1430	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #14, 1,120 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	Sample Taken?	Sample Interval (ft)	GRAPHIC	USCS	DESCRIPTION
0								0-9 ft. No cuttings returned to surface
5		CT		No				9-14 ft. From driller: gravels at 11-13 ft., slight H/C odor on mud returns; pulled out of hole, 2" rounded gravel in auger, H/C product in mud and on auger. Shut down until additional short center rods received. At 1230 started new hole at 5 ft. north of original.
10		CB	4.2	Yes	13-14 ft.		CL	9-11 ft. Clay, dark brown to 9.8 then light brown 11-12.3 ft. Clay, grading to light gray and sandy with gravels at 12.3 ft.
							GW	12.3-12.8 ft. Sandy gravel, dry, strong H/C odor
							SW	12.8-14 ft. Sand, dark gray, fine grained, strong odor
							GC	14-15 ft. Gravels with sand, clay and H/C product, saturated
15		CB	3.7	No			CL	15-16.7 ft. Clay, dark gray at top becoming light gray at base, mottled, dry, stiff, some silt and very fine grained sand, some H/C odor 16.7-18 ft. Caliche clay, light gray to chalk color, mottled, slight H/C odor, hard, pulled core at 18 ft. 18-20 ft. Clay, light gray and brown mottled, stiff, plastic, wet zone at 20 ft., no H/C odor
20		CB	3.8	Yes	18 ft.		CA	20-22 ft. Caliche, white, dry, hard, pulled core at 22 ft.
25		CB	3.8	No			CL	22-27 ft. Clay, mottled light brown and chalk colored, dry, hard but softer at 27 ft.
30		CB	27	No				27-32 ft. Clay, same as above, soft from 28.3-28.5 ft., occasional small gravel in clay matrix
35								

Notes: Boring 96-16 located in field northwest of well KWB-1, 1,140 ft. south of the Eagle Creek fence and 550 ft. west of electric fence. At completion, drillers plugged back hole with cuttings.
H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-17

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/20/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1610, 1700	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #12, 880 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0					0-5 ft. Clay, dark brown
5		CT		CL	7 ft. Clay, light brown, soft, plastic
10					11 ft. Gravel lens, dry, strong H/C odor
		CT		GC	13 ft. Gravels, strong H/C odor, water sheen and product observed on auger returns
15					15 ft. Gravels, heavy drill rig auger chatter
		CT		GW	
20					21 ft. Gravels, heavy drill rig auger chatter
25					22-29 ft. Clay, H/C odor on returns
30		CT		CL	
35					29-39 ft. Clay and caliche clay, chalk color
40					
45					

Notes:

Boring 96-17 located in field northwest of well KWB-1, 900 ft. south of the Eagle Creek fence and 250 ft. west of electric fence. At completion drillers plugged back hole with cuttings.

H/C = Petroleum Hydrocarbon

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LOG OF BORING OS 96-18

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/21/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1000, 1200	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #12, 810 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	Sample Taken?	Sample Interval (ft)	GRAPHIC	USCS	DESCRIPTION
0								
5		CT		No			CL	0-9 ft. Clay, brown, soft, plastic, from cuttings
10		CB	5	No			CL	9-9.7 ft. Clay, dark brown 9.7-12.9 ft. Clay, light brown, some silt, slightly soft & plastic, occasional light colored calich inclusions
15		CB	3.3	No			GC CL GW SP GW GC GW	12.9-13.3 ft. Clayey gravel, small (<1/2"), H/C odor 13.3-14.4 ft. Sandy clay, light brown, very fine-grained sand, some small gravel 14.4-15.2 ft. Sandy gravel (to 2'), saturated, dark gray, H/C odor 15.2-15.8 ft. Sand, fine grained, brown 15.8-16.2 ft. Sandy gravel, some clay, H/C odor 16.2-19 ft. Clayey gravel, small gravels, gray, H/C odor 19-19.2 ft. Sandy gravel, light brown, no H/C odor
20		CB	4.5	No			CL	19.2-20.2 ft. Clay, brown with some white streaking and caliche inclusions, some silt, dry, plastic 20.2-24 ft. Clay with increasing caliche zones to several inches thick, dry, no H/C odor
25		CB	0.9	No			CL	24-29 ft. Clay, brown and chalk colored, dry, no H/C odor
30								
35								

Notes:

Boring 96-18 located in field northwest of well KWB-1, 830 ft. south of the Eagle Creek fence and 250 ft. west of electric fence. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-19

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/21/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1230, 1430	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #34, 250 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	Sample Taken?	Sample Interval (ft)	GRAPHIC	USCS	DESCRIPTION
0								0-9 ft. Clay, brown, soft, plastic, from cuttings 9.5-10 ft. Gravels, auger refusal @10 feet; changed bit, H/C odor, dark gray clay on auger. Auger refusal @11 feet with rock in barrel. Moved over to redrill.
5		CT		No			CL	9-10 ft. Clay, brown, becoming gray at 10 ft.
10		CB	3.3	Yes	10-12		GC CL	10-10.8 ft. Gravels, clay matrix, large river gravel, strong H/C odor, dry.
							GC	10.8-11.1 ft. Clay, brown
		CB	1.4	No				11.1-12.4 ft. Gravels, same as above 12.4-12.6 ft. Clayey gravel, saturated, strong H/C odor
							GC	12.6-13.8 ft. Gravelly clay, wet where gravelly otherwise moist, dark gray, H/C odor.
15		CB	3	No			CL	14-15.3 ft. Gravel with sand and clay, saturated, gray, H/C, well sorted
							CA	15.3-17.5 ft. Clay, gray, hard, dry, black zones
								SAA, becoming caliche clay at 16.5 ft.
								No coring, installed pilot bit.
20		CT		No				Drilled gravels @ approx. 20-21 ft.
								Caliche. Free product on surface mud.
25							CA	Hard drilling 24-27 ft.
		CT		No				Softer drilling 27-29 ft.
30								
35								

Notes:

Boring 96-19 located in field southwest of well KWB-1, 250 ft. south of the concrete lined channel, and 990 ft. west of the corner fence post south of KWB-1. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-20

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/21/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1500, 1545	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #32, 555 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6"	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	GRAPHIC	USCS	DESCRIPTION
0				ML	0-4 ft. Topsoil
5		CT		CL	4-9 ft. Clay, brown
10					10 ft. Clay,tan
		CT		CA	11-13 ft. Caliche, no H/C odor
15				CL	13 ft. Clay, light brown, crumbly, slight H/C odor 15 ft. Clay, as above, slightly plastic
20		CT			17 ft. Clay, brown, softer, moist, strong H/C odor 20 ft. Clay, as above, no water
25		CT			22-29 ft. Caliche and clay, light gray, driller reports soft zone at approx. 27 feet. Product on auger when pulled.
30					
35					

Notes:

Boring 96-20 located in field southwest of well KWB-1, 555 ft. south of the concrete lined channel, and 690 ft. west of the corner fence post south of KWB-1. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-21

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/21/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1230, 1430	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #28, 1,000 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	Sample Taken?	Sample Interval (ft)	GRAPHIC	USCS	DESCRIPTION
0								No log or samples
10		CB	5	No			CL	9-10.4 ft. Clay, brown with caliche inclusions, stiff
							CA	10.4-12.4 ft. Caliche clay, gray & black with black zones where caliche present, dry, strong H/C odor 12.4-14 ft. Caliche clay, dry, hard, crumbly, some gray H/C staining, strong H/C odor
15		CB	5	Yes	16			14-16.7 ft. Clay with caliche 16.7-17.5 More caliche, less clay
							CL	17.5-18.5 ft. Clay
							CA	
20		CB	1.2	No			CL	18.5-19 ft. Caliche, soft, moist at core tip, very strong H/C odor throughout core.
				No				19-19.2 ft. Slough in core, water & product 19.2-20.2 ft. Clay, brown with caliche, dry, H/C odor
25		CT		No				Auger refusal @ 21 feet; retracted core 4 in., no effect. No core 21-24 ft., 0.5 ft. slough only 24-29 ft. Cuttings only, hard caliche drilling, softer at 28-29 ft., no gravels
30		CT		No				29-34 ft. Augered with pilot bit, cuttings only, mud return, hard caliche drilling, no gravels
35		CT		No				34-39 ft. Same as above, no gravels
40								Notes: Boring 96-21 located in field southwest of well KWB-1, 1,000 ft. south of the concrete lined channel, and 90 ft. west of the corner fence post south of KWB-1. At completion, drillers plugged back hole with cuttings.
45								H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-22

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/22/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0930, 1140	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #35, 380 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0						
5		CT				
						~6 ft. Clay, black, strong H/C odor
						9-9.7 ft. Clay, brown, some gray/black H/C staining
10		CB	5		CL	9.7-14 ft. Clay and caliche clay, gray, H/C staining except black from 11.5-11.7 ft., dry, very strong H/C odor
						14-15.6 ft. Silty clay, light gray, slightly moist, plastic, H/C odor
15						15.6-16.3 ft. Silty clay, black, crumbly
		CB	4.5		SP	16.3-18.3 ft. Sand, light gray to light brown, fine to v. fine grained, black stain at 18.1 ft.
					ML	18.5 ft. Sandy silt, sand v. fine grained.
					SC	19-19.3 ft. Clayey sand
20					GW	19.3-20.5 ft. Gravels, well sorted to 1.5 in. in core barrel, some sand and clay as matrix material, saturated, H/C odor with some product. Pulled core at 21 feet, removed jammed rock, contents as above. Cuttings show large river gravels.
		CB	4		SP	21-21.6 ft. Sand, light brown, fine to v. fine grained.
					GP	21.6-22.1 ft. Gravelly sand, light gray with H/C product.
						22.1-23.0 ft. Sandy gravel, light gray, with some clay
					SP	23.0-23.6 ft. Same as above, but light brown
25						24-24.5 ft. Sand, light gray, fine grained, H/C odor & product
		CB	5		CL	24.5-26.5 ft. Silty clay, light brown with some v. fine grained sand. 26.5-29 ft. Silty clay, light brown, occassional small caliche gravel and white streaks
30						
35						

Notes:

Boring 96-22 located in field southwest of well KWB-10, 380 ft. south of the concrete lined channel, and 50 ft. west of the corner fence post south of KWB-10. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-22a

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/09/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1300, 1450	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #35, 340 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0						
5		CT			CL	Contaminated clay at 6 feet, clay, dark gray, very plastic
10						13-15.3 ft. Clay, black, H/C saturated
15		CB	5			15.3-15.9 ft. Sandy clay, light gray, H/C saturated
					SW	15.9-17.1 ft. Clayey sand, light brown 17.1-18 ft. Sand, fine grained, brown, H/C saturated 18-19.8 ft. Sand, fine to medium grained, light brown, water and H/C saturated
20		CB	2.3		GW	19.8-23 ft. Gravel with sand, river gravel, light gray, saturated, strong H/C odor throughout
25		CB	4.4			23-23.4 ft. Sandy clay, light brown 23.4-25.3 ft. Silty clay, light brown 25.3-26.7 ft. Clay, light gray, very stiff 26.7-27.4 ft. Clay and caliche clay, light gray, granular
30		CB	2.5			28-33 ft. Silty clay with caliche clay, chalk color with trace of light gray, slight odor, very stiff, crumbly
35		CB	4.8		CL	33-38 ft. Clay, light brown with white caliche streaks, occassional gravel, frequent caliche inclusions, very stiff
40		CB	5			38-43 ft. Clay, brown, chalk, light gray, green caliche streaks, gravel in caliche at bottom, slight H/C odor
45						
50						

Notes:

Boring 96-22a located along west side of dirt farm road, 340 ft. south of the concrete lined channel (which is south of well KWB-10). At completion, drillers plugged back hole with cuttings.
H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-23

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/22/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1230, 1400	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #39, 950 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0						
5		CT			CL	0-9 ft. Cuttings, clay
10		CB	5		CL	9-10.6 ft. Clay, silty, brown with occassional caliche streaks, root at 10.4 ft. 10.6-12.4 ft. Silty clay, black, H/C odor, becoming lighter color at 12.4, slightly moist
					ML	12.4-14 ft. Clayey silt, light gray to light brown, H/C odor, dry, crumbly, strong H/C odor. Drillers note water at ~13.5 ft.
15		CB	5		CL	14-15.4 ft. Silty clay, gray, strong H/C odor, dry 15.4-17.7 ft. Silty clay, black, H/C odor, dry 17.7-18.9 ft. Silty clay, gray, black at tip, dry 19-19.7 ft. Silty clay, gray to black, damp
20		CB	5		GW	19.7-22 ft. Gravels, well sorted, sandy, saturated with water and hydrocarbon, gravels to 2 in., black
						22-23.2 ft. Caliche and clay, black, hard, strong H/C odor
25		CB	3.2		CL	24-26 ft. Silty clay, black to light gray 26-29 ft. Silty clay, light gray
30						
35						

Notes:

Boring 96-23 located in field southwest of well KWB-10, 950 ft. south of the concrete lined channel, and 650 ft. west of the corner fence post south of KWB-10. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-24

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 11/22/96	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1415, 1500	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #45, 115 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:	Sample From:
Remoulded	SS Split Spoon
Undisturbed	ST Shelby Tube
Lost	CT Auger Cuttings
Rock Core	CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0						
5		CT			CL	0-9 ft. Cuttings, silty clay soil, light brown, thin zone of small gravels at approx. 6 ft. No H/C evidence
10		CB	5			9-12 ft. Silty clay, light brown, dry 12-14 ft. Caliche clay, brown with gypsum(?) inclusions, hard, dry, at tip transition to light gray with slight H/C odor
15		CB,CT	0			Auger refusal at 14.5 ft. Retracted core barrel, re-entered hole. Limestone gravel to 3/4 in. at 15 ft., dry. Hard gravels at 17 ft. No recovery in core barrel, slightly moist at tip. Extended core barrel, re-entered hole, no recovery.
20		CT			GW	Auger refusal at 19 ft., replaced with pilot bit, gravel to 24 ft. Added auger flight, continued drilling, gravel returns
25						Gravels to approximately 27.5 ft., then soft, no returns
30					CL	Soft to approximately 32 ft., then stiff to 34 ft., no returns
35						
40						

Notes:

Boring 96-24 located in field southwest of well KWB-10, 115 ft. south of the refinery security fence, and 1,550 ft. west of the corner fence post south of KWB-10. At completion, drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 96-25

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/08/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1400, 1700	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #30, 880 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0						
5						
10		CT			CL	0-16 ft. Silty clay, brown
15						16-18 ft. Clay, gray-black, moist, H/C odor
						18-18.8 ft. Silty clay, gray black, H/C odor
20		CB	4.6			18.8-20.8 ft. Silty clay, brown, slight odor, sandy at base
					SP	20.8-21.7 ft. Sand, fine-grained, some clay
					GC	21.7-22.5 ft. Gravel with sand and clay, angular fragments (from drilling?)
					SP	23-23.5 ft. Sand, fine-grained, light brown, slight H/C odor
25		CB	2.9			25.5-28 ft. Clay, chalk-color, caliche gravels, no odor
						Rock in tip, no recovery 28-33 ft.; no recovery 33-38 ft. Moved north 10 ft. and drilled to 28-38 feet.
30		CB	2.5			From new hole: 28-33 ft. Clay, light brown, stiff, occassional rock, dry, sand at top (slough)
					CL	33-36 ft. Clay, light brown with white streaks, very stiff, crumbly
35		CB	3.6			36-38 ft. Clay, white, damp, plastic
						From original hole: 38-43 ft. Clay, brown with white streaks and occassional gravel, no odor, large single gravel at top of core
40		CB	4.8			
45						
50						

Notes:

Boring 96-25 located in field southwest of well KWB-1, 880 ft. south of the concrete lined channel, and 390 ft. west of the corner fence post south of KWB-1. Left hole open; hole caved to 11 ft. on 05/09. Drillers plugged back hole with cuttings. H/C = Petroleum hydrocarbon

09-24-1997 C:\MTECH46\mavoff97\05-08-97\off96-25.bor

LOG OF BORING OS 96-26

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/09/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0600, 0800	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #29, 1,180 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Sample From:	Recvy. (ft)	USCS	DESCRIPTION
0				
5	CT			0-13 ft. from cuttings.
10				12 ft. Clay, dark black, strong H/C odor
15	CB	0		13-18 ft. No recovery, blue H/C clay in tip. Probable thin permeable zone with H/C
			CL	18-19.6 ft. Clay with some silt, blue gray, strong H/C odor
20	CB	5		19.6-23 ft. Same as above, but becoming lighter, some caliche streaks.
				23 ft. Clay, chalk color but light blue in spots, occassional gravel, very stiff, H/C odor.
25	CB	3.8		25 ft. Clay, crumbly, chalk color but becoming brown at tip, water in top of core barrel
30	CB	1.8		30 ft. Caliche clay, chalk colored, hard to drill, saturated in core barrel, slight odor (from water?)
				33-37.3 ft. Caliche clay, saturated, chalk color with some sand and gravel, very plastic
35	CB	5		37.3-38 ft. Clay, light brown, some silt, very plastic, stiff, no odor
40	CB	1.5	SC	38-43 ft. Clayey sand with silt, light brown, very fine grained, no odor
45	CB	0	GC	43-48 ft. Drilling chatter, gravels, no recovery in core - completely empty, outside sandy
50				
55				

Notes:
Boring 96-26 located in field southwest of well KWB-1, 1,880 ft. south of the concrete lined channel, and 240 ft. west of the corner fence post south of KWB-1. Left hole open; water at 14.7 ft. at 1150, product too small to measure. Drillers plugged back hole with cuttings.
H/C = Petroleum hydrocarbon

09-24-1997 C:\MTECH46\mavoff97\05-08-97\off96-26.bor

LOG OF BORING OS 96-27

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/08/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1025, –	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: #33, 130 ft. South	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0					ML	Clayey silt, brown, no odor
5					CL	Silty clay, light brown, slightly moist
		CT			GC	5-8 ft. Clayey gravel, dry, gravels to 1.5 in., most 1/2-3/4 in., no H/C odor.
10						11-13 ft. Gravels to cobble size
15		CB	5		CL	13-13.3 ft. Silty clay, gray, strong H/C odor 13.3-14.8 ft. Clay, stiff, brown, slight H/C odor 14.8-15.6 ft. Gravelly clay, dark gray, small pebbles, H/C odor and product 15.6-17.1 ft. Silty clay, becoming light gray at base. 17.1-18 ft. Silty clay, dark gray, stiff, H/C odor
20		CB	3.7			19.5-21 ft. Clay, blue-gray color, stiff, very plastic
					CA	21-23 ft. Clay and caliche, white, slight odor, saturated
25		CB	1.5		CL	23-28 ft. Hard drilling in clay, core recessed even with bit Clay, white slight odor, some pea-sized caliche pebbles
30		CB	3.6			28-28.5 ft. Clay and caliche clay 28.5-33 ft. Clay, brown, stiff to very stiff, no odor, occassional small gravel and white streaks.
35			0			33-38 ft. Ran with core even with bit. Gravel in clay in tip, no other recovery, soft at 36 ft, heard some gravel chatter while drilling
40		CB	4.5			38-43 ft. Clay, brown with white streaks, with frequent large river gravel pieces, very stiff, very plastic, only slightly moist in places, mostly dry and crumbly
45						
50						

Notes:
Boring 96-27 located in field southwest of well KWB-1, 130 ft. south of the concrete lined channel, and 840 ft. west of the corner fence post south of KWB-1. Left hole open; water at 9.7 ft. at 1130 (but hole may have caved), product on probe but too small to measure. Drillers plugged back hole with cuttings.
H/C = Petroleum hydrocarbon

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LOG OF BORING OS 97-01

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/07/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1115, --	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: S. of KWB-11A	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0					ML	Clayey silt, brown, becoming silty clay at base, damp, plastic, no odor
5		CT				Silty clay, light brown to white at base
10		CT	0			No core barrel recovery, from cuttings: Silty clay, dry, caliche streaks, no odor
15		CB	4			Silty clay, brown, dry, crumbly, white streaks, becoming light gray at base. Thin caliche zone (< 0.5 in.) at 15 ft.
20		CB	3.4		CL	18-19.4 ft. Silty clay, occassional small gravel 19.4-20.5 ft. As above, increasing gravel 20.5-23 ft. Gravelly clay, limestone gravels, no odor Saturated at 22-23 ft.
25		CB	5			23-24.6 ft. Clay with gravel, brown, saturated 24.6-28 ft. Clay, occassional gravel, mostly dry, occassional iron staining on gravel, gravelly clay zone, 2 in. thick @ 25.5 ft., clay colored with streaks at base
30		CB	5			28-28.6 ft. Clay, light brown, slightly moist 28.6-31.4 ft. Clay, as above, caliche gravel @ 31 ft. 31.4-33 ft. Silty clay, brown, occ. gravel, dark brown at 31.6 ft., no H/C odor
35		CB	5			33-36 ft. Clay, as above, becoming more gray and silty with depth. Large gravel at 36 ft.
40		CB	2		ML	36-38 ft. Sandy silt with very fine grained sand, gravel at tip with H/C odor and product
					CL	38-39 ft. Silty clay with gravel, no H/C odor.
					GC	39-40 ft. Clayey gravel, limestone gravels, occ. H/C odor
			0			40-43 ft. Drilled with straight auger, no cobbles, no recovery, no H/C seen
45		CB	2		SM	43-45 ft. Silty sand and sandy silt, brown
50		CB	3.6		CL	45-50.8 ft. Clay, brown, saturated at top moist at bottom, occassional gravel, only slightly moist
					CA	50.8-51.2 ft. Caliche, white, hard, dry
					CL	51.2-52 ft. Clay, brown
55						
60						

Notes:

Boring 97-01 located 100 ft. south of KWB-11A in Chase pecan grove. DTW 17.8 ft., no H/C product at 0800 5/8/97. Drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 97-02

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/07/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1530, 1800	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: N. of KWB-11A	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0						0-8 ft. Silty clay, light brown, some pebbles on auger
5						
10		CT			CL	8-13 ft. Silty clay, lighter color than above
15						13-18 ft. Silty clay, light brown
20						18-23 ft. Silty clay, lighter color, saturated at 22 ft.
						23-24 ft. Clay, light brown, dry
25		CB	4		ML	24-25 ft. Clayey silt, light brown, saturated
						25-28 ft. Clay, light brown with white streaks, hard, no H/C odor
30		CB	5		CL	28-33 ft. Caliche clay, brown and white, dry
35		CB	3.8			33-38 ft. Clay, brown with white streaks, occassional gravel; clay hard, dense, dry except slightly moist in thin gravel lens at 36 ft., no H/C odor
						38-39.5 ft. Clay, as above, some silt
40		CB	5		GC	39.5-40 ft. Gravelly clay to clayey gravel, saturated
					ML	40-42 ft. Clayey silt, slightly plastic
					CL	42-43 ft. Clay, brown with streaks, stiff, slightly moist
					SP	43-44.1 Sand, light brown, fine grained, saturated, no odor, thin (0.1') zone of small, dark brown, pea-sized gravel @ 44'
45		CB	3.6		CL	44.1-46.6 ft. Clay, brown, increasing black flecks concentrated at 46 ft., no H/C odor. Auger refusal at 46 ft., adjusted bit and re-entered hole.
						48-49.5 ft. Gravelly clay, saturated, gravels angular, broken
50		CB	5		ML	49.5-50.7 ft. Clayey silt, light brown, soft
					CL	50.7-53 ft. Silty clay, light brown, becoming harder with depth
55						
60						

Notes:

Boring 97-02 located 100 ft. north of KWB-11A in Chase pecan grove. At 0730 5/8/97, TD 47.7 ft, DTW 16.9 ft., no H/C product. Drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

09-29-1997 C:\MTECH46\mavoff97\05-08-97\off97-02.bor

LOG OF BORING OS 97-03

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/08/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0600, 0800	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: N. of KWB-11A	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition: Remoulded; Undisturbed; Lost; Rock Core

Sample From: SS Split Spoon; ST Shelby Tube; CT Auger Cuttings; CB 5 ft. Core Barrel

Depth in Feet	Sample From:	Recvy. (ft)	USCS	DESCRIPTION
0				
5				
10				
15	CT		CL	Silty clay, brown, stiff
20				Clay, white, moist, very soft and plastic
25				
30	CB	5	GC	28-29.2 ft. Gravelly clay, gravel to 1 in.
			CL	29.2-29.6 ft. Clayey gravel
			SC	29.6-31.8 ft. Silty clay, brown w/white streaks, some sand
			SP	31.8-33 ft. Clayey sand, light gray, sand fine to very fine-grained, no H/C odor, 3 in. gravel at tip
35	CB	3	GP	33-34 ft. Sand, light brown, fine grained, some clay
			GC	34-35.5 ft. River gravel with sand, some clay, light brown, no H/C odor
40	CB	2	GP	35.5-38 ft. Clayey gravel, gravel angular (fractured), clay dark brown to black, some H/C and/or septic odor, large river gravel rock in core barrel tip
				38-43 ft. Gravel, poorly sorted, gravel stuck in tip at 40 ft., slight H/C odor, strong septic odor, sand (slough) 38-38.5 ft
45	CB	5	CL	Clay, brown, very stiff, dry, no H/C odor. Caliche zone at 45 ft. (with small gravel) and at 47.8 ft. White streaks from 44.5 to45 ft.
50				
55				

Notes:

Boring 97-03 located 250 ft. north of KWB-11A in Chase pecan grove. At 0810 5/8/97, TD 47.7 ft, DTW 17 ft., no H/C product. Drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

09-29-1997 C:\MTECH46\mavoff97\05-08-97\off97-03.bor

LOG OF BORING OS 97-04

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/09/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 0900, –	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: S. of KWB-8	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:
- Remoulded
- Undisturbed
- Lost
- Rock Core

Sample From:
- SS Split Spoon
- ST Shelby Tube
- CT Auger Cuttings
- CB 5 ft. Core Barrel

Depth in Feet	Sample From:	Recvy. (ft)	USCS	DESCRIPTION
0				
5	CT		CL	
10				13 ft. Hydrocarbon in clay cuttings 13-14.5 ft. Clay, light brown, occassional gravel, occ. caliche zone, stiff, very plastic, H/C odor
15	CB	4.7		14.5-18 ft. Clay, light brown, becoming gray with depth, more frequent caliche, strong H/C odor
20	CB	1.7		18-23 ft. Gravelly clay with silt, light gray, some brown gravels to 2.5 in., saturated with product
25	CB	1.3	GW	23-27 ft. Gravels, sized from 0.5 in. to river rock, rock jammed in tip. Heavy drill chatter 26-27 ft., "out of gravel at 27 ft." -- from Driller
			SC	27-28.2 ft. Clayey sand, very fine grained, brown
30	CB	3.7	CL	28.2 -29 ft. Silty clay, brown, some gray color 29-31 ft. Clay, light brown, stiff
			SC	31-33.4 ft. Clayey sand, light brown, very fine grained becoming medium grained at 33ft, saturated.
35	CB	3.4	CL	33.4-33.8 ft. Silty clay, some sand 33.8-35.2 ft. Silty clay
			SW	35.2-35.7 ft. Clayey sand, fine and medium grained 35.7-38 ft. Sand, brown, fine grained with some clay, H/C odor (odor residual from core barrel?)
			CA	
			SP	38-38.5 ft. Caliche and gravels, chalk color
40	CB	1.8	CA	38.5-39.1 ft. Clayey sand, light brown, very fine grained 39.1-43 ft. Caliche rock with gravels, H/C odor (from core barrel?)
45				
50				

Notes:

Boring 97-04 located in Chase pecan grove along a N-S line 21 ft. east of KWB-8 and 300 ft. north of Highway 82 fence. At completion, depth to product 18.1 ft., depth to water 18.3 ft. Drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

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LOG OF BORING OS 97-05

Offsite Borings 1996
Hydrocarbon Study
EM Survey Verification

Navajo Refining Company

Artesia, New Mexico

Date Drilled	: 05/09/97	Drilling Method	: Hollow Stem Auger
Time Start, Finish	: 1500, --	Drill Equipment	: Ingersoll-Rand A-300
Transect & Location	: 50 E of #35, 750 S	Drilled By	: Atkins Eng. Assoc.
Hole Diameter	: 6 inch	Logged By	: D.G. Boyer

Sample Condition:	Sample From:
Remoulded	SS Split Spoon
Undisturbed	ST Shelby Tube
Lost	CT Auger Cuttings
Rock Core	CB 5 ft. Core Barrel

Depth in Feet	Samples	Sample From:	Recvy. (ft)	GRAPHIC	USCS	DESCRIPTION
0						
5		CT				0-13 ft. Cuttings. Silty clay, brown
10					CL	Clay, blue gray, H/C odor
15		CB	5			13-14.4 ft. Clay, light gray, very stiff 14.4-16.8 ft. Clay, brown, calcite or gypsum crystals 16.8-18 ft. Clay, dark gray, caliche gravel at base
20		CB	4.7			18-19.9 ft. Sandy, silty clay, light gray, very fine-grained sand, light gray, strong H/C odor 19.9-21.8 ft. Silty clay, light gray to light brown
					CA	21.8-22 ft. Caliche zone, white, small caliche gravel
					CL	22-23 ft. Clay, brown, crystals seen, very small gravels
					CA	23-23.6 ft. Caliche with clay, chalk color, soft, slight odor
25		CB	4.1		CL	23.6-25.6 ft. Silty clay with caliche gravels, light gray to light brown, crystals
					CA	25.6-25.8 ft. Caliche zone, large caliche gravel, crumbly
					CL	25.8-28 ft. Silty clay, light brown to chalk, slight H/C odor
30						
35						

Notes:

Boring 97-05 located along west side of dirt farm road, 750 ft. south of the concrete lined channel (which is south of well KWB-10). At completion, DTW 15.4 ft., product TSTM. Drillers plugged back hole with cuttings.

H/C = Petroleum hydrocarbon

09-29-1997 C:\MTECH46\navoff97\05-08-97\off97-05.bor

Moniter Wells

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32

Geologic Description

0–2' SANDY CLAY, dark brown, with roots.

2–14' SANDY CLAY, brown, dry to moist, lighter in color with increasing depth, white caliche pebbles showing up at 9–10 feet, occasional pockets of fine white sand.

14–20' CLAY, reddish brown, moist, some caliche pebbles and sand pockets.

20–22' SANDY CLAY, brown and white, saturated increasing pebble content.

22–23' GRAVEL, 1 to 2" rocks, saturated.

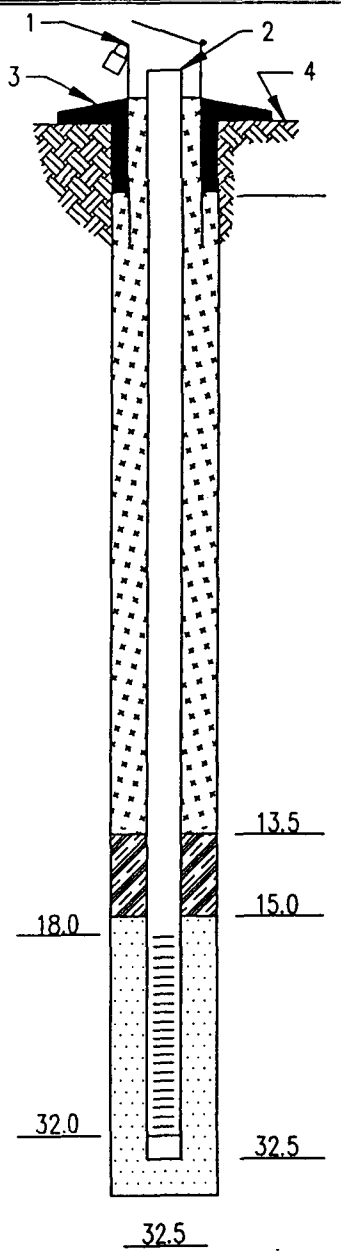
23–32.5' SANDY CLAY, brown and white, moist dry, pebble content decreasing with depth.

TD = 32.5'

NOTE: 5 foot core barrel recovery system used as sampling technique

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specification

Elevations: (feet MSL) 1 3351.07 2 3350.87 3 3349.10 4 3348.7

Coordinates: X 5171.71 Y 5193.86

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 11, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	14.7	3336.4			
3/10/92	14.5	3336.2			

Comments: Concrete with 5% bentonite used to grout from seal to surface.

KWBES

Navajo Nation

KWB1A

Project: 622092001-237 (1A)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32

Geologic Description

0–2' SANDY CLAY, dark brown, with roots.

2–14' SANDY CLAY, brown, dry to moist, lighter in color with increasing depth, white caliche pebbles showing up at 9–10 feet, occasional pockets of fine white sand.

14–20' CLAY, reddish brown, moist, some caliche pebbles and sand pockets.

20–22' SANDY CLAY, brown and white, saturated, increasing pebble content.

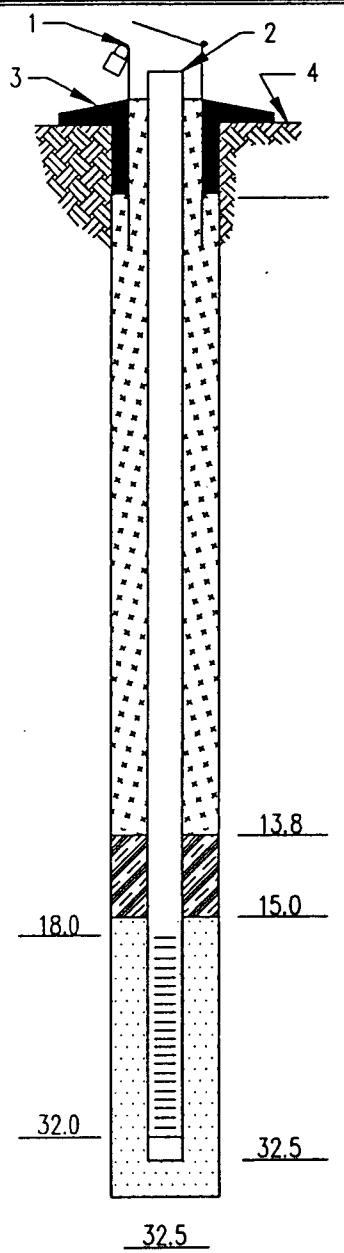
22–23' GRAVEL, 1 to 2" rocks, saturated.

23–32.5' SANDY CLAY, brown and white, moist to dry, pebble content decreasing with depth.

TD = 32.5'

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet
from Ground Surface
(Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3351.06 2 3350.83 3 3349.18 4 3348.8

Coordinates: X 5172.42 Y 5181.92

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16–40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 12"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 15, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	14.4	3336.4			
3/10/92	14.5	3336.3			

Comments: Concrete with 5% bentonite used to grout from seal to surface.

KWBES

KWB1B

Project: 622092001-237 (1B)
Location: ARTESIA, NEW MEXICO

DRAFT

Sym	Samp	Loc	PID (ppm)	Depth (Feet)
				3
				6
				9
				12
				15
				18
				21
				24
				27
				30
				33
				36
				39
				42
				45
				48
				51
				54
				57
				60

Geologic Description

0-2' SANDY CLAY, dark brown to brown, moist, plastic.

2-6' CLAYEY SAND, brown to tan, moist to slightly moist, friable.

6-14' SANDY CLAY, brown, moist, friable to firm, occasioal fragments fo claiche gravel, angular

14-20' CLAY, brown, moist, plastic, thin gravel seam @ 17', saturated, gypsum crystals throughout clay.

20-25' SILTY CLAY, brown to white, saturated from 20-23', very moist to moist 23-25'.

25-28' SILT, brown to white, saturated.

28-32' SILTY CLAY, brown to white, moist with thin intermittent seams fo caliche pebbles, saturated.

32-33' SANDY CLAY, brown, moist, plastic.

33-44' GRAVEL, CLAY, SILT MIX, saturated clay lenses with saturated pebble seams throughout.

44-45' SANDY CLAY, brown to white, slightly moist, stiff.

45-59' CLAY, brown, moist with saturated pebble seams throughout

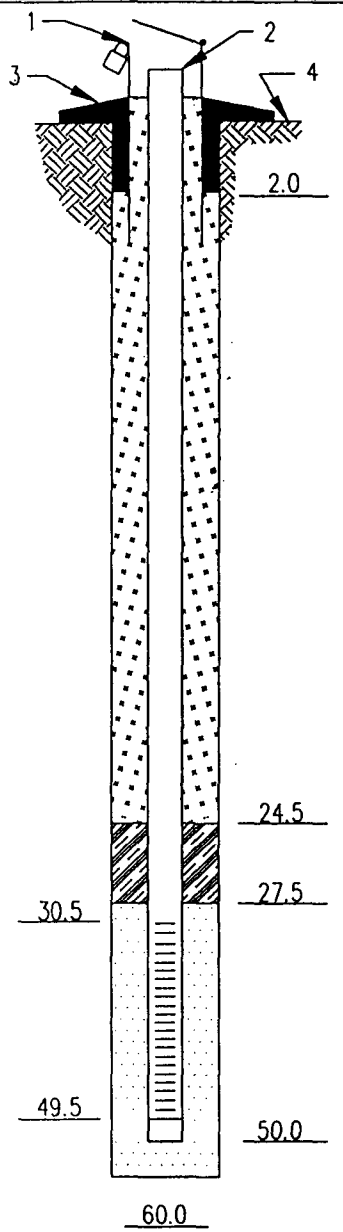
59-60' CLAY, brown, slightly moist, stiff.

TD = 60.0'

CME 5' core barrel recovery system

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☒ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 13.5"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 09/29/92

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: Boring plugged back to 50 feet before well set

KWBES

Navajo Artesia

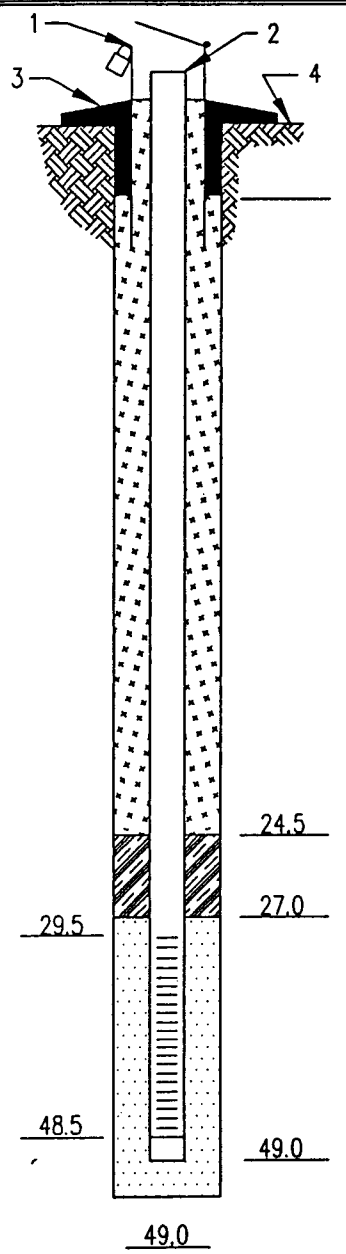
KWB-1C

Project: Navajo 622092003-236
Location: Artesia, New Mexico

Sym	Samp Loc	PID (ppm)	Depth (Feet)	Geologic Description
			2	
			4	0–16.5' SANDY CLAY, brown, moist to dry, becoming lighter in color with decreasing moisture, pockets of fine white caliche appearing at 14'.
			6	
			8	
			10	16.5–23' CLAY, brown, moist, stiff to plastic, some black stippling.
			12	
			14	23–29.5' SANDY CLAY, brown, moist, reaching saturation near 29'.
			16	29.5–45' CLAYEY GRAVEL, saturated, fine sand, pebbles, rocks to 3" in diameter, gravel sand-clay mix.
			18	
			20	
			22	45–47.5' SAND, fine grained, brown, saturated.
			24	47.5–49' SANDY CLAY, brown, moist to dry.
			26	
			28	
			30	
			32	TD = 49.0'
			34	
			36	NOTE: 5 foot core barrel recovery system used as sampling technique
			38	
			40	
			42	
			44	
			46	
			48	
			50	

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Mon. Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specification

Elevations: (feet MSL) 1 3366.18 2 3366.04 3 3364.03 4 3363.8

Coordinates: X 1659.24 Y 3905.78

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 14, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	29.0	3337.0			
3/10/92	29.3	3336.7			

Comments: Concrete with 5% bentonite used to grout from seal to surface.

KWBES

Navajo

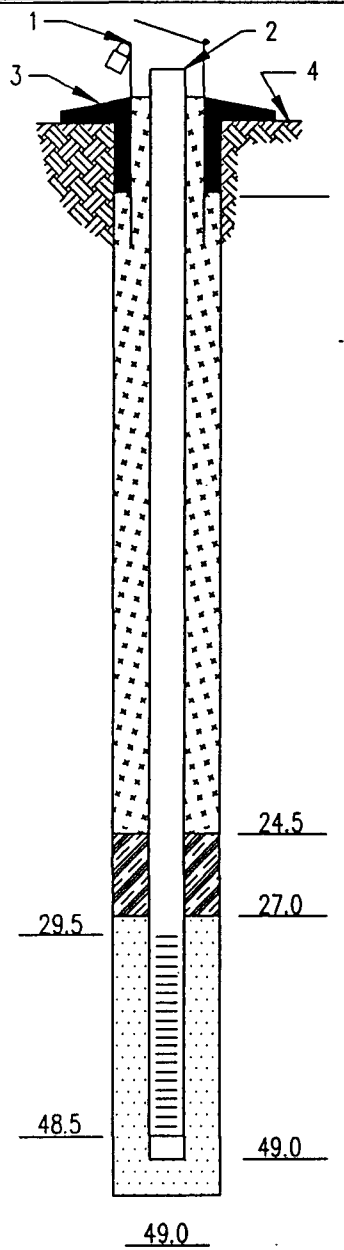
KWB2A

Project: 622092001-237 (2A)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	PID (ppm)	Depth (Feet)	Geologic Description
			2	0–16.5' SANDY CLAY, brown, moist to dry, becoming lighter in color with decreasing moisture, pockets of fine white caliche (appearing at 14').
			4	
			6	
			8	
			10	16.5–23' CLAY, brown, moist, stiff to plastic, some black stippling.
			12	
			14	23–29.5' SANDY CLAY, brown, moist, reaching saturation near 29'.
			16	29.5–45' CLAYEY GRAVEL, saturated, fine sand, pebbles, rocks to 3" in diameter, gravel sand–clay mix.
			18	
			20	
			22	45–47.5' SAND, fine grained, brown, saturated.
			24	47.5–49' SANDY CLAY, brown, moist to dry.
			26	
			28	
			30	
			32	TD = 49.0'
			34	
			36	
			38	
			40	
			42	
			44	
			46	
			48	
			50	

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet
from Ground Surface
(Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3366.40 2 3366.26 3 3364.12 4 3363.9

Coordinates: X 1646.63 Y 3905.71

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 12"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 18, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	28.9	3337.4			
3/10/92	29.2	3337.1			

Comments: Concrete with 5% bentonite used to grout from seal to surface.

KWBES

Navajo Refining

KWB2B

Project: 622092001-237 (2B)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	Pid (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–24' SANDY CLAY, brown, moist, becoming lighter in color with depth to @ 5'
- dryer with depth
- large pockets of white caliche starting around 8'.
- small seam of pebbles @ 17.5'
- intermittent thin seams
- small seam of pebbles @ 17.5'
- intermittent thin seams of fine sand from 17.5 to 20', moist
- occasional small pebbles

24–25' CLAY, brown, stiff, moist.

25–29' SANDY CLAY, brown, interspersed with 6" seams of gravel, saturated.

29–30' CLAYEY GRAVEL, saturated.

30–35' CLAYEY SAND, brown, saturated with pebbles and rock.

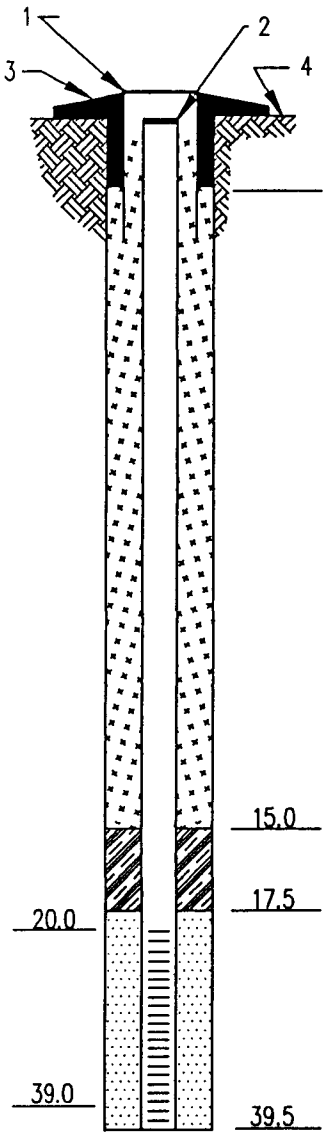
35–39.5' CLAY, brown, dry to moist, increasing sand and moisture with depth – gravel, dry at 39'.

TD = 39.5'

NOTE: 5 foot core recovery system used as sampling technique.

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3345.49 2 3345.31 3 3345.49 4 3345.3

Coordinates: X 2183.45 Y 7907.17

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ ____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ ____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ ____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ ____

Sand Pack: 20/40 Colorado

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ ____

Grout Type: Type I Portland Weight: ____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ ____

Drilled By: PRECISION ENGINEERING

Logged By: PHILLIP CADARETTE

Completion Date: FEBRUARY 14, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	20.7	3324.6			
3/10/92	21.0	3324.3			

Comments: Concrete with 5% bentonite used to grout from seal to surface.

KWBES

Navajo Refining

KWB3A

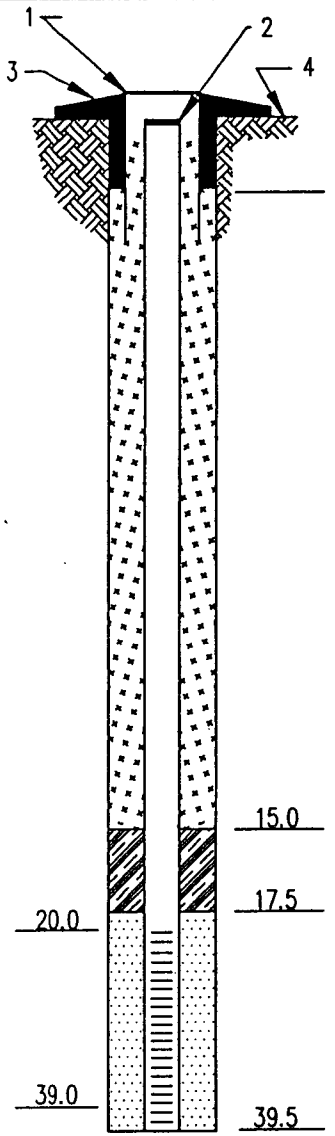
Project: 622092001-237 (3A)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	PID (ppm)	Depth (Feet)	Geologic Description
			0–24'	SANDY CLAY, brown, moist, becoming lighter in color with depth to @ 5' – dryer with depth – large pockets of white caliche starting around 8'. – small seam of pebbles @ 17.5' – intermittent thin seams – small seam of pebbles @ 17.5' – intermittent thin seams of fine sand from 17.5 to 20', moist – occasional small pebbles
			24–25'	CLAY, brown, stiff, moist.
			25–29'	SANDY CLAY, brown, interspersed with 6" seams of gravel, saturated.
			29–30'	CLAYEY GRAVEL, saturated.
			30–35'	CLAYEY SAND, brown, saturated with pebbles and rock.
			35–39.5'	CLAY, brown, dry to moist, increasing sand and moisture with depth – gravel, dry at 39'.
				TD = 39.5'

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Mo[illegible]g Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3345.52 2 3345.10 3 3345.52 4 3345.3

Coordinates: X 2193.17 Y 7905.71

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: 20/40 Colorado

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Type I Portland Weight: _____

Bore Hole Diameter: 12"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILLIP CADARETTE

Completion Date: FEBRUARY 15, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	21.0	3324.1			
3/10/92	21.2	3323.9			

Comments: Concrete with 5% bentonite used to grout from seal to surface.

KWBES

Navajo

KWB3B

Project: 622092001-237 (3B)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	PI (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–4.5' SANDY CLAY, brown, moist to dry, becoming lighter in color with decreasing moisture.

4.5–6' CLAYEY SAND, brown, moist.

6–7' SAND, fine grained, brown, moist.

7–25' SANDY CLAY, brown, moist, gray hydrocarbon staining appearing at 8', dark gray to black staining from 8–11', strong odor, staining and odor disappear from 15–16', brown color, gray stain and odor return at 16', thin pebble bed near 18', black, saturated, increasing rock content from 18–25'.

25–27' SILTY SAND, brown, odor.

27–30' SANDY CLAY, gray to brown, moist.

30–35' CLAYEY SAND, dark gray, grossly contaminated, no structure, saturated.

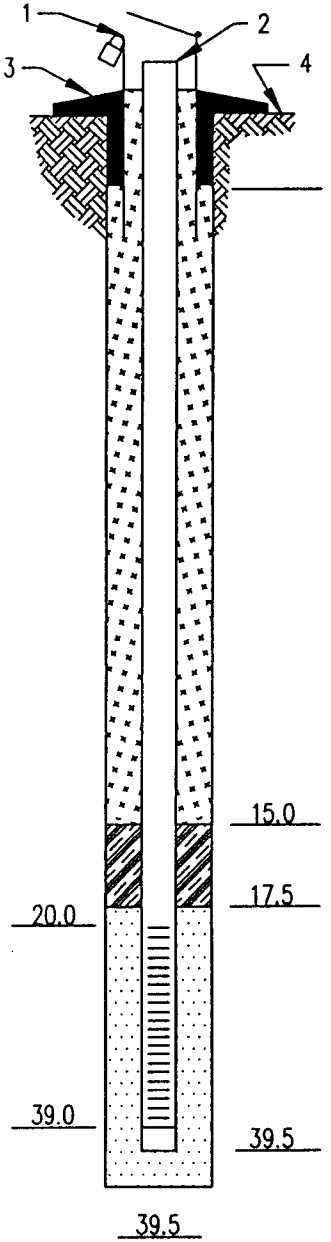
35–39.5' SANDY CLAY, brown, moist to dry.

TD = 39.5'

NOTE: 5 foot core barrel recovery system used as sampling technique

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Mo[illegible]g Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3368.33 2 3368.12 3 3365.81 4 3365.4

Coordinates: X 2811.44 Y 3574.80

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16–40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 12"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 17, 1992

Date	D-T-P	MSL	D-T-W	Field pH	Field EC
2/19/92			24.2		
3/10/92	24.0	3344.1	26.1		

Comments: Concrete with 5% bentonite used to grout from seal to surface.

KWBES

KWB4

Project: 622092001–237 (KWB4)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–9' SANDY CLAY, brown, moist to dry, becoming lighter in color with decreasing moisture.

9–10' CLAY, brown, moist.

10–15' SANDY CLAY, brown, dry to moist, gray hydrocarbon staining starting at 14'.

15–29' CLAYEY SAND, gray staining with strong hydrocarbon smell, dry to moist.

29–31' SANDY CLAY, gray staining, strong odor, moist.

31–38' SATURATED SILT, brown, strong odor, sheen.

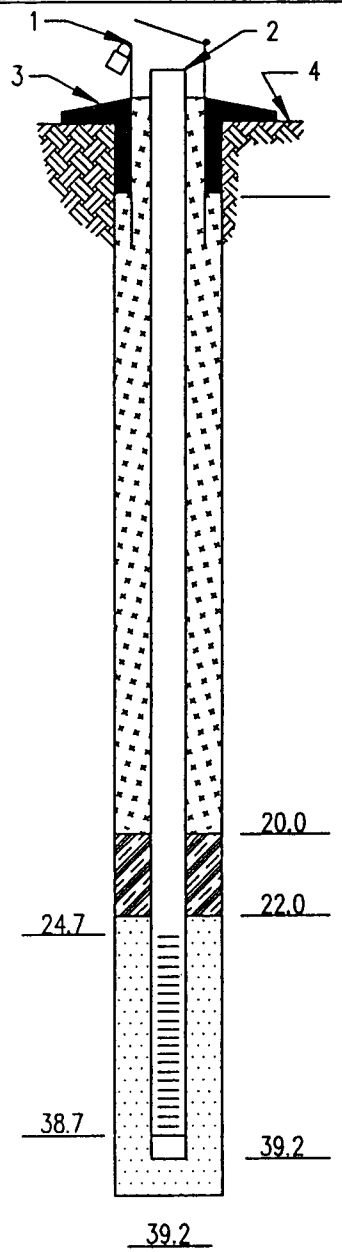
38–39.5' CLAY, brown, stiff, dry.

TD = 39.2'

NOTE: 5 foot core barrel recovery system used as sampling technique

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3363.02 2 3362.87 3 3360.92 4 3360.6

Coordinates: X 2928.10 Y 4245.94

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 11, 1992

Date	D-T-P	MSL	D-T-W	Field pH	Field EC
2/19/92			23.1		
3/10/92	23.3	3339.6	23.4		

Comments: Concrete with 5% bentonite used to grout from seal to ground surface.

KWBES

Navajo Nation

KWB5

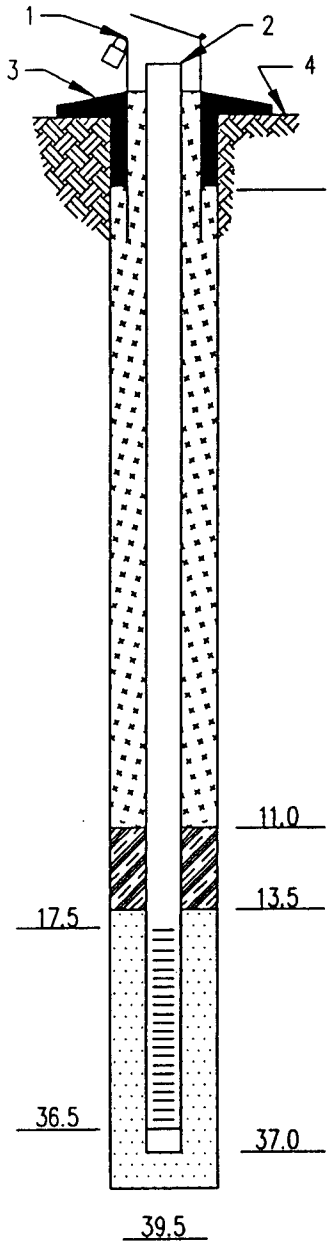
Project: 622092001-237 (KWB5)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	Pid (ppm)	Depth (Feet)	Geologic Description
			2	0–5' SANDY CLAY, brown, moist to dry, becoming lighter in color with decreasing moisture.
			4	
			6	
			8	5–13' SANDY CLAY, light brown, dry to moist, showing white streaks of caliche at 10'.
			10	
			12	13–15' CLAY, dark brown, dry to moist.
			14	
			16	15–29' CLAYEY SAND, brown, moist, slight gray discoloration starting at 16.5', black and gray hydrocarbon staining from 17–20', thin gravel layers at 18', discoloration lessening with depth, brown clayey sand alternating with thin bands of gravel starting at 20'.
			18	
			20	
			22	
			24	
			26	
			28	29–35' CLAYEY SILT, brown to tan, saturated.
			30	35–38' SAND with GRAVEL, tan, saturated.
			32	
			34	38–39.5' CLAY, brown, stiff, dry.
			36	
			38	TD = 39.5'
			40	
			42	
			44	
			46	
			48	
			50	

NOTE: 5 foot core barrel recovery system used as sampling technique

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3358.71 2 3358.55 3 3356.41 4 3356.1

Coordinates: X 2652.58 Y 5161.82

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 12, 1992

Date	D-T-P	MSL	D-T-W	Field pH	Field EC
2/19/92	21.6	3337.0	24.8		
3/10/92	21.8	3336.8	25.1		

Comments: Concrete with 5% bentonite used to grout from seal to ground surface.

KWBES

Navajo Refining

KWB6

Project: 622092001-237 (KWB6)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	Pi (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–4' CLAYEY SAND, brown, moist, becoming lighter colored with depth.

4–15' SANDY CLAY, brown, moist to dry, occasional small pebbles of caliche, white bands of fine grain caliche increasing in frequency to 10', gravel content increasing with depth, 2" diameter rocks encountered at 14.5'.

15–17' GRAVEL, silty, moist.

17–20' CLAYEY SAND, brown, saturated.

20–22' SILTY SAND, brown, saturated, some gravel.

22–30' CLAYEY GRAVEL, saturated, increasing clay content with depth.

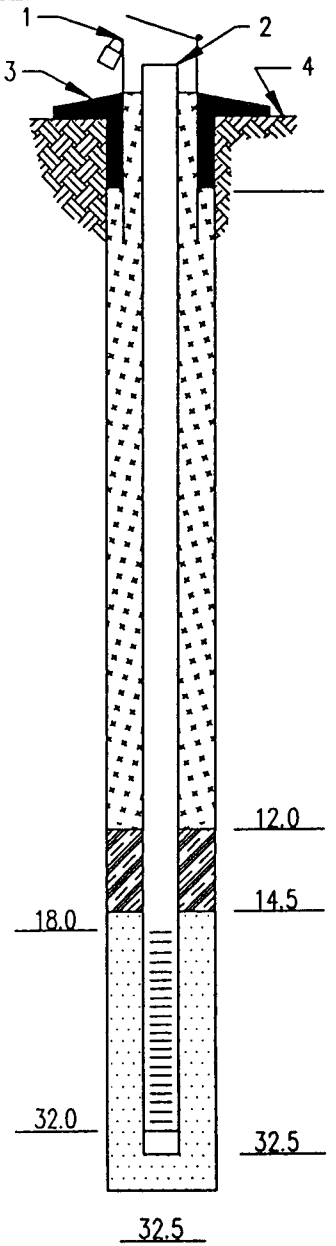
30–32.5' CLAY, brown, stiff, moist to dry.

TD = 32.5'

NOTE: 5 foot core barrel recovery system used as sampling technique

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specification

Elevations: (feet MSL) 1 3344.14 2 3344.00 3 3341.80 4 3341.6

Coordinates: X 3484.17 Y 8055.72

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 13, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	19.5	3324.5			
3/10/92	20.8	3323.2			

Comments: Concrete with 5% bentonite used to grout from seal to ground surface.

KWBES

Navajo Refining

KWB7

Project: 622092001-237 (KWB7)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–2' CLAYEY SAND, brown, moist, becoming lighter colored with depth.

2–25' SANDY CLAY, brown, moist to dry, becoming lighter in color with depth to 5', thin banding of caliche nodules noted at various depths, banding becoming thicker with depth, slight gray hydrocarbon staining evident at 15', darker gray hydrocarbon staining with depth, odor increasing, 2" gravel seam, saturated at 23'.

25–28' CLAYEY SAND, dark gray, from 23–26', strong hydrocarbon odor, saturated.

28–33' SILTY SAND, brown, saturated, slight staining, decreased odor.

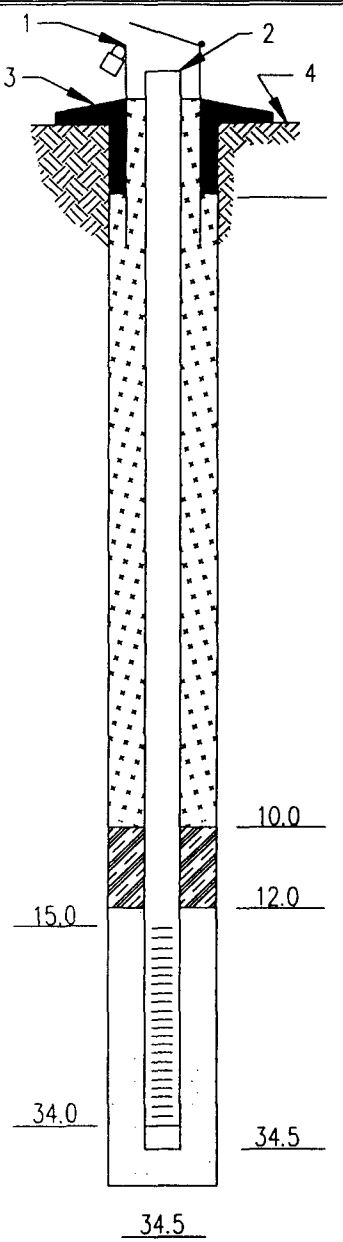
33–35' CLAYEY SAND, brown, moist.

TD = 34.5'

NOTE: 5 foot core barrel recovery system used as sampling technique

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 3348.59 2 3348.39 3 3346.22 4 3345.8

Coordinates: X 3211.93 Y 6875.69

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 12, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	20.6	3327.79			
3/10/92	21.0	3327.39			

Comments: Concrete with 5% bentonite used to grout from seal to ground surface.

KWBES

Navajo

KWB8

Project: 622092001-237 (KWB8)
Location: ARTESIA, NEW MEXICO

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0-22.5' SANDY CLAY, brown, dry, caliche nodules throughout, color lighter with depth, increasing sand content and caliche inclusions with depth white caliche banding starting at 10', thin gravel seam at 13', sandy clay exhibiting increasing moisture near 15'.

22.5-23' CLAYEY GRAVEL, saturated.

23-25' SILTY SAND, brown, saturated.

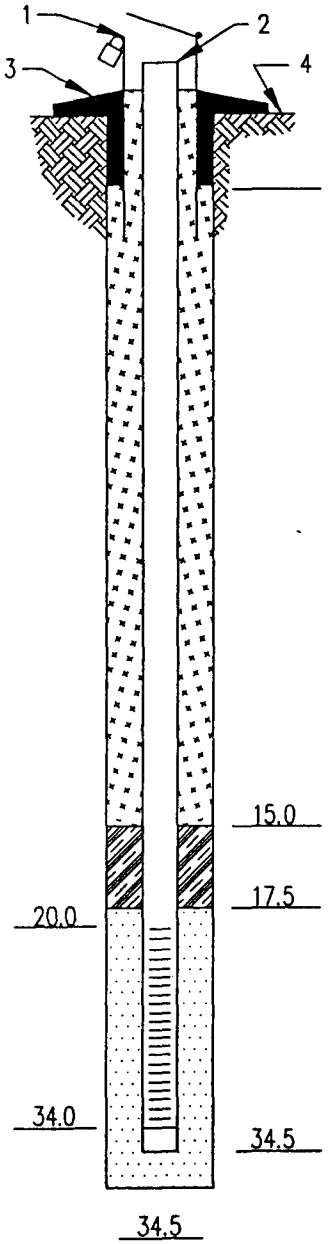
25-34.5' SANDY CLAY, brown, saturated to 26' then moist, dry near 34'.

TD = 34.5'

NOTE: 5 foot core barrel recovery system used as sampling technique

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitoring Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specification

Elevations: (feet MSL) 1 3352.67 2 3352.53 3 3349.90 4 3349.8

Coordinates: X 1838.15 Y 6600.55

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: PRECISION ENGINEERING

Logged By: PHILIP CADARETTE

Completion Date: FEBRUARY 13, 1992

Date	D-T-W	MSL	Date	Field pH	Field EC
2/19/92	24.9	3327.6			
3/10/92	25.2	3327.3			

Comments: Concrete with 5% bentonite used to grout from seal to ground surface.

KWBES

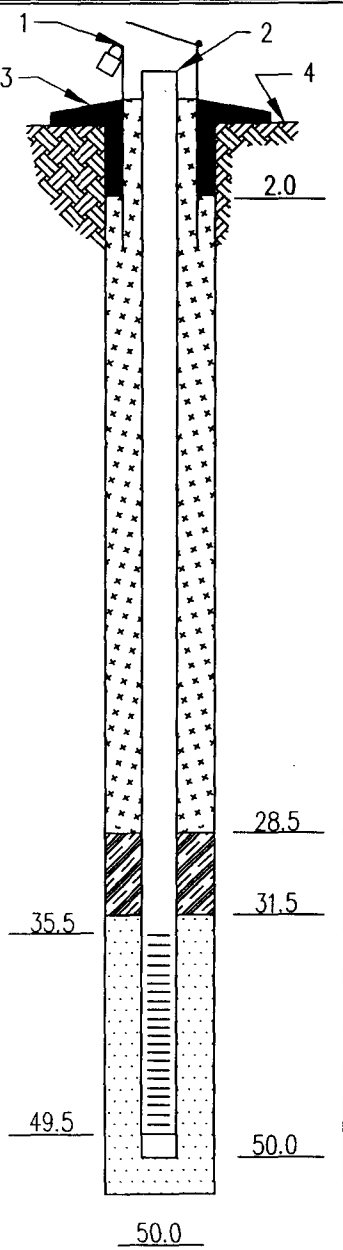
KWB9

Project: 622092001-237 (KWB9)
Location: ARTESIA, NEW MEXICO

Sym	Samp	Loc	PID (ppm)	Depth (Feet)	Geologic Description
				2	0–10' SANDY CLAY, dark brown to brown, moist to slightly moist, plastic to friable.
				4	–hydrocarbon odor apparent at 8.0'
				6	–gray hydrocarbon staining apparent starting at 9.0'
				8	
				10	10–12' CLAY, gray hydrocarbon staining, strong odor, occasional pockets of fine sand, moist.
				12	
				14	12–20' SANDY CLAY, gray hydrocarbon staining, strong hydrocarbon odor, occasional pockets of fine sand, moist.
				16	–color darkens to black from 17–19.5'
				18	–saturated thin pebble seams at 17' and 18.5'.
				20	–hydrocarbon staining becomes lighter at 19.5'.
				22	
				24	20–29' CLAYEY SAND, gray hydrocarbon staining, strong odor, very moist to saturated at 25–28'.
				26	
				28	29–32' CLAY WITH SAND, light brown, slightly moist to dry, very stiff, no hydrocarbon staining or odor.
				30	
				32	32–45' SANDY CLAY, hydrocarbon starinin and strong odor, moist to saturated at 33 feet with thin gravel zone
				34	–saturated from 42.5–45.0'
				36	
				38	45–46' GRAVEL WITH SAND AND CLAY, saturated hydrocarbon staining and strong odor.
				40	
				42	46–50' SANDY CLAY, brown, slightly moist, stiff, no hydrocarbon stain or odor.
				44	
				46	TD = 50.0'
				48	CME 5' core barrel recovery system
				50	

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Moni Well
Piezometer



Depths in Feet
from Ground Surface
(Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☒ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 13.5"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/02/92

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: 10" PVC casing grouted in from 0–30'.
After curing, well completed.

KWBES

KWB-10

Project: Navajo 622092003-236
Location: Artesia, New Mexico

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–10' CLAYEY SAND, dark brown to brown, moist to slightly miist, plastic to stiff.
–thin caliche pebble ozne @ 9.0', dry.

10–15' CLAY, brown to white, moist, blocky, gypsum crystals appearing near 15.0'.

15–25' CLAYEY SAND, brown to white, moist, plastic.
–saturated @ 20.5' with gravel and fine tan sand seams interbedded.

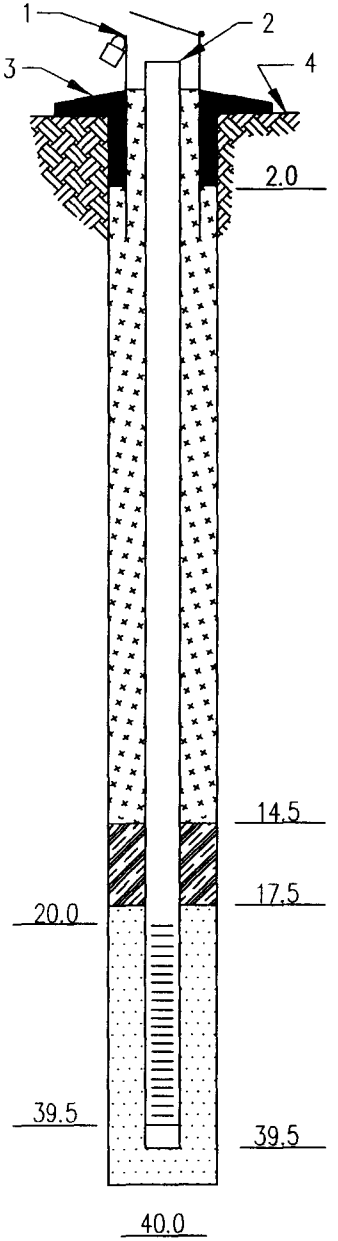
25–40' GRAVEL WITH CLAY AND SILT, saturated, gravel is calich with angular fragments up to 2" in size.

TD = 40.0'

CME 5' core barrel recovery system

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitor Well ☒
Piezometer



Depths in Feet
from Ground Surface
(Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☒ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 13.5"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/04/92

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: _____

KWBES

Navajo

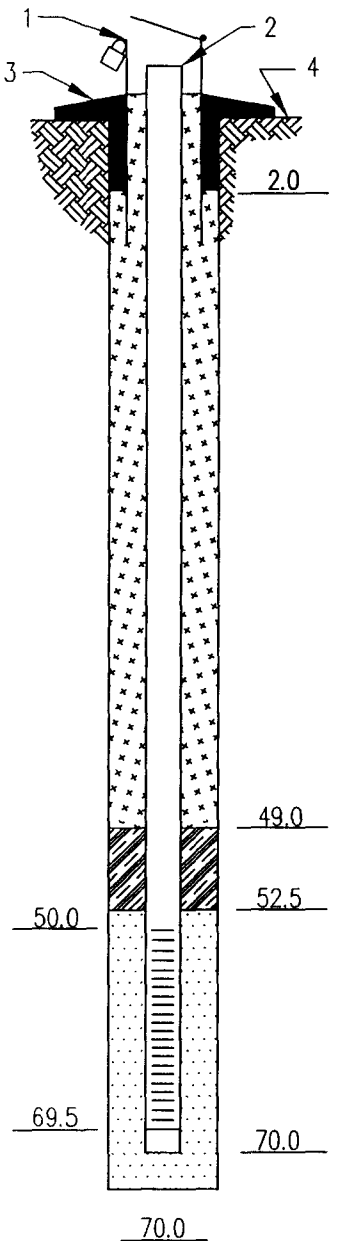
KWB-11A

Project: Navajo 622092003-236
Location: Artesia, New Mexico

Sym	Samp Loc	PID (ppm)	Depth (Feet)	Geologic Description
			3	0–10' CLAYEY SAND, dark brown to brown, moist to slightly moist, plastiec to stiff.
			6	–thin caliche pebble zone @ 9.0', dry.
			9	
			12	10–15' CLAY, brown to white, moist, blocky, gypsum crystals appearing near 15.0'.
			15	15–25' CLAYEY SAND, brown to white, moist, plastic.
			18	–saturated at 20.5' with gravel and fine
			21	tan sand seams interbedded.
			24	25–45' GRAVEL WITH CLAY AND SILT, saturated,
			27	ravel is caliche with angular fragments up to 2" in size.
			30	45–48.5' RIVER ROCK, blue to gray, well rounded,
			33	saturated, 1/4" in diameter.
			36	48.5–50' SANDY CLAY, reddish brown, slightly moist, very stiff.
			39	
			42	50–55' CLAY WITH SAND, slightly moist to dry, very stiff, occassional rock fragments.
			45	
			48	55–69' CLAY, reddish brown, moist, plastic to stiff.
			51	–thin pebble beds, saturated, starting @ 58.0', occuring intermittently to 65.0'
			54	
			57	69–70' CLAY, reddish brown, moist to slightly, moist, very stiff.
			60	TD = 70.0'
			63	CME 5' core barrel recovery system
			66	
			69	
			72	
			75	

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitor Well ☒
Piezometer



Depths in Feet
from Ground Surface
(Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☒ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 13.5"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/04/92

Date	D–T–W	MSL	Date	Field pH	Field EC

Comments: 10" PVC casing grouted in from 0–50.0' to seal off first saturated zone. After curing, well completed to 70.0'.

KWBES

KWB–11B

Project: Navajo 622092003–236
Location: Artesia, New Mexico

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–4' SANDY CLAY, dark brown to brown, moist, plastic.

4–10' CLAYEY SAND, brown to tan, moist, plastic, occasional gypsum crystals.

10–13' SANDY CLAY, moist, plastic, thin bands of fine sand interbedded.

13–15' CLAYEY SNAD, slightly moist, stiff.

15–20' CLAY WITH GRAVEL, sand and silt brown, moist, thin saturated gravel seam @ 18.0'.

20–22' GRAVEL WITH CLAY AND SAND, saturated.

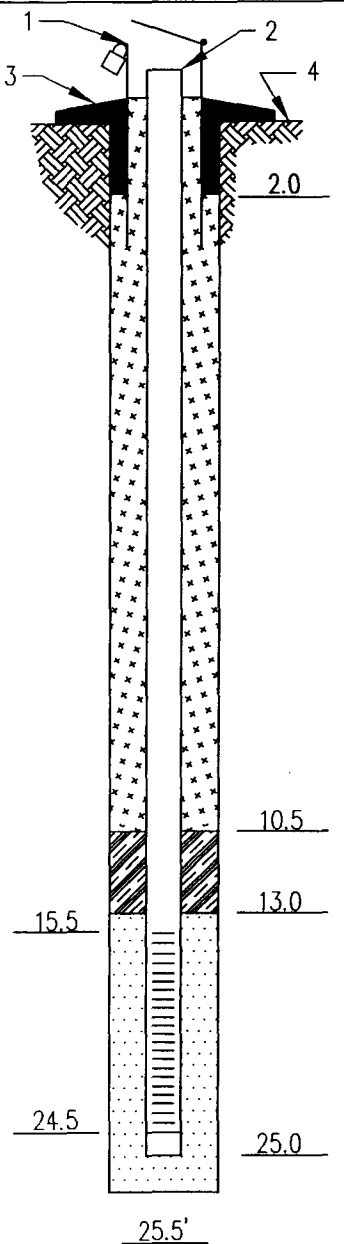
22–25' CLAY, brown, slightly moist, stiff.

TD = 25.0'

CME 5' foot core barrel recovery system

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitor Well ☒
Piezometer



Depths in Feet
from Ground Surface
(Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☒ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 13.5"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/04/92

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: _____

KWBES

Navajo

KWB-12A

Project: Navajo 622092003-236
Location: Artesia, New Mexico

Sym	Samp	Loc	PID (ppm)	Depth (Feet)
				2
				4
				6
				8
				10
				12
				14
				16
				18
				20
				22
				24
				26
				28
				30
				32
				34
				36
				38
				40
				42
				44
				46
				48
				50

Geologic Description

0–4' SANDY CLAY, dark brown to brown, moist, plastic.

4–10' CLAYEY SAND, brown to tan, moist, plastic, occassional gypsum crystals.

10–13' SANDY CLAY, moist, plastic, thin bands of fine sand interbedded.

13–15' CLAYEY SAND, slightly moist, stiff.

15–20' CLAY, with gravel, sand, silt, brown, moist, thin saturated gravel seam @ 18.0'.

20–22' GRAVEL WITH CLAY AND SAND, saturated.

22–35' CLAY, brown, slightly moist, very stiff, occassional caliche rock fragments, dry.
–thin saturated seams of rock at 30.0', 32.0', 35.0'.

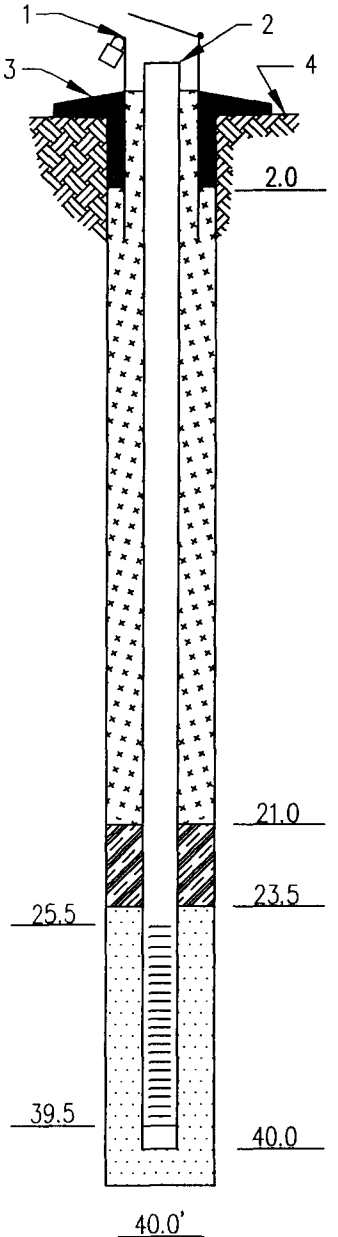
35–40' CLAY, reddish brown, moist with thin saturated caliche zones at 36.0' and 37.0'.
–slightly moist and stiff from 38–40.0'.

TD = 40.0'

CME 5' core barrel recovery system

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitor Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☐ 2" ☐ 3" ☒ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☒ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☐ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 13.5"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/04/92

Date	D–T–W	MSL	Date	Field pH	Field EC

Comments: 10" PVC casing grouted in from 0–25.0' to seal off first saturated zone. After curing, well completed to 40.0'.

KWBES

Navajo Nation

KWB–12B

Project: Navajo 622092003–236
Location: Artesia, New Mexico

Sym	Samp	Loc	PID (ppm)	Depth (Feet)
				2
				4
				6
				8
				10
				12
				14
				16
				18
				20
				22
				24
				26
				28
				30
				32
				34
				36
				38
				40
				42
				44
				46
				48
				50

Geologic Description

0–.1' CRUSHED LIMESTONE, base materal for pad.

.1–4' CLAYEY SAND, brown, slightly moist, friable.

4–8' CLAYEY SAND, interbedded with caliche seams, gray, dry.

8–9' CLAYEY SAND, greenish/gray, moist, friable, occassional caliche fragments, up to 1/2".

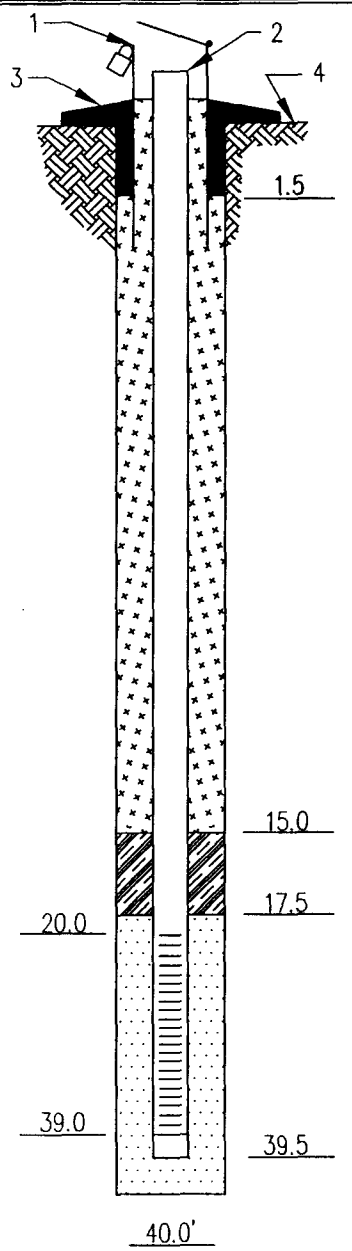
9–40' SAND, tan, fine to medium grain, clean.
- –saturated from 22–40.0'
- –well rounded river rock seam @ 20.0'.
- –occassional thin seams of red clay, high plasticity encountered, never more than a few inches thick.

TD = 40.0'

Split Spoon and CME 5' core barrel recovery system

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitor Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 8.25"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/07/92

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: _____

KWBES

Navajo

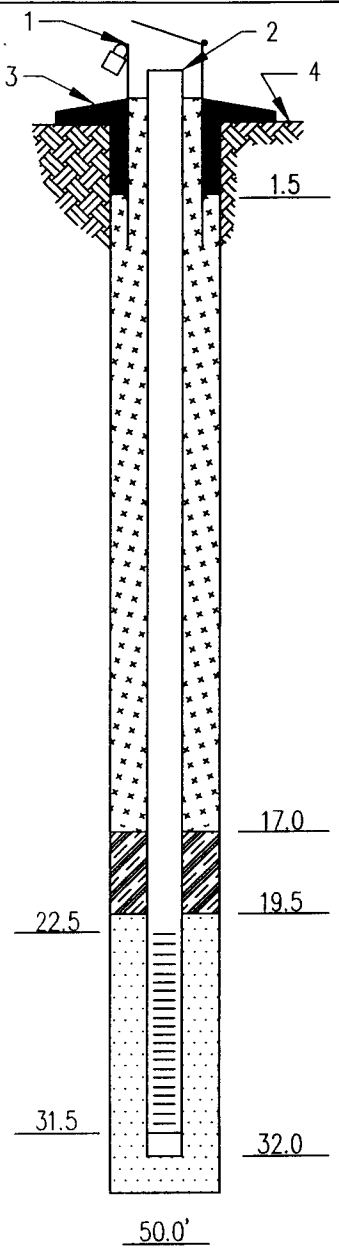
KWB-1P

Project: Navajo 622092003-236
Location: Artesia, New Mexico

Sym	Samp Loc	PID (ppm)	Depth (Feet)	Geologic Description
			2	0–8' CLAYEY SAND, brown, moist plastic. –gypsum crystals appearing @ 4'
			4	
			6	8–10' CLAY, red with white banding, moist, plastic.
			8	10–14' CLAY, red and brown, moist, plastic. –4" band of fine sand @ 12.5'
			10	
			12	14–16' SAND, tan, fine–grained, moist.
			14	16–22' SANDY CLAY, red and brown, slightly moist to dry, plastic to stiff, occasional fragments of caliche gravel throughout.
			16	
			18	22–23.5' SANDY CLAY, white, slightly moist, plastic.
			20	23.5–25' CLAY, greenish/gray, moist, blocky.
			22	
			24	25–30' SAND WITH SILT, reddish–brown, saturated, fine to medium grain.
			26	
			28	30–50' SAND, tan, fine to medium grain, saturated. –well rounded river rock seam @ 40.0'
			30	
			32	TD = 50.0'
			34	Note: Plugged boring back to 32.0' before setting well
			36	
			38	Split Spoon and CME 5' core barrel recovery system
			40	
			42	
			44	
			46	
			48	
			50	

ST=Shelby Tube ☒ SS=Split Spoon ☐ C=Cuttings

Monitor Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland/5% Bentonite Weight: _____

Bore Hole Diameter: 8.25"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/07/92

Date	D-T-W	MSL	Date	Field pH	Field EC

Comments: _____

KWBES

Navajo

KWB-2P

Project: Navajo, 622092003-236
Location: Artesia, New Mexico

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–4' CLAYEY SAND, brown, dry, stiff.
–abundant gypsum crystals

4–11' SANDY CLAY, red, moist, friable.
–abundant gypsum crystals
–occasional small pockets fo fine tan sand

11–11.5' GRAVEL AND CLAYEY SAND, saturated.

11.5–13' CLAYEY SAND, gray, very moist, plastic.

13–14' GRAVEL (CALICHE), CLAY MIX, saturated.

14–25' SILTY SAND, gray to reddish brown, saturated, fine–grained.

25–50' SAND, tan, fine to medium–grained, saturated

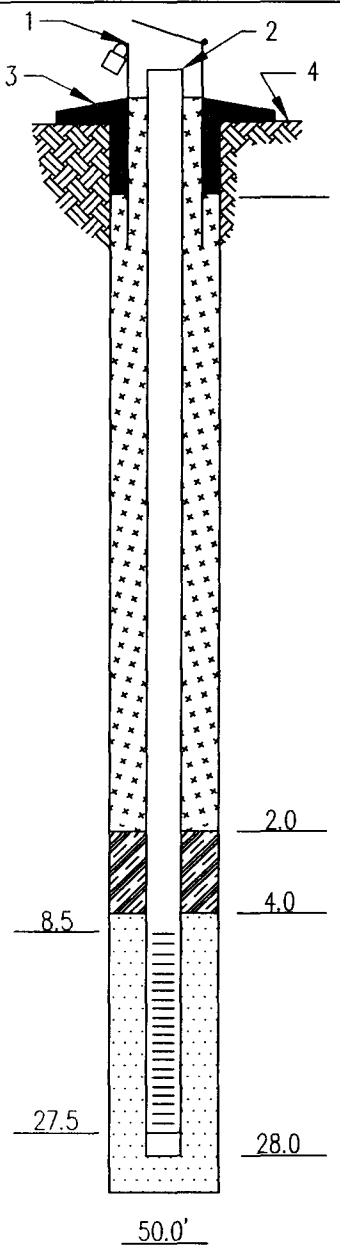
TD = 50.0'

Note: Plugged boring back to 28.0' before setting well

Split Spoon and CME 5' core barrel recovery system

ST=Shelby Tube | ☒ SS=Split Spoon | C=Cuttings

Monitor Well ☒
Piezometer



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8.25"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Precision Engineering

Logged By: PWC

Completion Date: 10/07/92

Date	D–T–W	MSL	Date	Field pH	Field EC

Comments: Bentonite plug is near surface–pad was poured with Portland cement from 2' below depth to top of the form.

KWBES

Navajo

KWB–3P

Project: Navajo, 622092003–236
Location: Artesia, New Mexico

Sym	Samp Loc	PID (ppm)	Depth (Feet)
			2
			4
			6
			8
			10
			12
			14
			16
			18
			20
			22
			24
			26
			28
			30
			32
			34
			36
			38
			40
			42
			44
			46
			48
			50

Geologic Description

0–15.0' CLAYEY SAND, brown to reddish–brown, moist to very moist.
–gypsum crystals abundant from 5–10'
–thin saturated band of caliche from 14.5–14.7'.

15.0–17.0' SANDY CLAY, brown, blocky, moist.

17.0–17.5' GRAVEL WITH CLAY, saturated

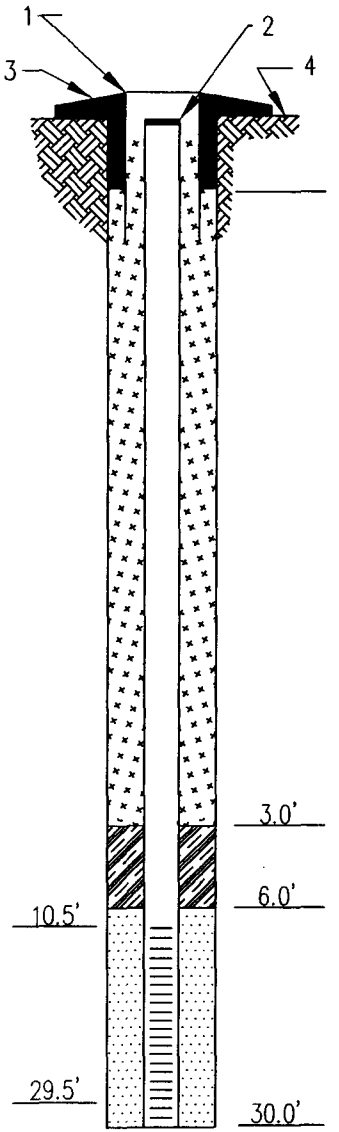
17.5–23.0' SILTY CLAY, light green (reduced), moist to very moist, Fe staining.

23.0–50.0' SILTY SAND, light green, saturated from 23–30'.
–color change to reddish–brown after 30', saturated
–occasional caliche gravel fragments encountered.

TD = 50.0'

ST=Shelby Tube | SS=Split Spoon | C=Cuttings

Monitor Well ☒
Piezometer ☐



Depths in Feet from Ground Surface (Not to Scale)

Design Specifications

Elevations: (feet MSL) 1 _____ 2 _____ 3 _____ 4 _____

Coordinates: X _____ Y _____

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 3" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: Colorado Silica Sand 20/40

Bentonite Seal: ☐ 1/2" Pellets ☐ Hole Plug ☐ Slurry ☒ 1/4" Pellets ☐ _____

Grout Type: Portland Weight: _____

Bore Hole Diameter: 8"

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled By: Percision Engineering

Logged By: PWC

Completion Date: 10/08/92

Date	D–T–W	MSL	Date	Field pH	Field EC

Comments: Portland cement poured from 3.0' to surface pad – no bentonite added.

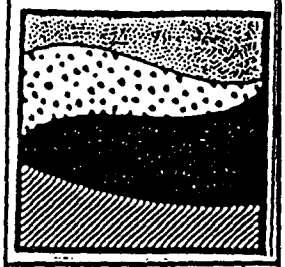
KWBES

Navajo

KWB–4P

Project: Navajo 622092003 (KWB4P)
Location: Artesia, New Mexico

GCL



WELL LOGGING FORM

Client NAVAJO REFINERY Well Number MW- 8

1/4 1/4 1/4 1/4 S T R State NEW MEXICO

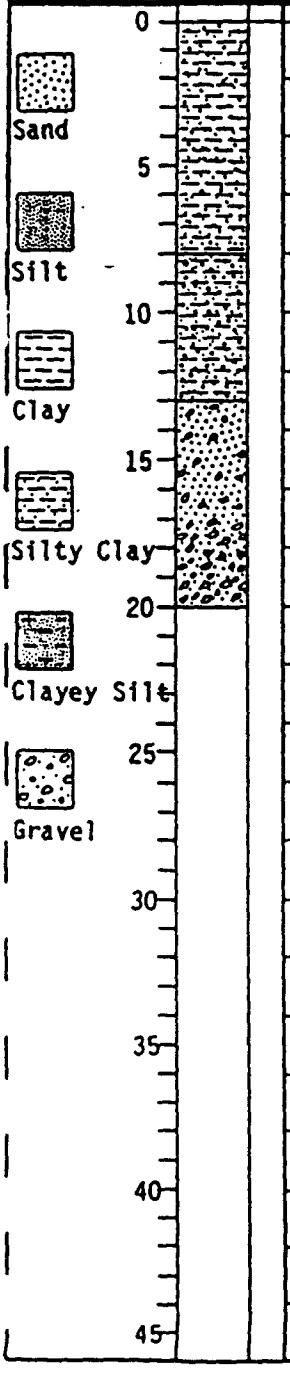
County EDDY Contractor LARRY'S DRILLING

Spud Date 6-20-86 Completion Date 6-20-86

Logs Run LITHOLOGY Logged By SELKE

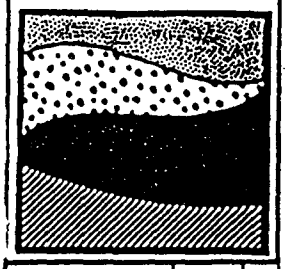
Elevation (Spud In (Fm.)

Remarks Steam cleaned rig and tools prior to drilling - drilled with air rotary



RUN	FROM	TO	SAMPLE DEPTH	REMARKS
				0-8' Brown, silty sandy clay moist at approx. 8'
				8-13' white to gray, sandy clay with modera amounts of gravel(pea size)
				13-20' lt. brown clayey sand (abund. clay) v. minor gravel at top w/ moderate to abundant gravel at bottom

GCL



WELL LOGGING FORM

Client NAVAJO REFINERY Well Number MW- 9

__1/4__1/4__1/4__1/4 S__T__R__ State NEW MEXICO

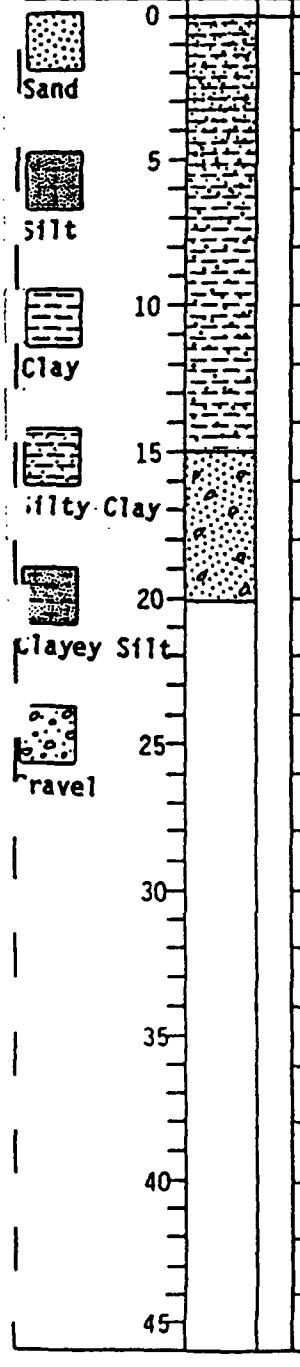
County EDDY Contractor LARRY'S DRILLING

Spud Date 6-20-86 Completion Date 6-20-86

Logs Run LITHOLOGY Logged By SELKE

Elevation _____ Spud In (Fm.) _____

Remarks Steam cleaned rig and tools prior to drilling- drilled with air rotary- no temporary casing



RUN	FROM	TO	SAMPLE DEPTH	REMARKS
				0-approx. 5' brown, silty , sandy clay
				approx. 5'-approx. 15' white to gray, sandy clay
				15-20' lt. brown, clayey sand w/ moderate amounts of fine grain gravel

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
			16
			17
			18
			19
			20
			21
			22
			23
			24

Geologic Description

0–1' SILTY SAND, brown, moist, medium to fine grained, many roots.

1–8.5' CLAYEY SAND, brown, changing to tan near 4', moist, friable, many roots and root channels, clay content increasing with depth.

8.5–13' CLAY, brown, moist, plastic, some gray mottling, gypsum crystals noted.

13–14' CLAYEY SAND, tan, moist, friable.

14–14.5' SAND with silt, tan, saturated, fine to medium grain.

14.5–20' CLAY, with gravel, clay is reddish/brown, very moist, plastic; gravel is < 1" dia. and saturated.

20–20.5 CLAYEY SAND, gray, saturated, some gravel fragments.

20.5–24' CLAY, reddish/brown, moist, plastic, blocky.
- thin zone of gravel near 23' is saturated (<4").

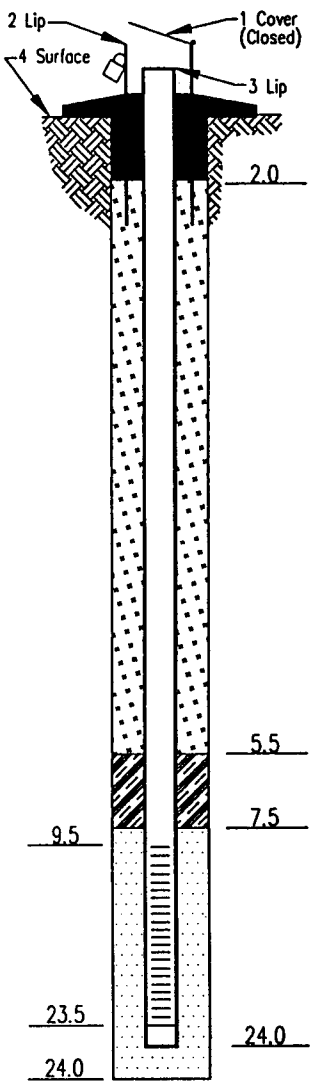
TD = 24'

Sample Method Symbols

☒ RB=Recovery Barrel ☒ 5' ☐ ____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well	X
Piezometer	
Protective Casing	YES



Depths in Feet from Ground Surface (Not to Scale)

LOG-1

Design Specifications

Elevations: (feet MSL) 1 3340.69 2 3340.67 3 3340.00 4 3337.20

Coordinates: X 5606.12 Y 2420.80

Bore Hole Diameter: 12"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ ____

Casing Diameter: ☐ 2" ☒ 4" ☐ 6" ☐ ____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ ____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ ____

Sand Pack: C.S.S.I. 20/40

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ ____

Grout Type: Portland/Bentonite Weight: ____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ ____

Drilled By: Pool Environmental Lic. #: WD 1266

Logged By: PWC

Completion Date: 01/21/93

Depth First Encountered Water: 14.0' BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
1/26/93	10.18			6.93	7,600
2/10/93	10.41				

Comments: ____

KWBES

MW-20

Project: 622092005-110 (MW-20)
Location: Artesia, New Mexico

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

Geologic Description

0-3.0' CLAYEY SAND, light brown, fine grained, white (carbonate nodules throughout, hard, dry, earthy odor.

3.0-7.5' SANDY CLAY, dark brown, color change to light gray at 6.0', fine grained sand, rust staining (dendritic) throughout, some clear crystals (gypsum?), soft, moist, earthy odor.

7.5-10.5' CALICHE (carbonate) GRAVEL, light gray, some clay throughout, hard, saturated at 10.0', no odor.

10.5-12.0' SANDY CLAY, light gray, fine grained sand, moist, no odor.

12.0-13.0' CALICHE (carbonate) GRAVEL, light gray, some clay throughout, hard, saturated, no odor.

13.0-23.0' CALICHE (carbonate) GRAVEL, reddish/brown, some clay throughout, hard, saturated at 13.0-13.5', 14.5-15.5', and 19.0-19.5', no odor.

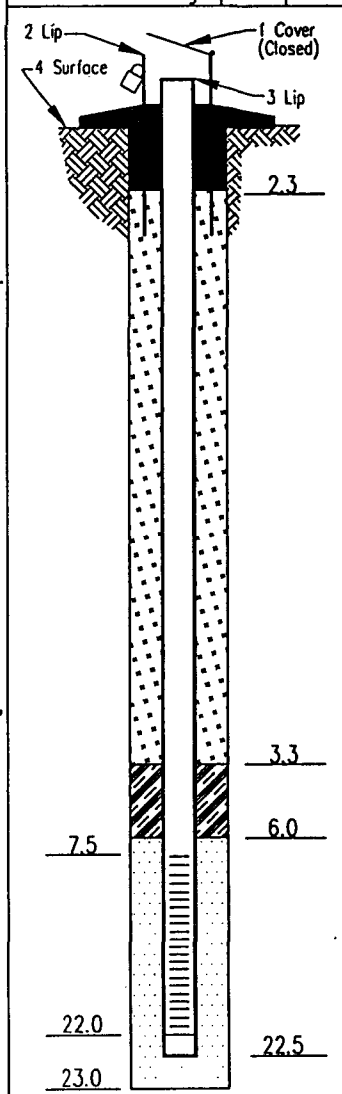
TD = 23.0'

Sample Method Symbols

☒ RB=Recovery Barrel ☒ 5' ☐ ____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well	X
Piezometer	
Protective Casing	YES



Depths in Feet from Ground Surface (Not to Scale)

LOG-1

Design Specifications

Elevations: (feet MSL) 1 3336.39 2 3336.37 3 3336.18 4 3333.50

Coordinates: X 6925.27 Y 1807.82

Bore Hole Diameter: 12"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ ____

Casing Diameter: ☐ 2" ☒ 4" ☐ 6" ☐ ____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ ____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ ____

Sand Pack: Colorado Silica 20-40

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ ____

Grout Type: None Weight: ____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ ____

Drilled By: Precision Engineering Lic. #: ____

Logged By: WCZ

Completion Date: 1/23/93

Depth First Encountered Water: 10.0' BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
1/27/93	10.65			6.85	5,200
2/10/93	10.92				

Comments: Replacement well between MW-8 and MW-9.

KWBES

MW-21

Project: 622092005-110 (MW-21)
Location: Artesia, New Mexico

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

Geologic Description

0-0.5'	Silt, roots, topsoil.
1-7'	Silty clay, light gray, dry 1-3', crystals (calcite?) 3-4', brown with some black, no odor, roots 4-4.5', brown olive brown mottling with crystals 5-6', less mottling 6-7'.
7-8'	Clay, light gray, fine gravel, crystals, very plastic, no odor.
8-10'	Missing.
10-13'	Clay, light gray, granular, saturated at 10', light gray brown, moist and plastic 10.5-13'.
13 -15.5'	Silty clay, light brown, moist, 2" piece of broken limestone gravel at 15'.
15.5-17'	Clay, light brown, plastic, slightly moist, platy caliche 16.5-17'.
17-17.5'	Gravely clay, light gray, 3/4" gravel, cemented, saturated.
17.5-20'	Silty clay, light brown, slightly moist and plastic.

Sample Method Symbols

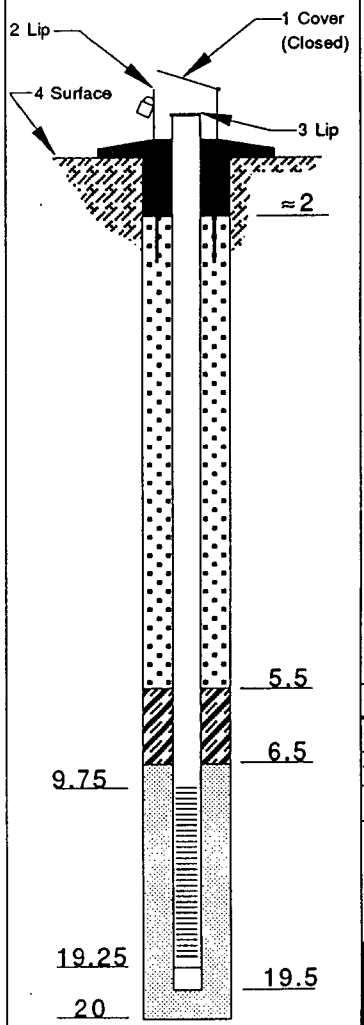
☒ RB=Recovery Barrel ☒ 5' ☐ _____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well ☒

Piezometer ☐

Protective Casing YES



Depths in Feet from Ground Surface (Not to Scale)

LOG - 1

Design Specifications

Elevations: (feet MSL) 1 3334.52 2 _____ 3 3334.29 4 3331.6

Coordinates: X 7336.58 Y 1645.21

Bore Hole Diameter: 8 1/4"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40 silica sand

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ _____

Hydrated w/ 5 gallons water

Grout Type: 6% bentonite/Portland Weight: _____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled by: Precision Engineering Lic.#: _____

Logged by: DGB

Completion Date: 1/10/95

Depth First Encountered Water: 10 ft. BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
1/10/95	11.07				
1/12/95	11.05			6.5	6100
2/5/95	11.19				

Comments: D-T-W from casing lip.

RE/SPEC

MW-29

Project: 318/3.3

Location: Artesia, New Mexico

SAMPLE LOG

Well # 45 Navajo Refining Company - Monitor Wells

Drilling Contractor - D. Anderson, El Paso

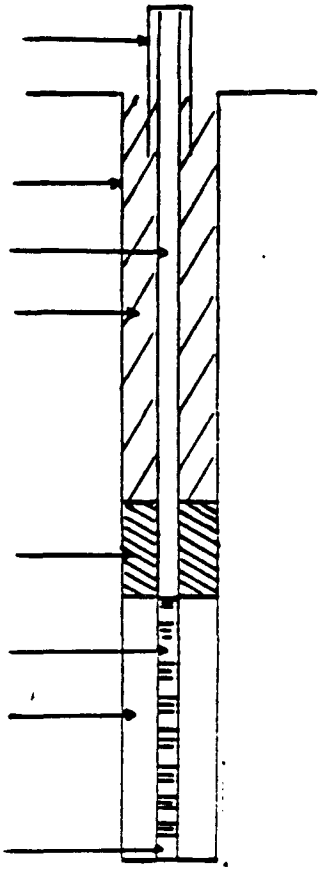
Rig - Hollow stem auger 8" diameter Split spoon core barrel 18"

Date 8/22/84 Stroud & Ledesma

Depth	Sample description
0 - 4½	Red soil dry
5	Gyp dry
6½	6.3 wht gyp - dry. 6½ gry shale - dry
8	Gry sdy shale w very lge anhy pcs - dry
9½	8.8 gry shale & gyp. 9.3 anhy gravel 9½ gry shale & anhy - dry
10	drill
11½	10.8 gry shale w anhy pcs. 11.3 anhy gravel. 11½ gry shale sli damp to dry
13	gry shale w gyp & anhy pcs - damp. Tr rd shale 11½-12.3
14½	14' gravel. 14½ gry shale w gravel streaks - water
16	14.7-15 gry shale & gravel. 15-16 drk gry shale water TD

DETAILS OF WELL CONSTRUCTION

Well # 45 Date 8/22/84 Navajo Refining Company



SAMPLE LOG

Well # 46 Navajo Refining Company - Monitor Wells

Drilling Contractor - D. Anderson, El Paso

Rig - Hollow stem auger 3" diameter Split spoon core barrel 18"

Date 8/22/84 Stroud & Ledesma

Depth	Sample description
0 - 6½	Dark red soil
8	Lite red soil & gyp dry
11	Gry clay w gyp damp
12½	gry clay, gyp, anhy pcs, tight - dry
14	Gry clay, gyp, anhy gravel water
15½	15.3 gry sdy shale 15½ Red shale
17	Fine red shale. TD

DETAILS OF WELL CONSTRUCTION

Well # 46 Date 8/22/84 Navajo Refining Company

Protective steel casing

Ground level

8" auger hole

2" PVC casing

cement grout

10'

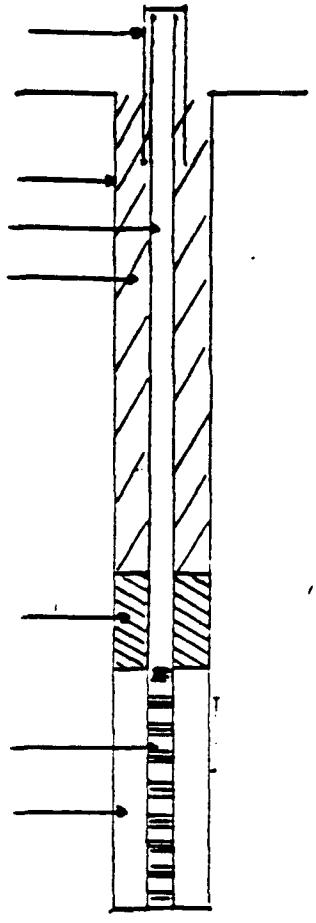
clay seal

12'

slotted screen

gravel pack

TD 17'



SAMPLE LOG

Well # 47 Navajo Refining Company - Monitor wells

Drilling Contractor - O. Anderson, El Paso

Rig - Hollow stem auger 8" diameter Split spoon core barrel 18"

Date 8/22/84 Stroud & Ledesma

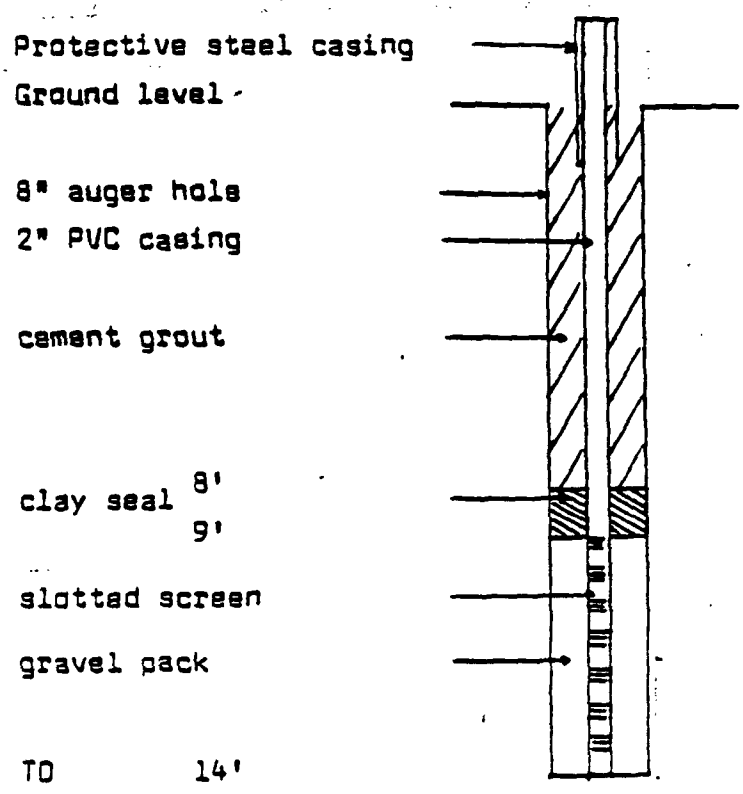
0 -	5	Dark red soil	damp
	10	Lite red soil	damp
	11½	Red shale	
	13	Orange-red shale	damp
	14	Orange-red shale	damp

TD

DRAFT

DETAILS OF WELL CONSTRUCTION

Well # 47 Date 8/22/84 Navajo Refining Company



Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			1–24

Geologic Description

0–10' CLAYEY SAND, brown, dry to moist near 9', stiff to friable, roots decreasing with depth, clay content increasing with depth, rock fragments noted at 9'.

10–11' SANDY CLAY, brown, moist, gravel fragments throughout.

11–12.5' CLAYEY SAND, tan, moist, plastic.

12.5–14' SILTY SAND, tan with orange mottling, moist to saturated at 14'.

14–18' SAND with gravel, sand is tan, saturated, fine grained, gravel is up to 1" dia. and well rounded, blue/grey color.

18–19' SILTY SAND, tan, saturated to very moist at 19'.

TD = 19.0'

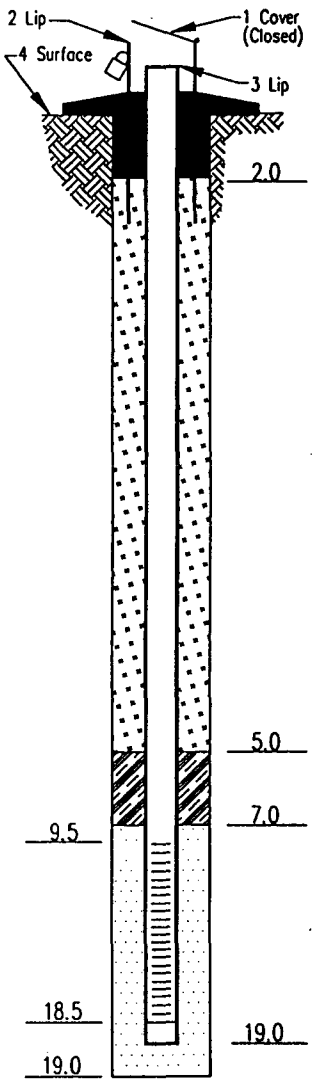
Sample Method Symbols

RB=Recovery Barrel ☒ 5' ☐ ____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well
Piezometer X

Protective Casing YES



Depths in Feet from Ground Surface (Not to Scale)

LOG-1

Design Specifications

Elevations: (feet MSL) 1 3341.64 2 3341.62 3 3341.49 4 3338.60

Coordinates: X 5810.74 Y 1613.93

Bore Hole Diameter: 8"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ ____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ ____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ ____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ ____

Sand Pack: C.S.S.I. 20/40

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ ____

Grout Type: Portland/Bentonite Weight: ____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ ____

Drilled By: Pool Environmental Lic. #: WD 1266

Logged By: PWC

Completion Date: 01/22/93

Depth First Encountered Water: 14.0' BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
2/10/93	12.19				

Comments: ____

KWBES

EC-NP1

Project: 622092005-110 (EC-P1)
Location: Artesia, New Mexico

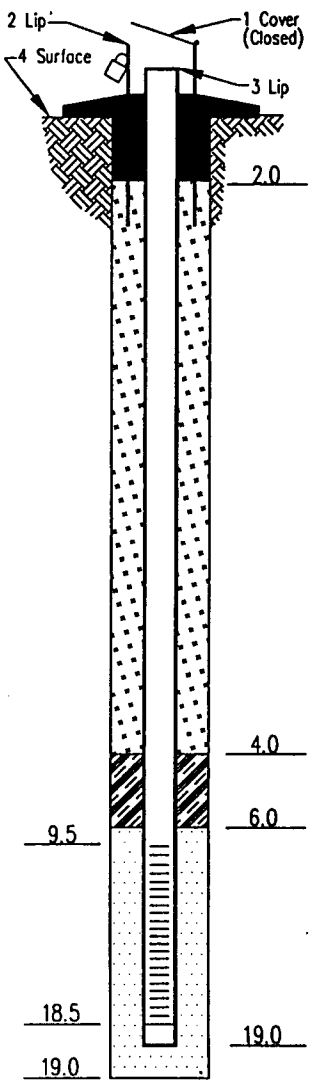
Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)	Geologic Description
			1	0–8.5' CLAYEY SAND, brown to tan, dry to moist, friable, roots decreasing with depth.
			2	
			3	
			4	8.5–9' CLAYEY GRAVELS, brown and tan, dry, clay very stiff.
			5	
			6	9–10' GRAVEL, tan to white, up to 1–1/2" dia., dry.
			7	
			8	10–12' CLAYEY GRAVELS, brown and white, saturated.
RB			9	
			10	12–13.5' SILTY SAND, brown, saturated, fine grained, some small gravel fragements.
			11	
			12	13.5–17' CLAYEY SAND, brown, saturated to 16' then moist, clay content increasing with depth.
			13	
			14	
			15	17–18' CLAYEY GRAVEL, brown and white, saturated.
			16	
			17	18–19' SILTY SAND, saturated, fine grained.
			18	
			19	TD = 19.0'
			20	
			21	
			22	
			23	
			24	

Sample Method Symbols

RB=Recovery Barrel ☒ 5' ☐ ____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well	
Piezometer	X
Protective Casing	YES



Depths in Feet from Ground Surface (Not to Scale)

LOG-1

Design Specifications

Elevations: (feet MSL) 1 3342.09 2 3342.07 3 3341.89 4 3339.10

Coordinates: X 5384.01 Y 2190.68

Bore Hole Diameter: 8"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ ____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ ____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ ____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ ____

Sand Pack: C.S.S.I. 20/40

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ ____

Grout Type: Portland/Bentonite Weight: ____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ ____

Drilled By: Pool Environmental Lic. #: WD 1266

Logged By: PWC

Completion Date: 01/21/93

Depth First Encountered Water: 10.0' BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
2/10/93	11.13				

Comments: ____

KWBES

EC-NP2

Project: 622092005-110 (EC-P2)
Location: Artesia, New Mexico

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			1
			2
			3
			4
			5
			6
			7
			8
			9
			10
			11
			12
			13
			14
			15
			16
			17
			18
			19
			20
			21
			22
			23
			24

Geologic Description

0-1.5' CLAYEY GRAVELS, brown clay, gray gravel, clay is dry, gravel is well rounded.

1.5-8' CLAYEY SAND, brown, moist, friable, clay content increasing with depth.

8-11.5' SILTY GRAVELS, tan silts and sand, gravel is well-rounded, saturated.

11.5-13' CLAYEY SAND, brown, very moist, friable.

13-16' CLAYEY GRAVELS, brown clay, gray gravel, saturated, gravel is well rounded.

16-19' SILTY SAND, tan, satruated, fine grained.

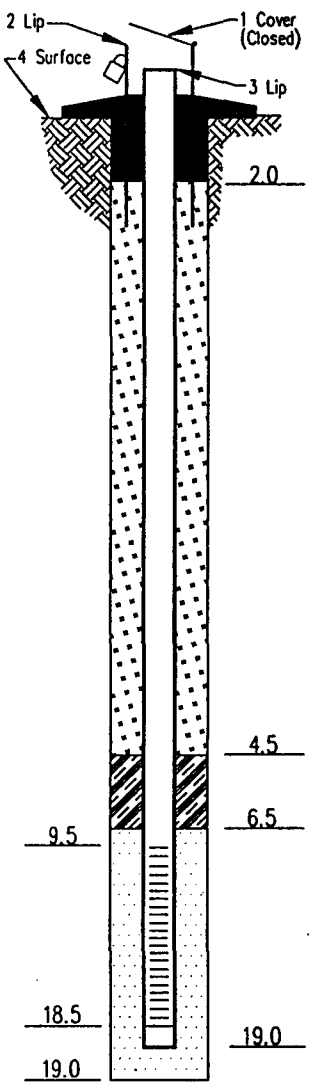
TD = 19.0'

Sample Method Symbols

RB=Recovery Barrel ☒ 5' ☐ ____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well	
Piezometer	X
Protective Casing	YES



Depths in Feet from Ground Surface (Not to Scale)

LOG-1

Design Specifications

Elevations: (feet MSL) 1 3342.24 2 3342.22 3 3342.05 4 3339.40

Coordinates: X 5790.02 Y 2612.22

Bore Hole Diameter: 8"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ ____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ ____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ ____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ ____

Sand Pack: C.S.S.I. 20/40

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ ____

Grout Type: Portland/Bentonite Weight: ____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ ____

Drilled By: Pool Environmental Lic. #: WD 1266

Logged By: PWC

Completion Date: 01/22/93

Depth First Encountered Water: 8.0' BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
2/10/93	13.32				

Comments: ____

KWBES

EC-NP3

Project: 622092005-110 (EC-P3)
Location: Artesia, New Mexico

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36

Geologic Description

0–11.5' SILTY GRAVELS, sand and silt are tan, dry, gravel is well rounded.

11.5–19' SANDY CLAY, reddish/brown, moist, plastic, clay content increasing with depth.

19–25' CLAY, brown, moist, plastic.

25–29' SANDY CLAY, brown, saturated.

29–34' SILTY SAND, brown, saturated, fine grained.

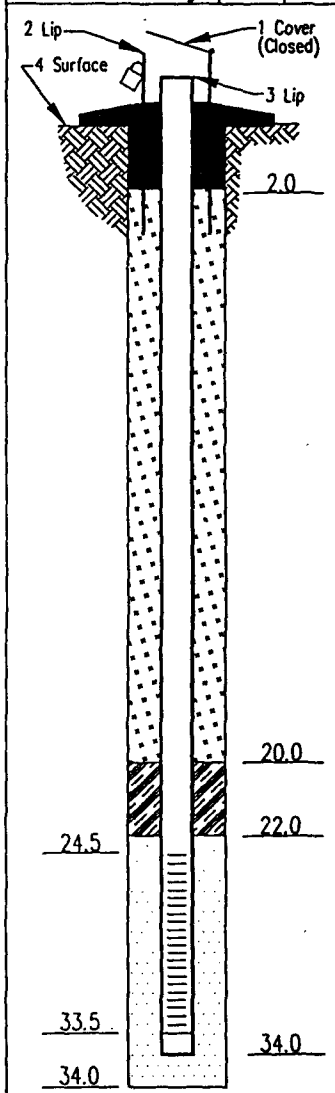
TD = 34.0'

Sample Method Symbols

RB=Recovery Barrel ☒ 5' ☐ ____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well	
Piezometer	X
Protective Casing	NO



Depths in Feet from Ground Surface (Not to Scale)

LOG-1

Design Specifications

Elevations: (feet MSL) 1 3345.01 2 3344.99 3 3344.84 4 3342.10

Coordinates: X 6120.29 Y 2960.65

Bore Hole Diameter: 8"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ ____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ ____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ ____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ ____

Sand Pack: C.S.S.I. 20/40

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ ____

Grout Type: Portland/Bentonite Weight: ____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ ____

Drilled By: Pool Environmental Lic. #: WD 1266

Logged By: PWC

Completion Date: 01/23/93

Depth First Encountered Water: 25.0' BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
2/10/93	18.58				

Comments: ____

KWBES

EC-NP4

Project: 622093001-115 (EC-P4)
Location: Artesia, New Mexico

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

Geologic Description

0-1.5'	Clayey silt, light brown, some white staining.
1.5-4'	Silty clay, light brown, slightly moist, dry, some white staining.
5-8'	Silty clay, light gray, increasing clay with depth.
8-10'	Clay, white (chalk) color with some black streaks, some silt, moist.
10'	Clay with gravel, moist fine gravel to 3/4".
10-11'	Clay, chalk color, very moist.
11-12.5'	Clay, chalk color, slightly moist, some fine gravel (≈5%).
12.5-15'	Clay, gray and brown mottling, shiny-grained inclusions (dissolve in water), no odor, very plastic.
15-17'	Silty clay, brown, some sand and fine gravel, very moist.
17-20'	Clay, gray and light brown, moist at 17.5'.
20-25'	Clay, gray, massive, some fine gravel at inclusions, moist from 22-22.5'.

Sample Method Symbols

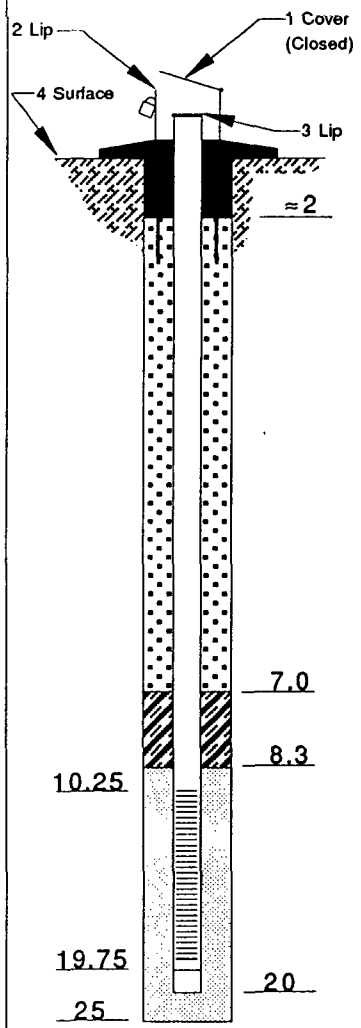
☒ RB=Recovery Barrel ☒ 5' ☐ _____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well ☐

Piezometer ☒

Protective Casing YES



Depths in Feet from Ground Surface (Not to Scale)

LOG - 1

Design Specifications

Elevations: (feet MSL) 1 3353.66 2 3351.50 3 3353.41 4 _____

Coordinates: X 2659.36 Y 3408.23

Bore Hole Diameter: 8 1/4"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40 silica sand

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ _____

Hydrated w/ 5 gallons water

Grout Type: 6% bentonite/Portland Weight: _____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled by: Precision Engineering Lic.#: _____

Logged by: DGB

Completion Date: 1/11/95

Depth First Encountered Water: 15 ft. BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
1/11/95	10.71				4500
2/5/95	10.95				

Comments: Pumped 60 gallons to clean.
Pumped 3.8 gpm, D-T-W from casing lip.

RE/SPEC

NP-5

Project: 318/3.3

Location: Artesia, New Mexico

Geologic Description

Depth (Feet)	Samp. Meth.	Description
0-1.6'		Clayey sand, brown, topsoil
1.6-5'		Silty clay, light gray, dry, friable, white (caliche?) streaks.
5-6.4'		Silty clay, brown, dry stiff, gray streaks.
6.4-7'		Silty clay, light gray, dry.
7-10'		Silty clay, moist, increasing silt at 10.
10-11.5'		Silty clay, alternating brown and gray, moist.
11.5-13'		Missing.
13-15'	RB	Clayey gravel (caliche) gray, crumbly, saturated.
15-17'		Clayey gravel, gray, cemented.
17-18'		Missing.
18-20'		Clayey silt to silty clay, light brown.

Sample Method Symbols

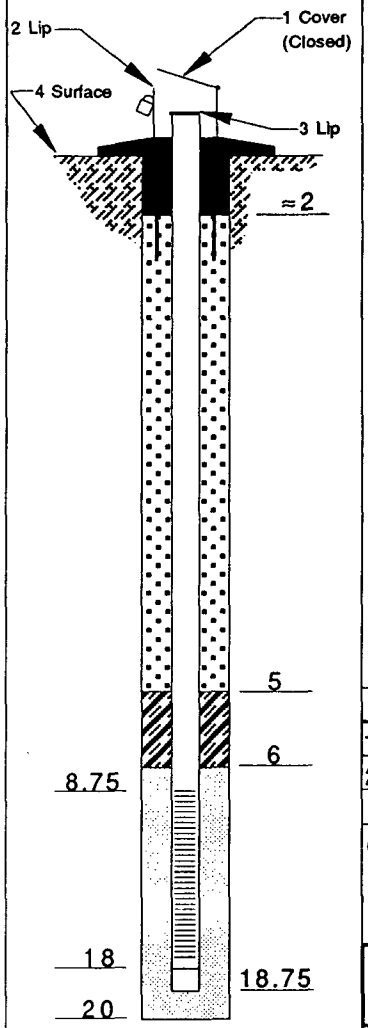
☒ RB=Recovery Barrel ☒ 5' ☐ _____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well ☐

Piezometer ☒

Protective Casing YES



Depths in Feet from Ground Surface (Not to Scale)

LOG - 1

Design Specifications

Elevations: (feet MSL) 1 3337.12 2 _____ 3 3336.96 4 3335.20

Coordinates: X 6860.05 Y 1571.60

Bore Hole Diameter: 8 1/4"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40 silica sand

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ _____

Hydrated w/ 5 gallons water

Grout Type: 6% bentonite/Portland Weight: _____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled by: Precision Engineering Lic.#: _____

Logged by: DGB

Completion Date: 1/10/95

Depth First Encountered Water: 13 ft. BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
1/10/95	9.88				
2/5/95	10.06				

Comments: Pumped 60 gallons to clean, slightly whitish. Pumped 1.7 gpm, D-T-W from casing lip.

RE/SPEC

NP-6

Project: 318/3.3

Location: Artesia, New Mexico

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)
RB			2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Geologic Description

0-2'	Silt, dark brown with black mottling, some fine gravel.
2-6.8'	Clayey silt, light brown, calcite streaks, increasing calcite and fine gravels 5-6'.
6.8-7.8'	Clay, reddish brown, calcite stiff.
7.8-10.5'	Silty gravel, varying sized to 2" diameter, dry.
10.5-12'	Clayey silt, dark brown, some calcite.
12-20'	Silty clay, mottled gray and light brown, clay increasing with depth, calcite inclusions, light gray, stiff 14-15', caliche zones 1-2" thick at 15', 16.5', 17.5', dry to 20'.
20-20.5'	Silt, light brown, some clay.
20.5-25.5'	Clay, dark brown with mottling, some white caliche inclusions, numerous small gravel to 3/8", 24.5-25'.
25.5-26'	Caliche gravel and clay, saturated.
26-27.5'	Clay, stiff with occasional caliche gravel, gravel and saturated from 27.3-27.5'.
27.5-30'	Clay, lightbrown to gray, slightly moist, with caliche gravel and pebbles.

Sample Method Symbols

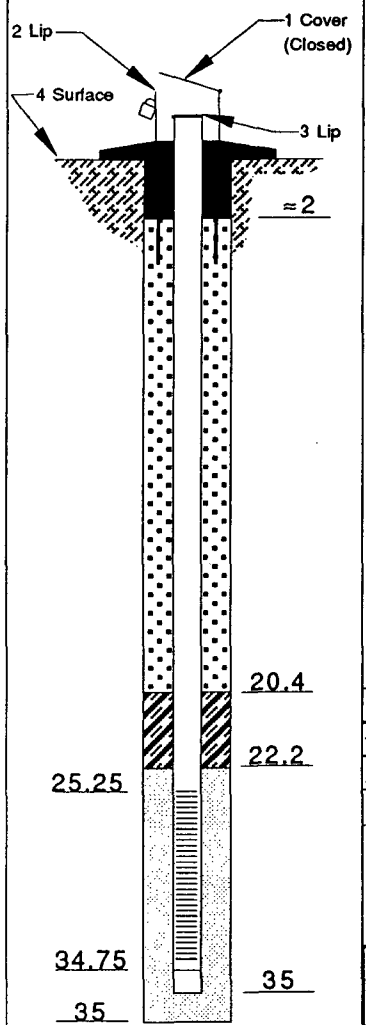
☒ RB=Recovery Barrel ☒ 5' ☐ _____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well ☒

Piezometer

Protective Casing YES



Depths in Feet from Ground Surface (Not to Scale)

LOG - 1

Design Specifications

Elevations: (feet MSL) 1 3329.27 2 _____ 3 3328.86 4 3326.3

Coordinates: X 10097.01 Y 3452.81

Bore Hole Diameter: 8 1/4"

Type of Casing: ☒ PVC Sched. 40 Flush Thread ☐ Stainless Steel ☐ _____

Casing Diameter: ☒ 2" ☐ 4" ☐ 6" ☐ _____

Screen Slot: ☐ 0.008 ☒ 0.010 ☐ _____

Screen Style: ☒ Machine Slot ☐ Wire Wrap ☐ _____

Sand Pack: CSSI 16-40 silica sand

Bentonite Seal: ☐ 1/4" Pellets ☒ 1/2" Pellets ☐ 1/2" Chips ☐ Hole Plug ☐ _____

Hydrated with 5 gallons of water.

Grout Type: 6% bentonite/Portland Weight: _____

Drill Rig: ☒ Hollow Stem ☐ Rotary ☐ _____

Drilled by: Precision Engineering Lic.#: _____

Logged by: DGB

Completion Date: 1/11/95

Depth First Encountered Water: 25.5 ft. BLS

Date	D-T-W	D-T-P	Prod Thick	Field pH	Field EC
1/12/95	25.21			7	3700
2/5/95	24.61				

Comments: Purged 65 gallons to clean and develop, pumped a 2-9 gpm1/12. D-T-W from casing lip.

RE/SPEC

NP-7

>Page 1of 2<

Project: 318/3

Location: Artesia, New Mexico

Samp. Meth.	Samp. Log	PID (ppm)	Depth (Feet)	Geologic Description
RB			22	30-31.4' Clay and silty clay, light brown to gray, with caliche gravel and pebbles.
			24	31.4-32.7' Sandy clay with increasing sand to total depth, sand fine to medium, light brown.
			26	32.7-35' No recovery.
			28	
			30	
			32	
			34	
			36	
			38	
			40	

Sample Method Symbols

RB=Recovery Barrel ☒ 5' ☐ _____

ST=Shelby Tube | SS=Split Spoon | C=Cutting

Monitoring Well	☒
Piezometer	
Protective Casing	YES

Refer to NP-7

Page 1

Design Specifications

Refer to NP-7

Page 1

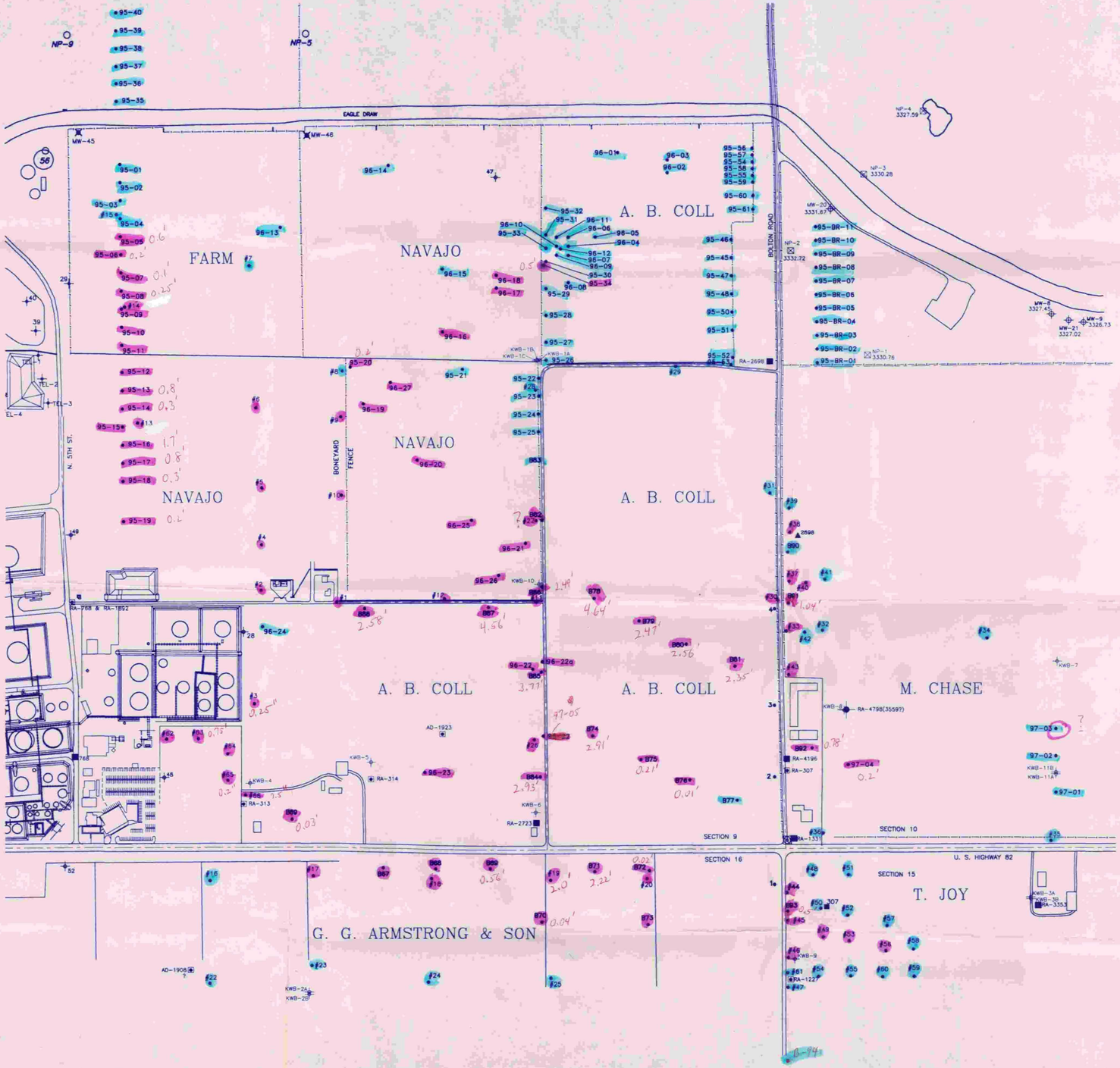
RE/SPEC

NP-7
(CONTINUED)
>Page 2 of 2<

Project: 318/3
Location: Artesia, New Mexico

Site Map

Site Map



LEGEND

- • BORING LOCATION
  - #18 – 1991 DRILLING
  - B75 – 1992 DRILLING
  - 95-50 – 1995 DRILLING
  - 96-20 – 1996 DRILLING
  - 97-04 – 1997 DRILLING
- ✦ MONITOR WELL
- ⊠ PIEZOMETER LOCATION
- ■ WATER WELL – SHALLOW VALLEY FILL AQUIFER
- ⊡ WATER WELL – DEEP, ARTESIAN AQUIFER
- ✦ OIL/GAS EXPLORATION WELL CONVERTED TO WATER WELL
- ⊙ SECTION CORNER
- RA-397 STATE ENGINEER OFFICE WELL NUMBER, ROSWELL ARTESIAN BASIN
- AD-1917 AGE OF WELL, RECORD ON FILE SEO, NO "RA" NUMBER ASSIGNED

N W E S

150' 0 300' 600' 1200'
225' 75'
SCALE

NOTES

REFERENCE DRAWINGS

NO.	REVISIONS	BY	CHK.	DATE	APPR.	APPR.

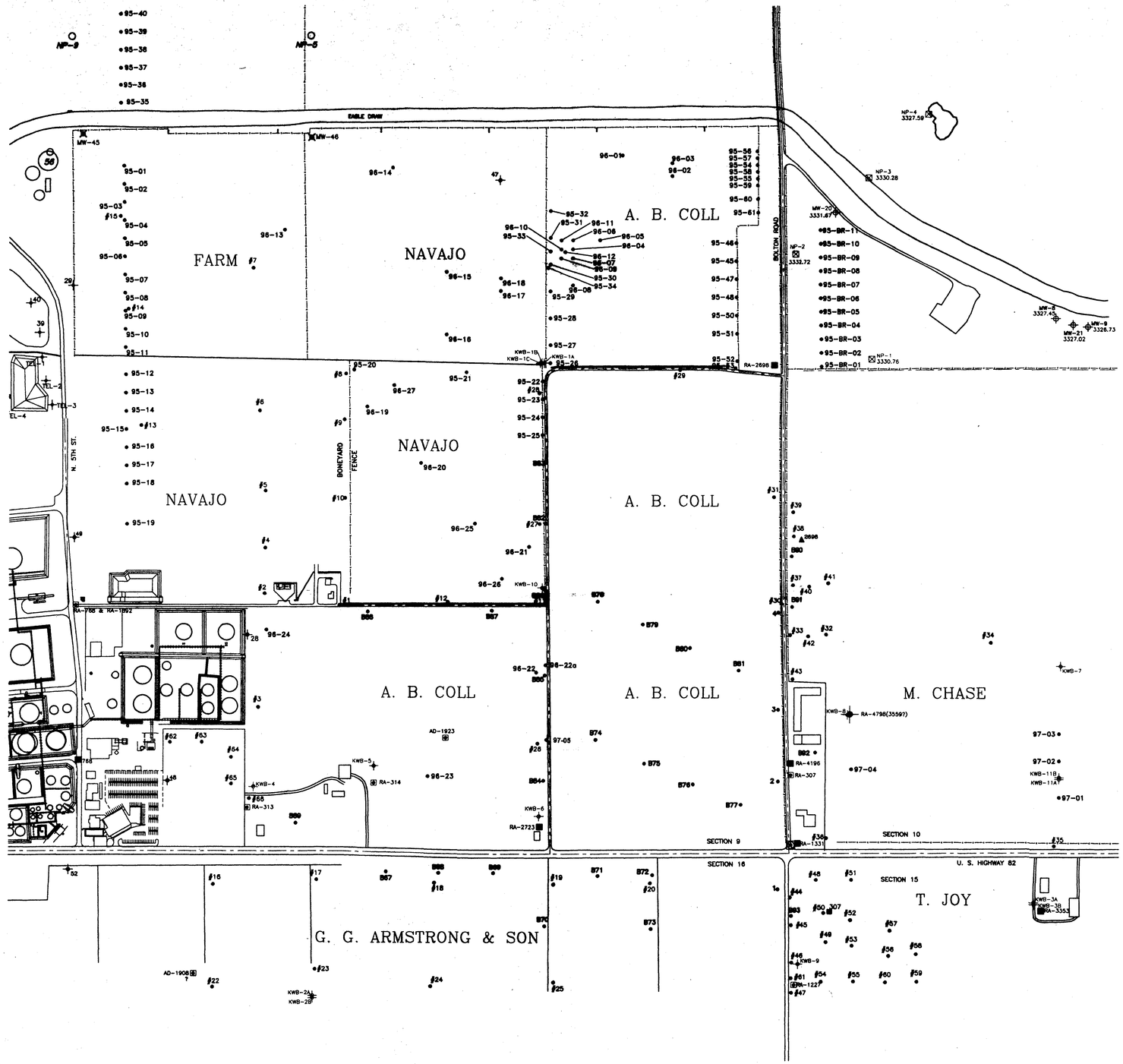
NO.	REVISIONS	BY	CHK.	DATE	APPR.	APPR.

DRAWING TITLE

WELL & BORING LOCATIONS EAST OF NAVAJO REFINING

NAVAJO REFINING CO.
P.O. DRAWER 159
ARTESIA, NEW MEXICO

DRAWN BY	CHK'D BY	SCALE
EJS	DB	1" = 300'-0"
DATE	APPR BY	DRAWING NUMBER / REV.
9-29-97	–	NAVREF01.DWG / 0



LEGEND

- • BORING LOCATION
  - #18 – 1991 DRILLING
  - B75 – 1992 DRILLING
  - 95-50 – 1995 DRILLING
  - 96-20 – 1996 DRILLING
  - 97-04 – 1997 DRILLING
- ✦ MONITOR WELL
- ⊠ PIEZOMETER LOCATION
- ■ WATER WELL – SHALLOW VALLEY FILL AQUIFER
- ⊞ WATER WELL – DEEP, ARTESIAN AQUIFER
- ✦ OIL/GAS EXPLORATION WELL CONVERTED TO WATER WELL
- ⊠ SECTION CORNER
- RA-397 STATE ENGINEER OFFICE WELL NUMBER, ROSWELL ARTESIAN BASIN
- AD-1917 AGE OF WELL, RECORD ON FILE SEO, NO "RA" NUMBER ASSIGNED

RECEIVED
OCT 06 1997
Environmental Bureau
Oil Conservation Division

150' 0 300' 600' 1200'
225' 75'
SCALE

NOTES

REFERENCE DRAWINGS

NO.	REVISIONS	BY	CHK.	DATE	APPR.	APPR.

NO.	REVISIONS	BY	CHK.	DATE	APPR.	APPR.

DRAWING TITLE

WELL & BORING LOCATIONS EAST OF NAVAJO REFINING

NAVAJO REFINING CO.
P.O. DRAWER 159
ARTESIA, NEW MEXICO

DRAWN BY	CHK'D BY	SCALE
EJS	DB	1" = 300'-0"
DATE	APPR BY	DRAWING NUMBER / REV.
9-29-97	—	NAVREF01.DWG / 0