PROPOSED GROUNDWATER MONITORING SYSTEM
SUNRAY SERVICES SANITARY LANDFILL
TONTITOWN, ARKANSAS

29939 29940

Permit 123-SR-2 and 162-SR-2

Prepared for:

Sunray Services, Inc.
P.O. Box 1310
Springdale, Arkansas 72765-1310

Prepared by:

SCS Engineers
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Kansas City, Missouri 64131
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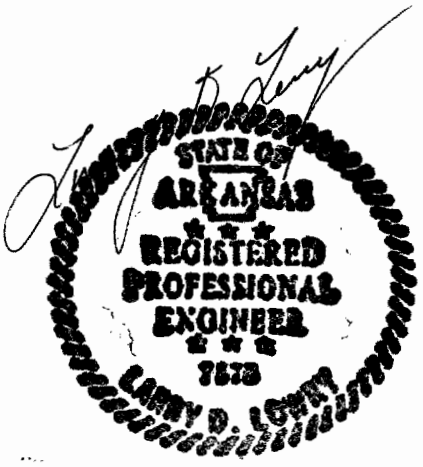

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INTRODUCTION

SCS Engineers (SCS) is currently conducting a hydrogeologic investigation of Sunray Services, Inc., Tontitown Landfill Complex, as requested by the Arkansas Department of Pollution Control and Ecology (ADPC&E), as outlined in the Permit Modifications 123-SR-2 and 162-SR-2, dated September 20, 1991.

The initial phase of the work has been completed. The initial phase of the project involved the installation of two groundwater monitoring wells and hydrogeologic characterization of the bedrock aquifer. A downhole camera was utilized to characterize the bedrock aquifer and well construction. The downhole camera work indicated that four of the existing monitoring wells were either damaged or improperly constructed.

This report will present the findings of the initial work and make recommendations for a revised groundwater monitoring well network.

BEDROCK AQUIFER CHARACTERIZATION

Monitoring Well Installation

Two groundwater monitoring wells were installed as part of the bedrock aquifer characterization. The two additional wells were labeled MW-10 and MW-11. Monitoring well MW-10 is located near the southern border of the site, and monitoring well MW-11 is located near the northern border of the site. Boring Logs are presented in Appendix A.

The soil borings were advanced at each well location using mud rotary drilling methods. The borings were logged by observing cuttings during drilling. The soil borings were advanced to bedrock.

Upon completion of the soil borings, Nx size casing was set and the limestone was cored using a Nx double-tube core barrel. The borings were logged by SCS personnel in the field with written documentation. All cores were preserved in cardboard boxes.

Each borehole was then reamed to 8 inches in diameter from ground surface to the total depth of the well using air rotary drilling methods.

The monitoring wells were constructed of 4-inch diameter, 0.010-inch factory slotted, schedule 40 PVC well screen. The well screen extended from the bottom of the boring to approximately 4 feet below the soil bedrock interface. Schedule 40 PVC riser pipe was connected to the screen and extended from 2 to 2.5 feet above the ground surface.

A clean sand filter pack was tremied into the annular space around the screen to a point 1 to 2 feet above the top of the screen, and a 3 to 5-foot thick bentonite pellet seal was placed above the filter sand. The bentonite seal extended across the soil rock interface. The remaining annular space was filled with a portland cement-bentonite mix tremied into position.

Upon completion, each well was developed using a submersible pump until clean formation water was observed.

An oversized steel casing with locking cap was placed over the PVC well casing and sealed in concrete. A 4-foot square concrete protective pad was constructed around the protective casing and sloped away from the casing. A well construction diagram is presented in Figure 1. Well construction logs are presented in Appendix B.

Rock Coring and Packer Testing

The rock cores indicate that the bedrock is composed of a gray cherty limestone with chert interbeds. Numerous horizontal fractures were also observed. The fractures ranged in thickness from 1 to 10 millimeters. The fracture density for bedrock core collected from well MW-11 was 1.8 fractures per foot. The fracture density for bedrock core collected from MW-10 was 1.3 fractures per foot.

Packer test data from packer tests conducted in the bedrock at monitoring wells MW-10 and MW-11 indicated a range of hydraulic conductivities from 1.50×10^{-5} to 3.04×10^{-4} cm/sec. Packer test data is presented in Appendix C.

Downhole Camera Survey

A downhole camera was lowered into existing monitoring wells to determine the extent and size of fractures in the bedrock aquifer. Bedrock was observed in monitoring wells MW-1, MW-2, MW-4, and MW-8. The camera survey indicated horizontal fractures similar to those observed in the rock cores.

Groundwater Flow Conditions

Groundwater level measurements were taken at each monitoring well and a potentiometric surface map prepared. This map indicates that groundwater is flowing to the south-southeast. In addition, the potentiometric surface contours generally reflect the bedrock surface contours. It appears that the groundwater is flowing in the highly fractured cherty limestone. A potentiometric surface map is shown on Sheet 1 of 2.

MONITORING WELL ASSESSMENT

The downhole camera survey indicated that four existing monitoring wells (MW-3, MW-4, MW-7, and MW-9) were improperly constructed. The survey indicted that the well casing in well MW-3 was broken near the soil rock interface and that the grout seal at the soil rock interface was damaged. A leaking seam was observed at approximately 14 feet below land surface in well MW-4. A hole was observed in the well casing at approximately 80 feet below land surface in

well MW-7. The well casing was cracked in well MW-9 from approximately 61 to 65 feet below land surface.

It is the opinion of SCS that the integrity of these wells has been compromised as a result of the improper well construction.

GROUNDWATER MONITORING PLAN

The proposed groundwater monitoring plan consists of three monitoring wells on Site 3 and four monitoring wells on Site 4. Monitoring wells for Site 3 include existing wells MW-1 and MW-10 and one well (MW-12) located between MW-3 and MW-4. Monitoring wells MW-3 and MW-4 will be abandoned.

Monitoring wells for Site 4 include wells MW-11, MW-5, MW-8, and one well located between MW-6 and MW-7. Monitoring wells MW-7 and MW-9 will be abandoned. Proposed monitoring well locations are shown on Sheet 2 of 2.

Monitoring wells MW-1, MW-5, and MW-11 will be utilized as upgradient wells. Monitoring wells MW-8, MW-10, MW-12, and MW-13 will be utilized as downgradient wells.

* No justifacation for moveing wells. The present system was Located base upon:
  A) photo lineament analysis
  B) Resistivity soundings
* What about MW-2 and MW-6?
* MW-11 is accuny together from MW-5.

APPENDIX A

BORING LOGS

Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/27/92
Drilled by: Layne Western

Surface Elevation: 1190.58 ft, MSL
Coordinates: E1149.9993; N2198.0005
Total corehole depth: 85.5 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-10

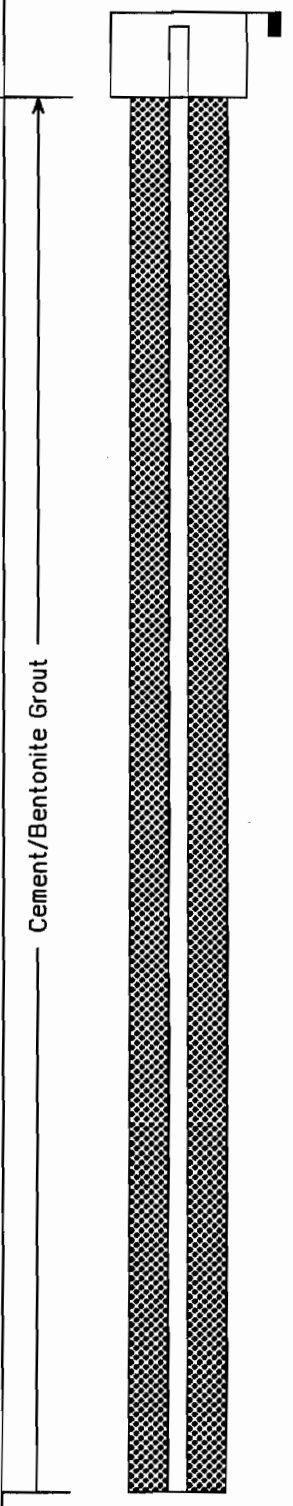
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
							Brown Clayey SILT
							Intermixed Orange/red, highly plastic CLAY and white, Cherty LIMESTONE

1
2
3
4
5

Monitoring Well: MW-10



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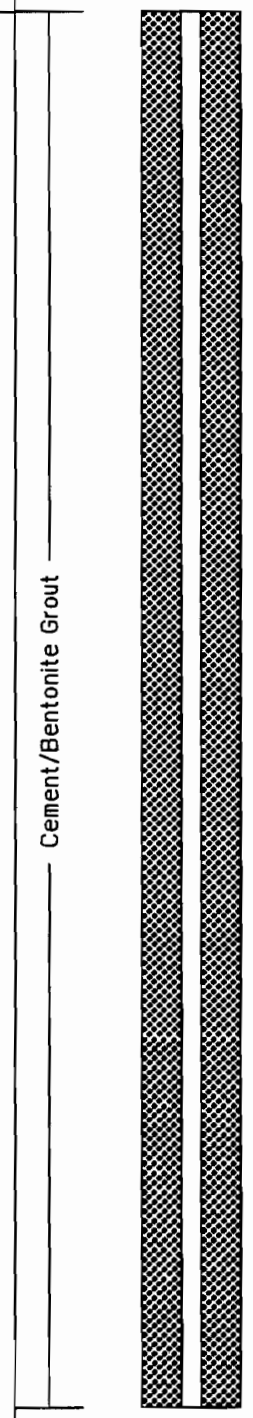
6							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
7							
8							
9		SS	12"				
10							

Monitoring Well: MW-10



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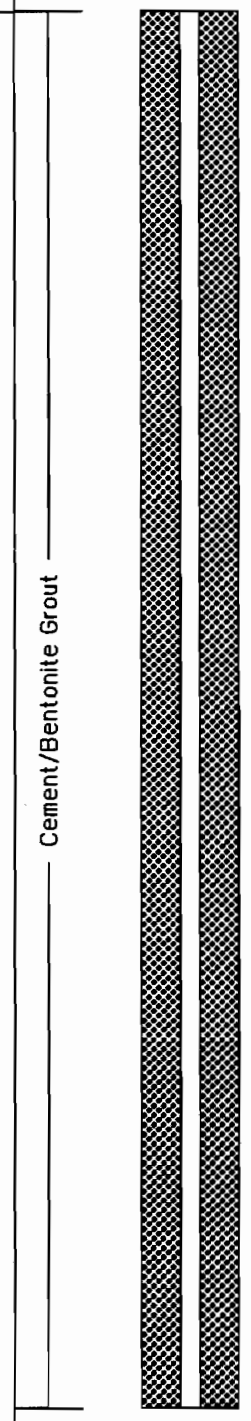
11							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
12							
13							
14		SS	4"				
15							

Monitoring Well: MW-10



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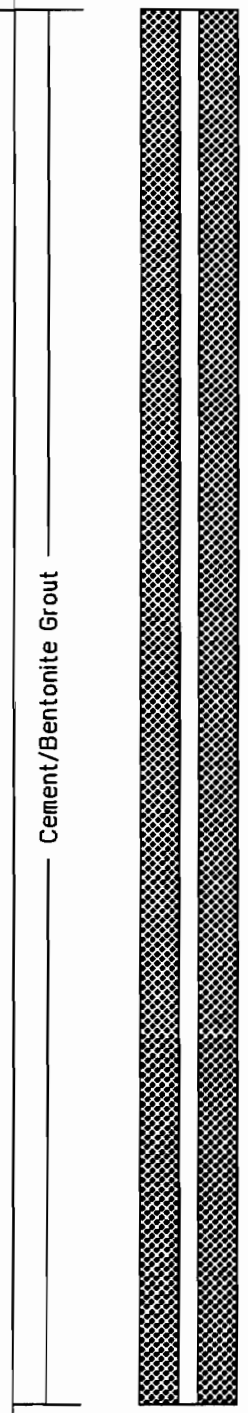
16							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
17							
18							
19		SS	6"				
20							

Monitoring Well: MW-10



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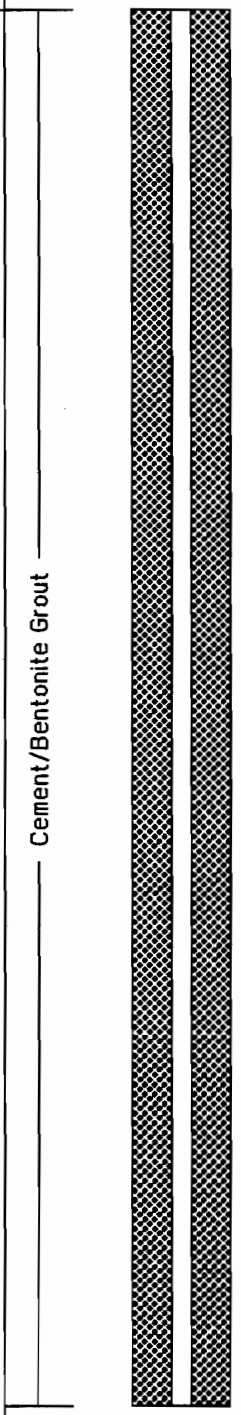
21							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
22							
23			3"				
24		SS					
25							

Monitoring Well: MW-10



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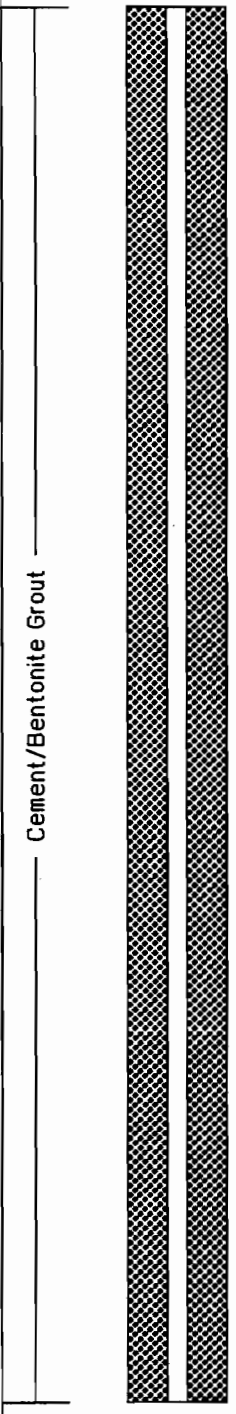
26							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
27							
28			6"				
29		SS					
30							

Monitoring Well: MW-10



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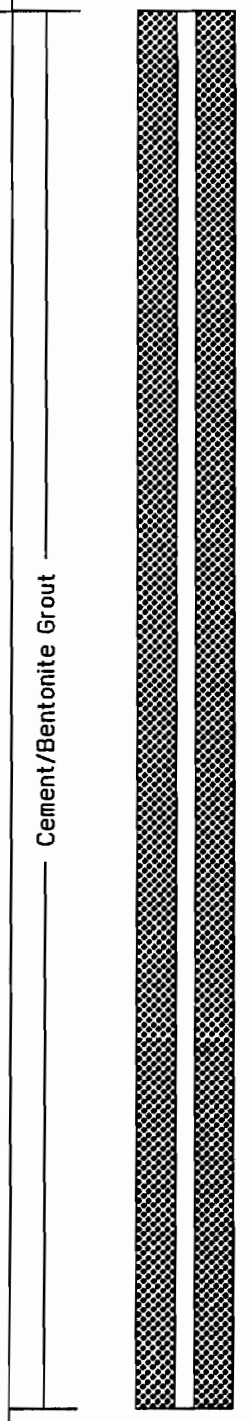
31							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
32							
33							
34		SS	6"				
35							

Monitoring Well: MW-10



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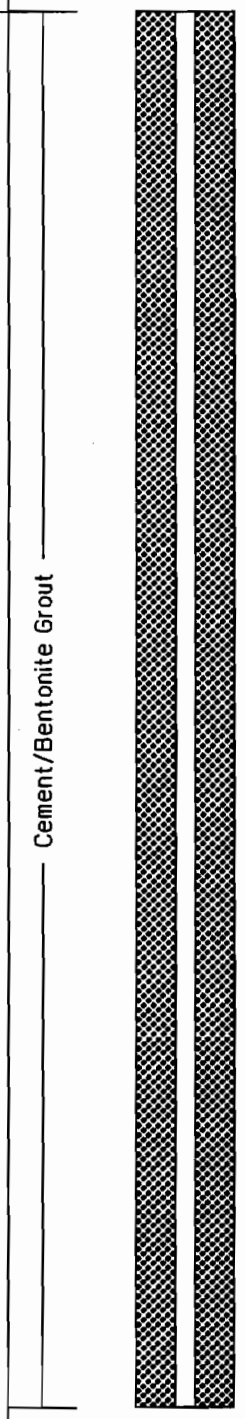
36							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
37							
38	1/28/92 ▽		4"				
39		SS					
40							

Monitoring Well: MW-10



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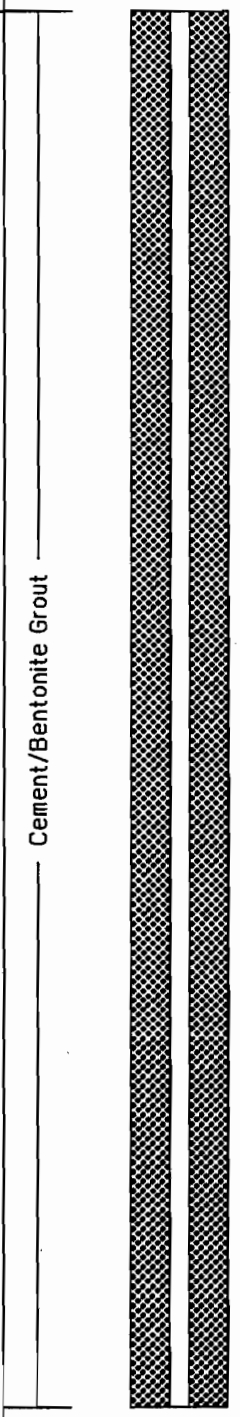
41							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
42							
43							
44							
45							

Monitoring Well: MW-10



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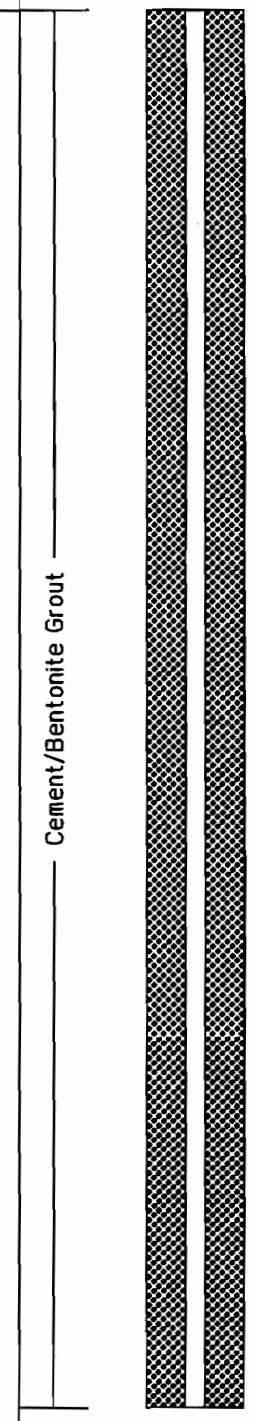
DEPTH (ft.)	ELEVATION (ft. MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
46							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
47							
48							
49		SS					
50							

Monitoring Well: MW-10



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DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
51		Run 1	104	40			Intermixed white, weathered Cherty LIMESTONE with dark gray LIMESTONE Begin core run #1 at 51' Broken from 51.7 to 52.1
52							LIMESTONE: White/light gray, competent
53		Run 2	99	48			Begin core run #2 at 53' LIMESTONE: White marbled with dark gray, Cherty weathered horizontal fracture at 53.2 weathered horizontal fracture at 53.3 weathered horizontal fracture at 53.5 weathered horizontal fracture at 53.7
54							weathered horizontal fracture at 54 LIMESTONE: Dark gray, fine-grained, competent
55							CHERT: White marbled with gray, Limey, weathered horizontal fracture between beds

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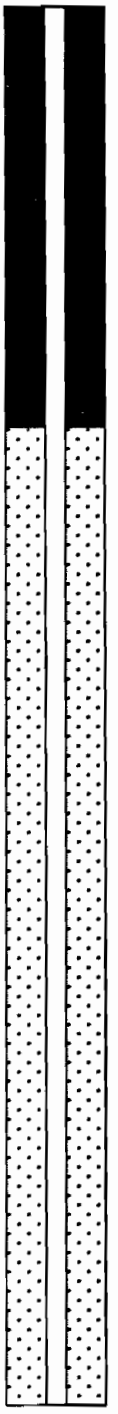
DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
56							brown styolite at 55.3 weathered horizontal fracture at 55.4 weathered horizontal fracture at 55.6 weathered horizontal fracture at 55.8
							LIMESTONE: Dark gray, coarse-grained. Black styolite at contact CHERT: White marbled with gray, Limey. Weathered fracture between beds
57		Run 2					LIMESTONE: Dark gray, coarse-grained
58							LIMESTONE: Dark gray, coarse-grained, intermixed with CHERT: Gray; Separated by a cemented vertical fracture filled with pyrite. Weathered horizontal fracture above. CHERT: Light gray marbled with dark gray, Limey
59							LIMESTONE: Dark gray, coarse-grained CHERT: Light gray marbled with dark gray
							LIMESTONE: Dark gray, coarse-grained. Black styolite at contact
60							CHERT: Light gray marbled with dark gray, Limey Begin core run #3 at 60'

Monitoring Well: MW-10



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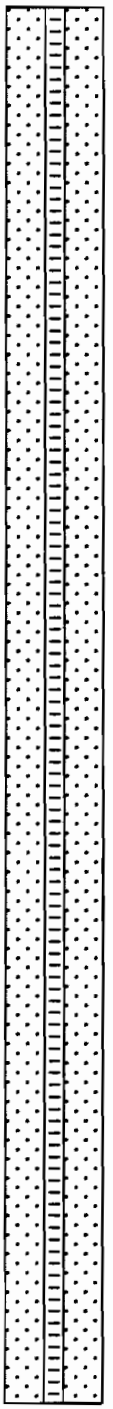
			95	88			LIMESTONE: medium gray marbled with light and dark gray, competent Cherty.
							Horizontal fracture at 60.4
							Horizontal fracture at 60.6
							Horizontal fracture at 60.8
61							Horizontal fracture at 61.1
							LIMESTONE: Dark gray, coarse-grained
							Cemented 60 degree fracture, black styolite
							CHERT: Light gray marbled with dark gray, Limey
62							LIMESTONE: Dark gray, coarse-grained
							CHERT: Light gray marbled with dark gray, Limey
		Run 3					
							LIMESTONE: Medium gray, coarse-grained. Black styolite at contact.
63							
							CHERT: Light gray, Limey; with slight weathered horizontal fracture at contact.
		Run 4					LIMESTONE: Medium gray, coarse-grained
							Cemented 70 degree fracture from 63.4 to 63.6
64							LIMESTONE: Light gray marbled with dark gray, Cherty
							Cemented horizontal fracture
							LIMESTONE: Medium gray, fine-grained, competent
							Begin core run #4 at 65'
65							

Monitoring Well: MW-10



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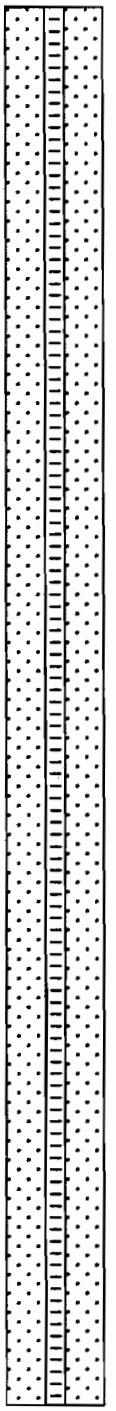
			100	95			LIMESTONE: Medium gray marbled with light and dark gray, Cherty
66							LIMESTONE: Dark gray, coarse-grained, competent. Black styolite at contact
							LIMESTONE: Medium gray, competent; horizontal fracture at contact
		Run 4					LIMESTONE: Medium gray, slightly Cherty intermixed with dark gray coarse-grained LIMESTONE; Slightly weathered horizontal fracture at contact.
67							CHERT: Medium gray, marbled with light and dark gray, Limey; cemented vertical fractures throughout
							Black styolite at 67.4
							Thin lense of light blue LIMESTONE with black styolites above and below
68							LIMESTONE: Dark gray, coarse-grained; 30 degree fracture
							CHERT: Medium gray, marbled with light and dark gray, Limey; Sealed vertical fractures throughout
			103	96			Begin core run #5 at 68.6'
69							LIMESTONE: Medium gray marbled with light and dark gray, Cherty with black veins throughout
							Weathered horizontal fracture at 69.0
		Run 5					Black styolite at 69.1
							70 degree cemented fracture from 69.2 to 69.4
							Weathered horizontal fracture at 69.6
70							Slightly weathered horizontal fracture at 69.9

Monitoring Well: MW-10



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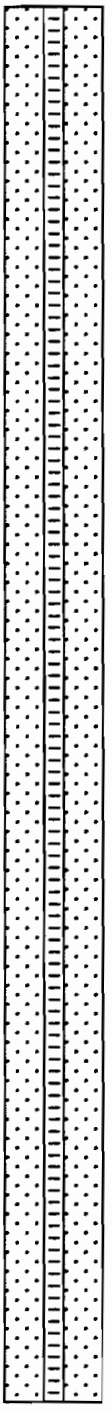
							Slightly weathered horizontal fracture at 70
71							LIMESTONE: Thin layer of dark gray, coarse-grained; weathered horizontal fracture at contact
							CHERT: Light gray marbled with dark gray Limey; black styolite at contact
72							Black styolite at 72.0
							LIMESTONE: Medium gray marbled with dark gray, Cherty
		Run 5					LIMESTONE: Thin seam of dark gray, coarse-grained
							Weathered horizontal fracture at 72.5
73							Highly weathered horizontal fracture at 73.3
							LIMESTONE: Dark gray, coarse-grained intermixed with light gray CHERT; weathered 20 degree fracture at contact.
74							Black styolite at 74.0
							LIMESTONE: Medium gray marbled with dark gray, Cherty
							Weathered horizontal fracture at 74.7
75							

Monitoring Well: MW-10



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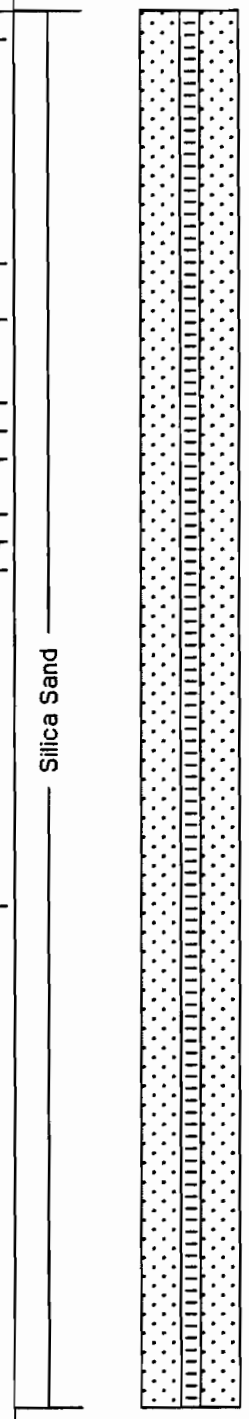
BORING LOG MW-10

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
76		Run 5					LIMESTONE: Thin seam of dark gray, coarse-grained CHERT: Medium gray, marbled with dark gray, Limey Black styolite at 75.5 LIMESTONE: Dark gray, coarse-grained; black styolite at contact CHERT: Light gray marbled with dark gray, Limey; black styolite at contact Horizontal fracture at 76.2 LIMESTONE: Dark gray, coarse-grained CHERT: Light gray, Limey; black styolite at contact. LIMESTONE: Dark gray, coarse-grained CHERT: Light gray, Limey; 40 degree fracture at contact LIMESTONE: Dark gray, coarse-grained LIMESTONE: Medium gray marbled with dark gray, Cherty Black styolite at 77.5
77							
78							End of coring at 78', borehole advanced from 78' to 85.5' using air rotary method. Intermixed light and dark gray Chert, Limey Chert and Limestone
79							
80							

Monitoring Well: MW-10



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/27/92
Drilled by: Layne Western

Surface Elevation: 1190.58 ft, MSL
Coordinates: E1149.9993; N2198.0005
Total corehole depth: 85.5 ft.
Logged by: Joe Hoffmeister

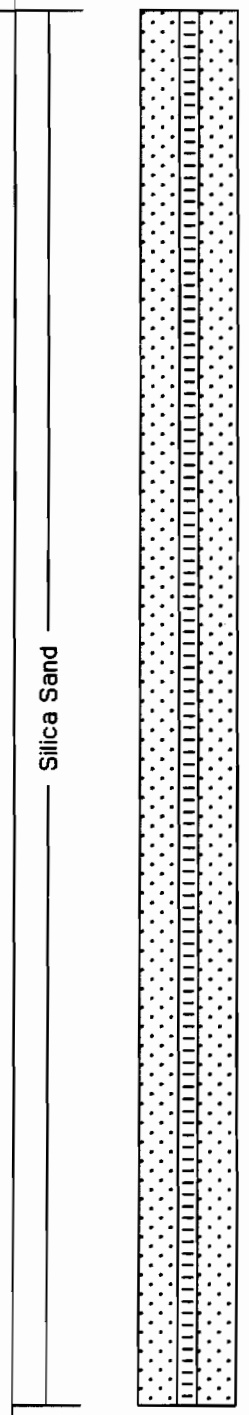
BORING LOG MW-10

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/ROD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
81							As Above: Intermixed light and dark gray Chert, Limey Chert and Limestone.
82							
83							
84							
85							

Monitoring Well: MW-10



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/27/92
Drilled by: Layne Western

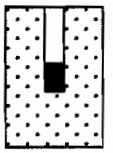
Surface Elevation: 1190.58 ft, MSL
Coordinates: E1149.9993; N2198.0005
Total corehole depth: 85.5 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-10

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION	Monitoring Well: MW-10
							AS Above: Intermixed light and dark gray CHert, Limey Chert and Limestone.	Silica Sand
							Bottom of boring at 85.5'	



86
87
88
89
90

Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11

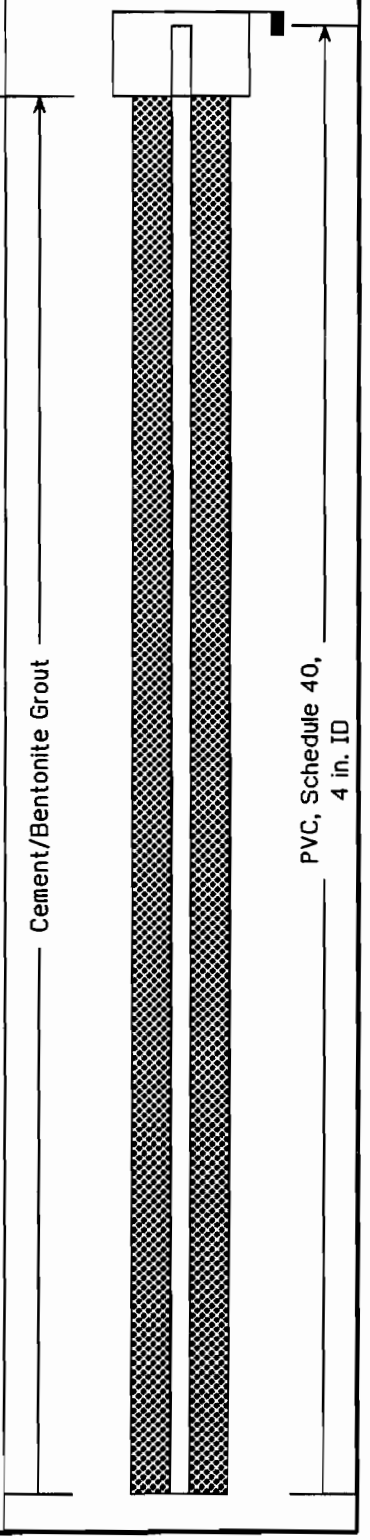
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
							Brown Clayey SILT
							Intermixed Orange/red, highly plastic CLAY and white, Cherty LIMESTONE

1
2
3
4
5

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

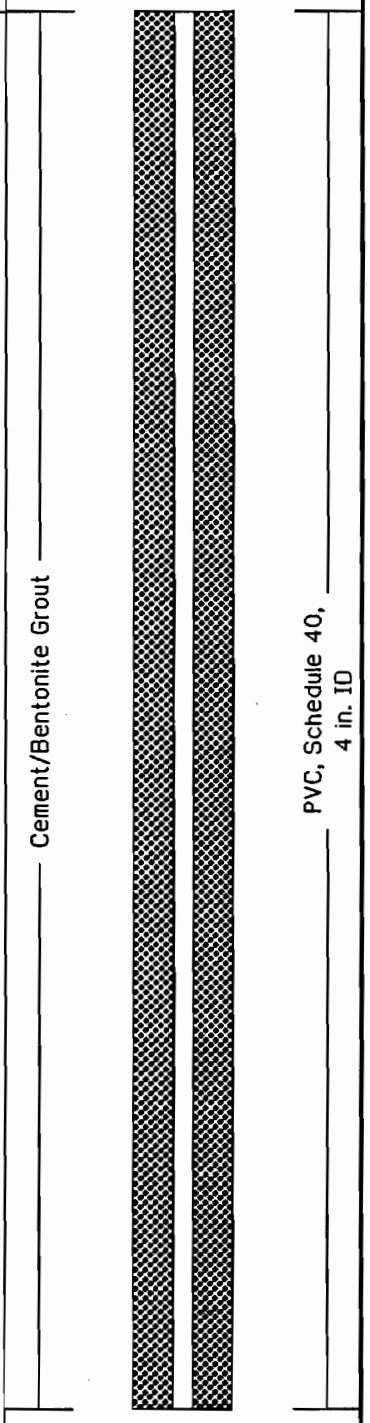
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
6							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
7							
8							
9							
10							

Monitoring Well: MW-11



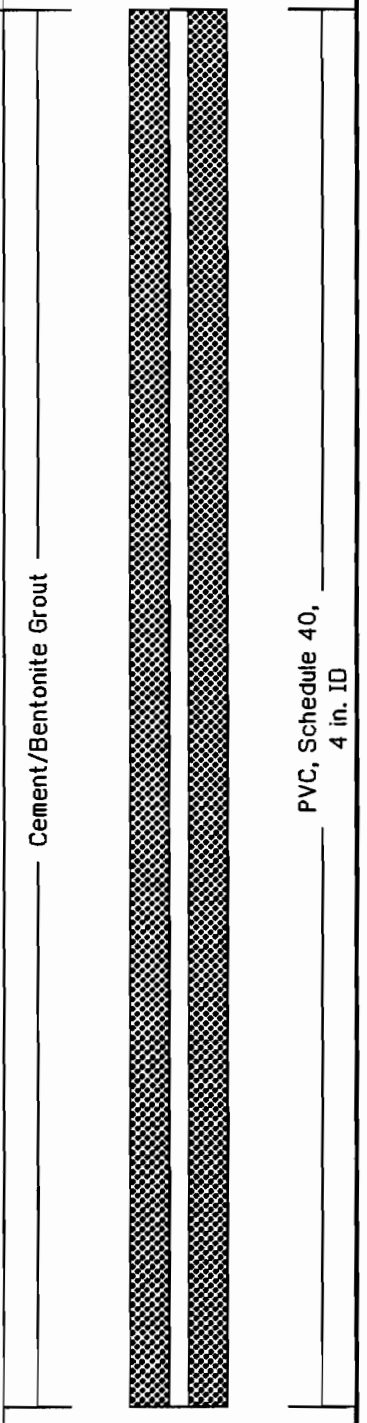
Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
11							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
12							
13							
14							
15							



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

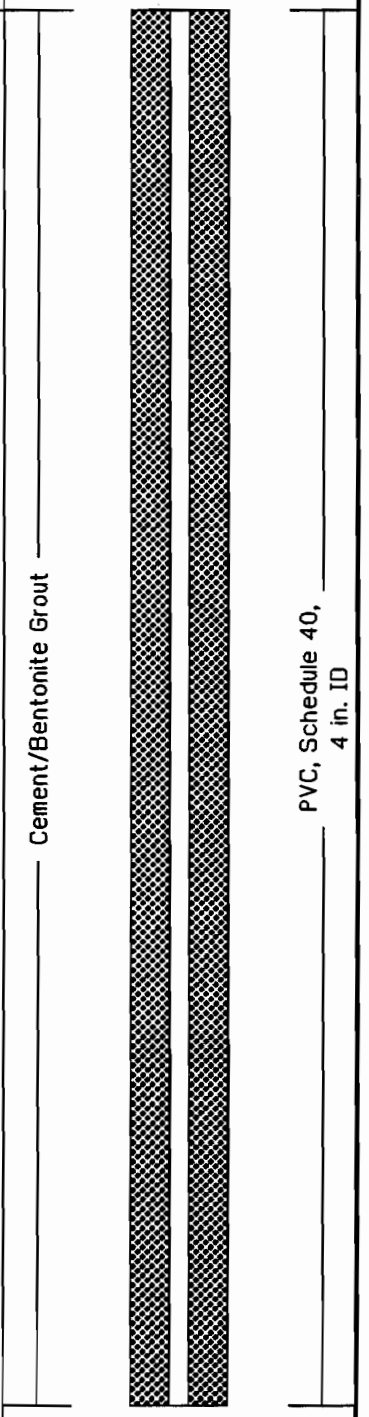
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
16							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
17							
18							
19							
20							

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

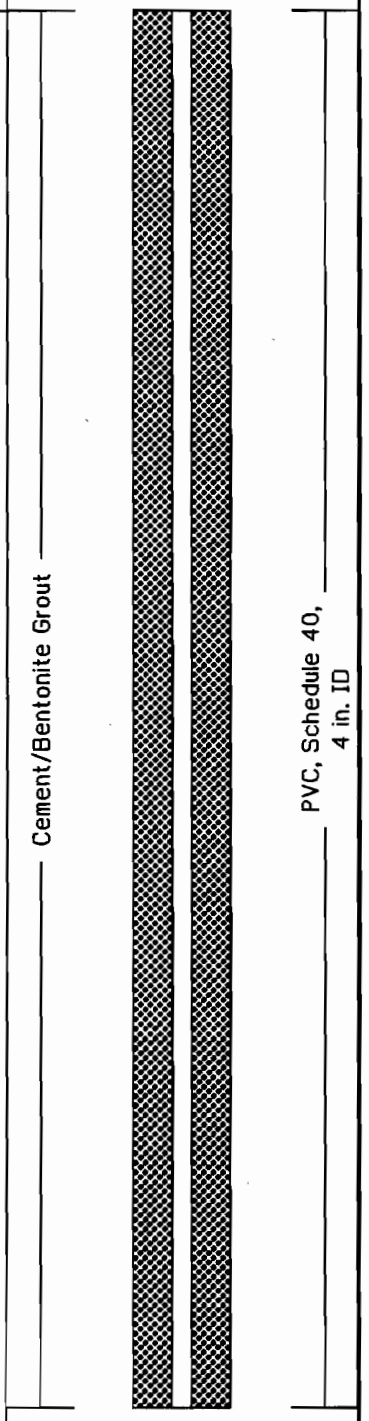
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
21							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
22							
23							
24							
25							

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

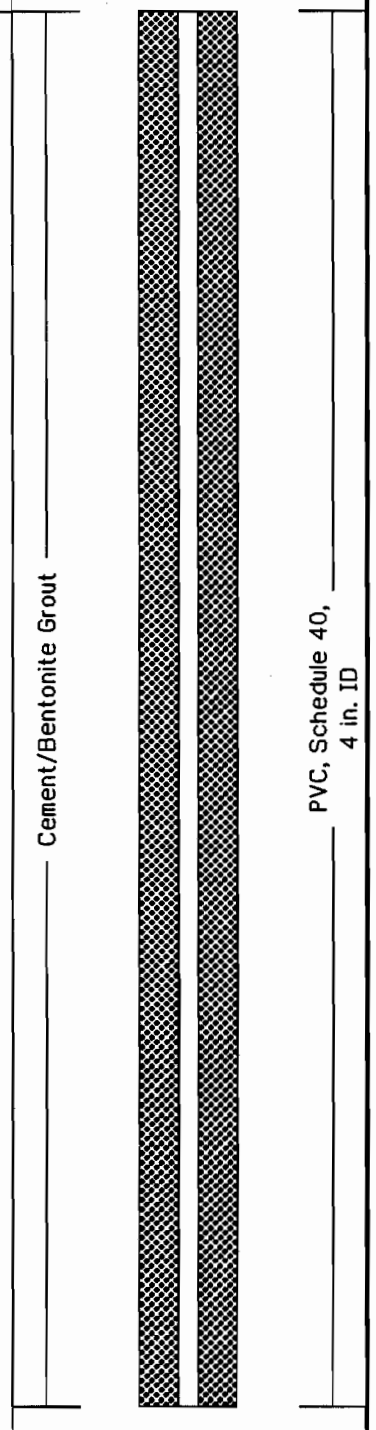
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
26							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
27							
28							
29							
30							

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

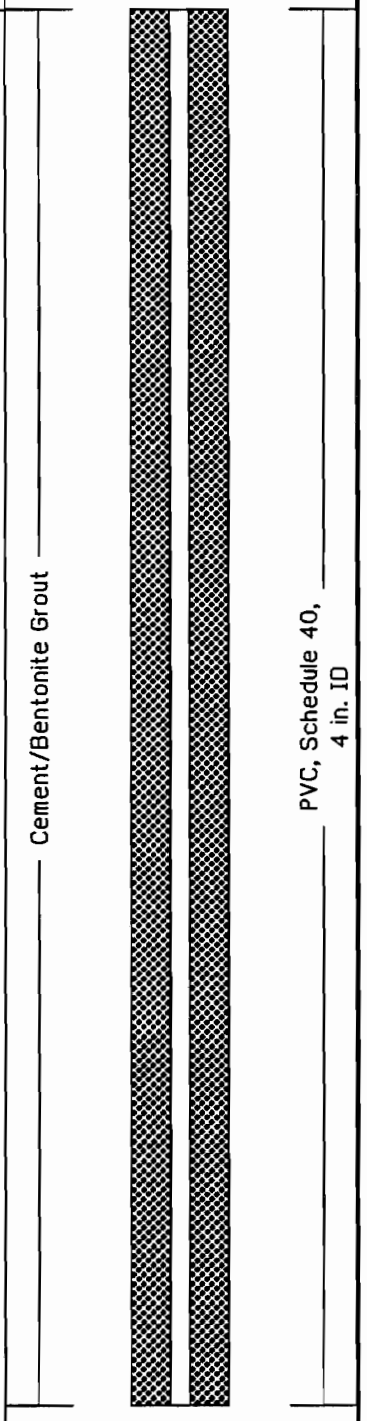
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
31							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
32							
33							
34							
35							

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

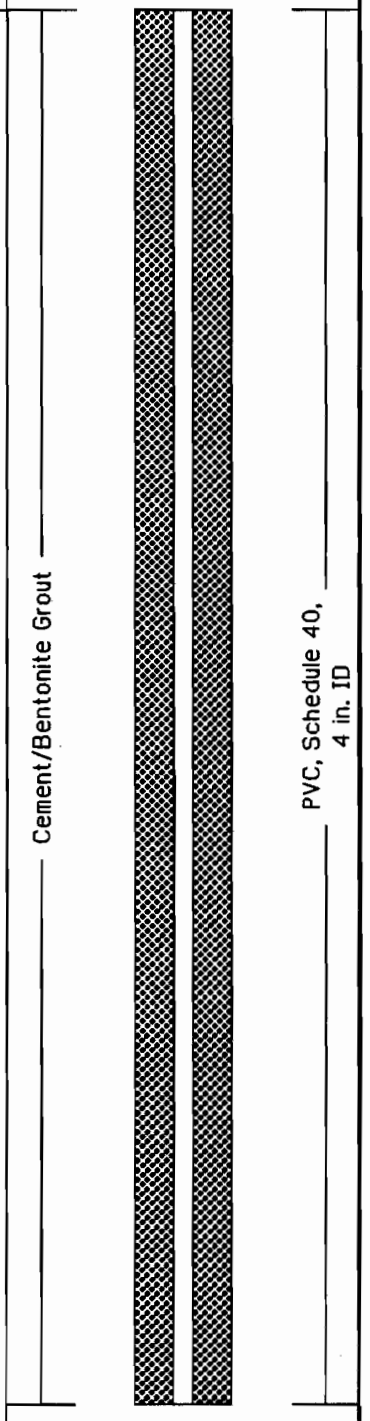
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
36							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
37							
38							
39							
40							

Monitoring Well: MW-11



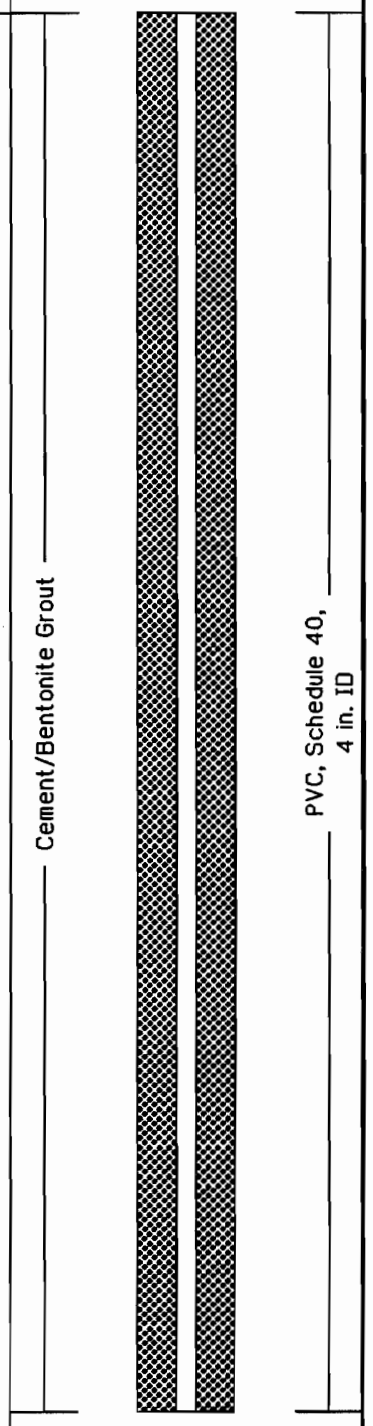
Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
41							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
42							
43							
44							
45							



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

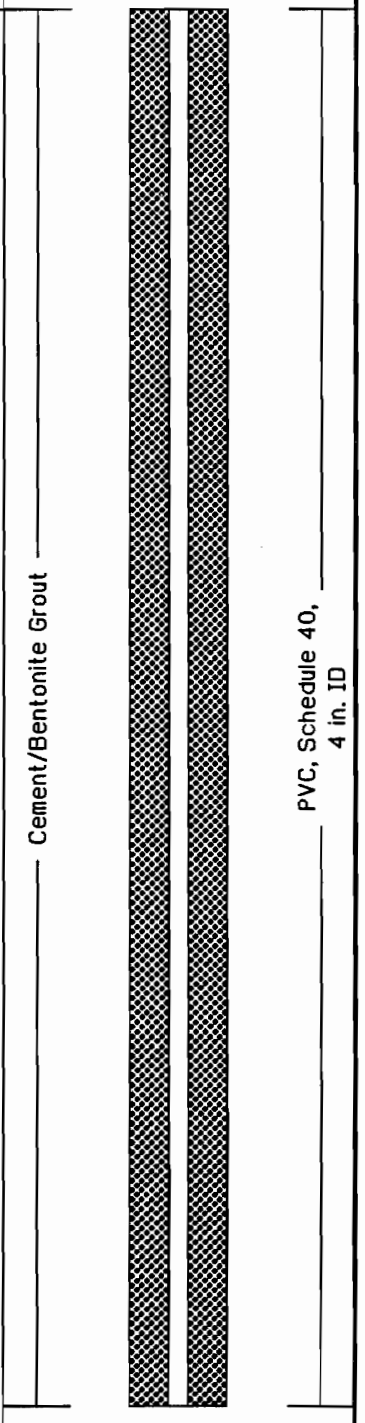
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
46							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
47							
48							
49							
50							

Monitoring Well: MW-11



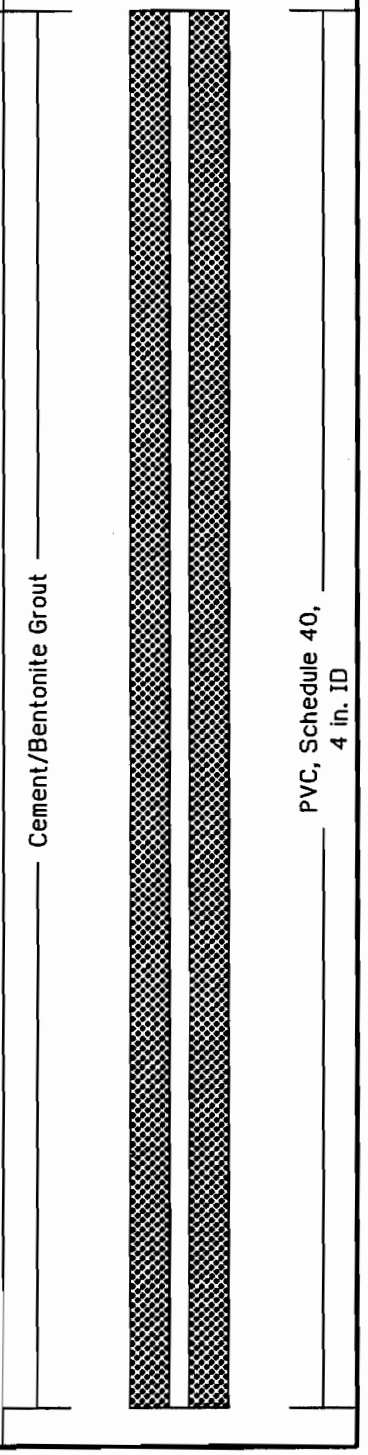
Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
51							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
52							
53							
54							
55							



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

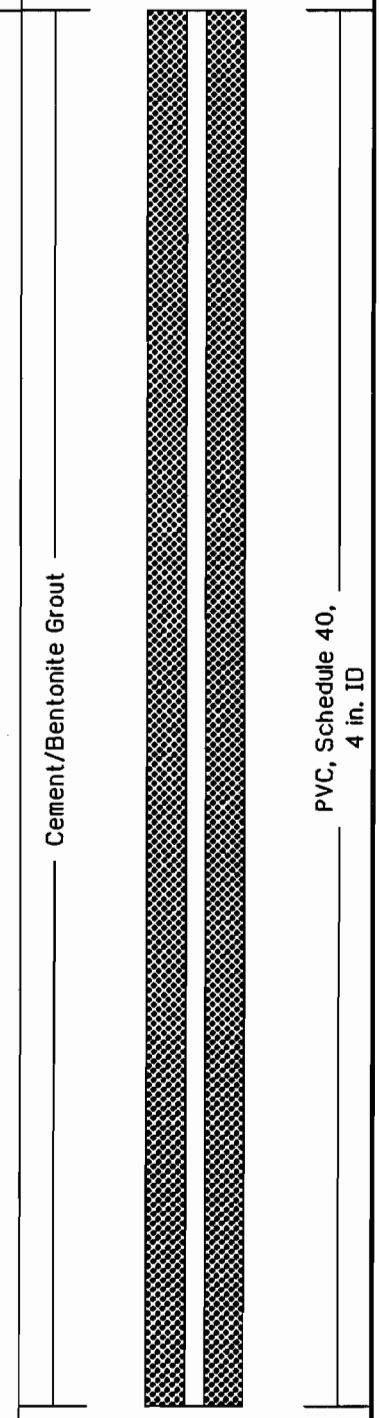
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
56	1224.21						As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
57							
58							
59							
60							

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

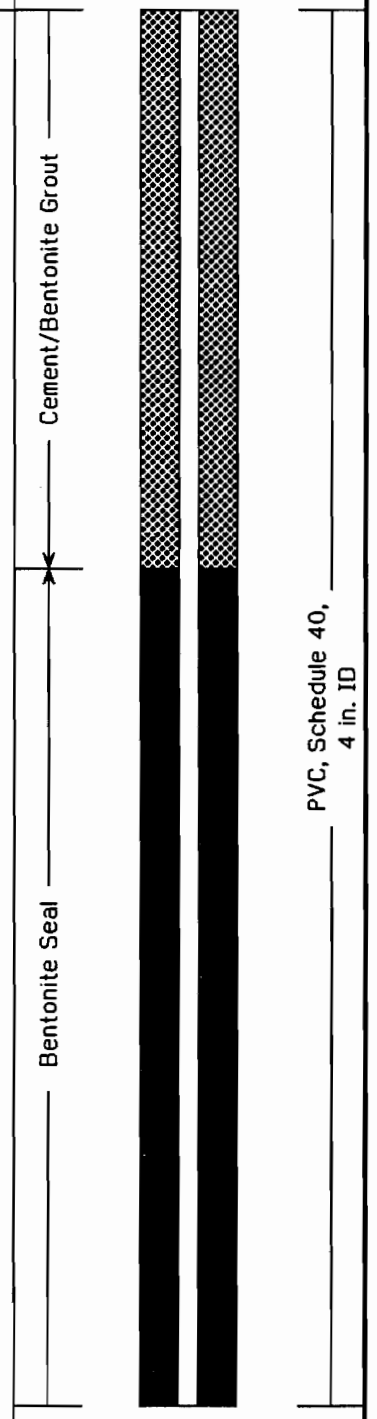
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
61							As Above: Intermixed orange/red, highly plastic CLAY and white, Cherty LIMESTONE
62							
63							
64							
65							



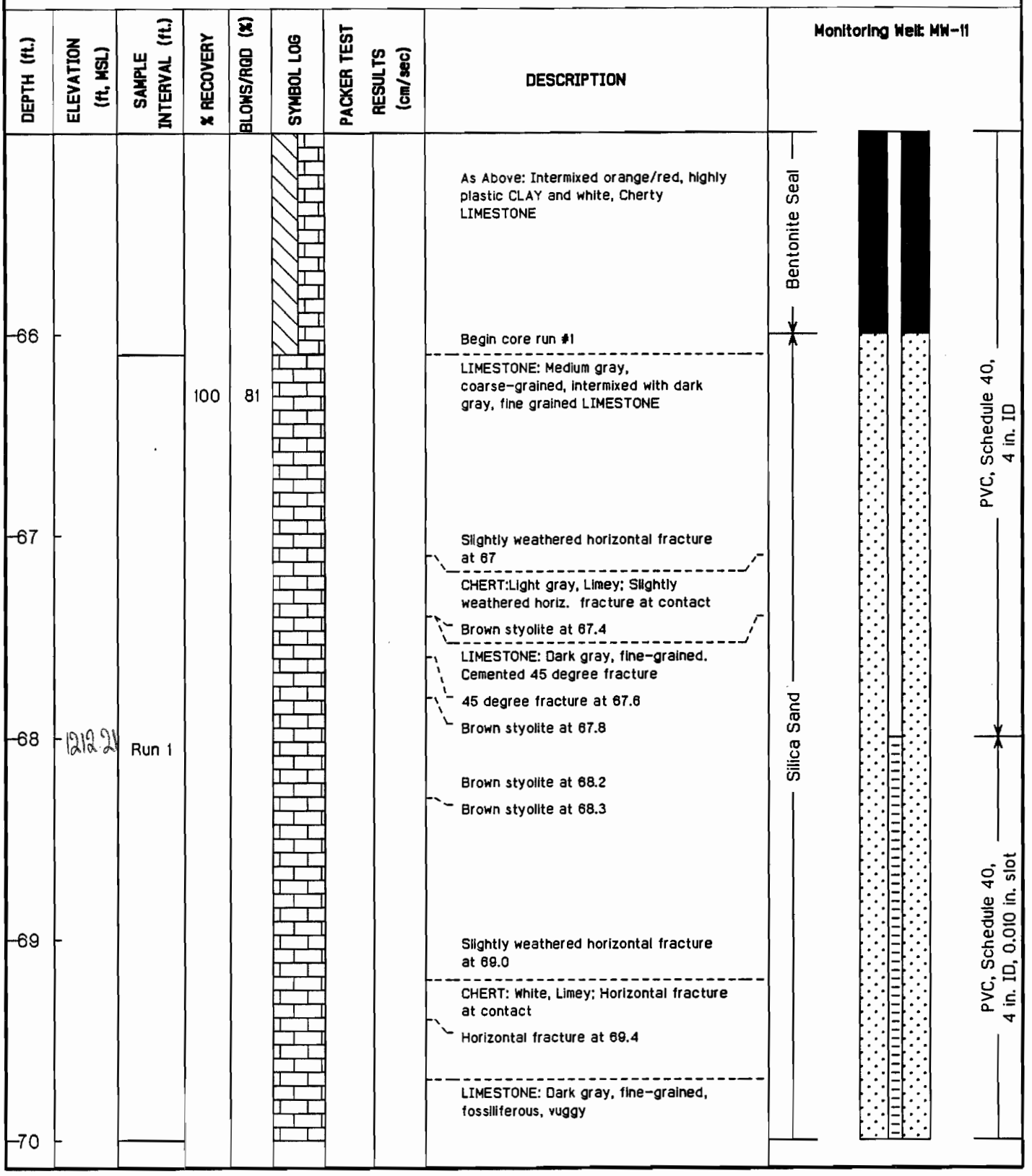
Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS



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Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

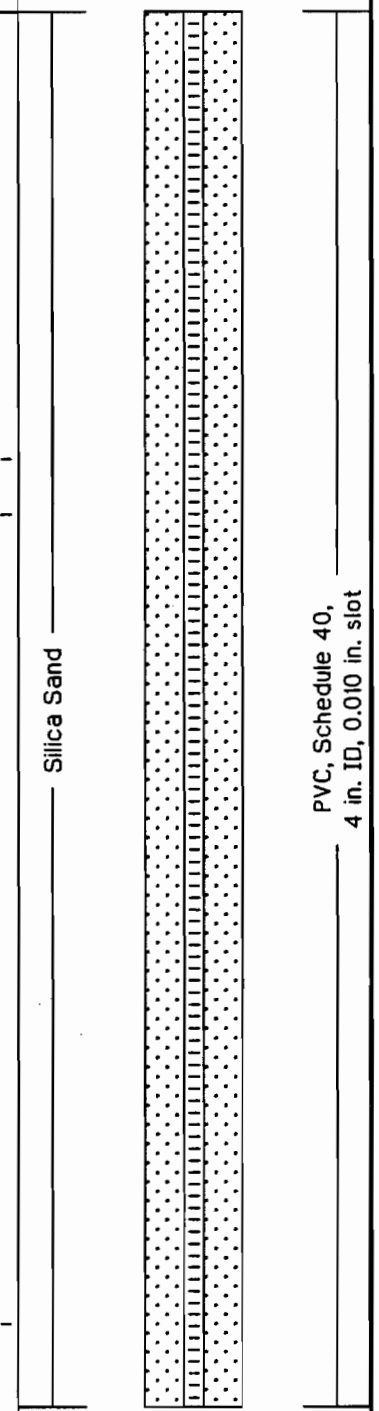
BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
71							Weathered horizontal fracture at 70.6
							Slightly weathered horizontal fracture at 71.4
							LIMESTONE: Intermixed light and dark gray
72		Run 1					LIMESTONE: Dark gray, fine-grained, non-weathered
							Vertical fracture from 71.8 to 72.5
73							Weathered horizontal fracture at 73.6
74							Cemented fracture at 74.1
							LIMESTONE: White, coarse-grained, non-weathered; weathered horizontal fracture at contact.
75							Begin core run #2 at 75'

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

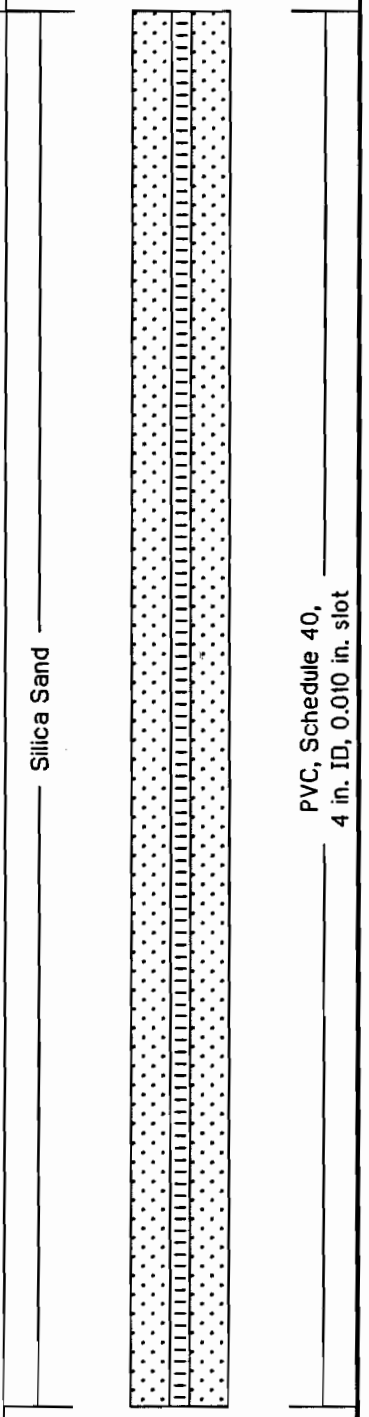
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
			95	48			CHERT: Dark gray LIMESTONE: White, coarse-grained, non-weathered; weathered horizontal fracture at contact
76							CHERT: Medium gray, Limey 20 degree fracture at 76.3 LIMESTONE: Dark gray, fine-grained, non-weathered,
77		Run 2					Brown styolite at 77.1 LIMESTONE: White, coarse-grained, weathered; slightly weathered 20 degree fracture at contact Broken from 77.6 to 77.8
78							LI8ESTONE: Intermixed light and dark gray CHERT: Medium gray, non-weathered, Limey
79							LIMESTONE: Dark gray, fine-grained, non-weathered CHERT: Medium gray, non-weathered, Limey
80							Begin core run #3 at 80'

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

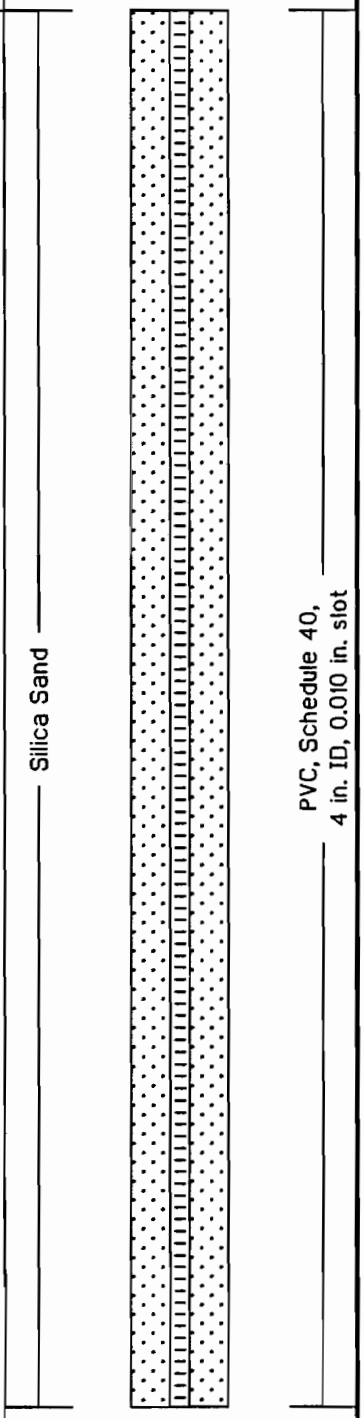
BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
			98	66			LIMESTONE: Medium gray, non-weathered, Cherty
81							LIMESTONE: Intermixed light and dark gray, non-weathered
82		Run 3					LIMESTONE: Medium gray Cherty; intermixed with a small amount of dark gray LIMESTONE. Vug at 82.0 Cemented fracture at 82.4 LIMESTONE: Light gray, Cherty; brown styolite at contact Weathered horizontal fracture at 82.7
83							LIMESTONE: Dark gray, fine-grained, non-weathered; brown styolite at contact Brown styolite at 83.4
84							Slightly weathered horizontal fracture at 83.9 LIMESTONE: Light gray, Cherty; brown styolite at contact 70 degree fracture from 84.5 to 84.7
85							LIMESTONE: Intermixed light and dark gray; slightly weathered horizontal fracture at contact

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

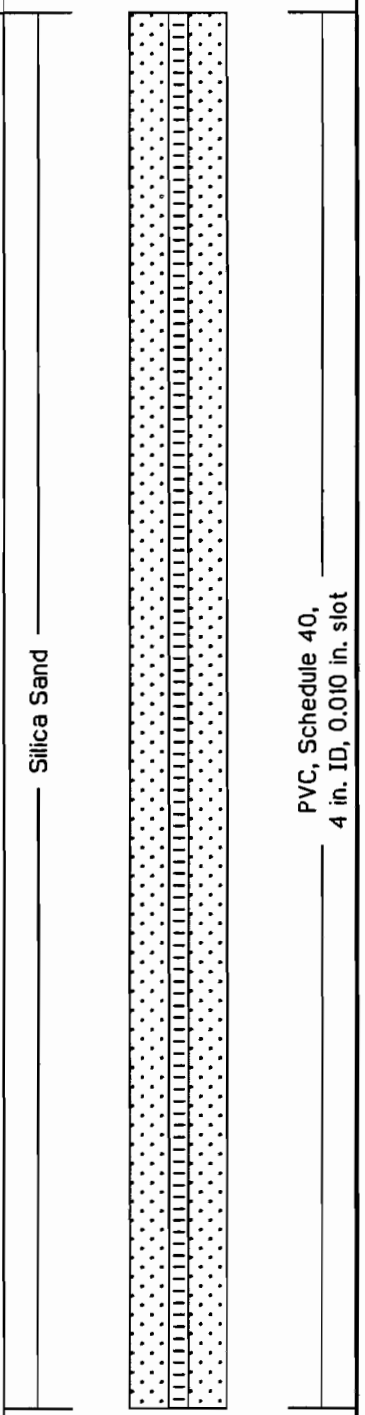
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/ROD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
86							LIMESTONE: White, weathered, coarse-grained; slightly weathered horizontal fracture and brown styolite at contact.
							Slightly weathered horizontal fracture at 85.7
							Slightly weathered horizontal fracture at 86.0
							LIMESTONE: Dark gray, fine-grained, non-weathered
							LIMESTONE: White, weathered, coarse-grained; broken from 86.2 to 86.3
87							LIMESTONE: Dark gray, fine-grained, non-weathered; slightly weathered horizontal fracture at contact.
		Run 3					LIMESTONE: White, weathered, coarse-grained; slightly weathered 30 degree fracture at contact.
							Weathered 30 degree fracture at 87.1
							LIMESTONE: Dark gray, fine-grained, non-weathered
88							LIMESTONE: White, slightly weathered, coarse-grained
89							
							LIMESTONE: Dark gray, fine-grained, non-weathered
90							Begin core run #4 at 90'



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

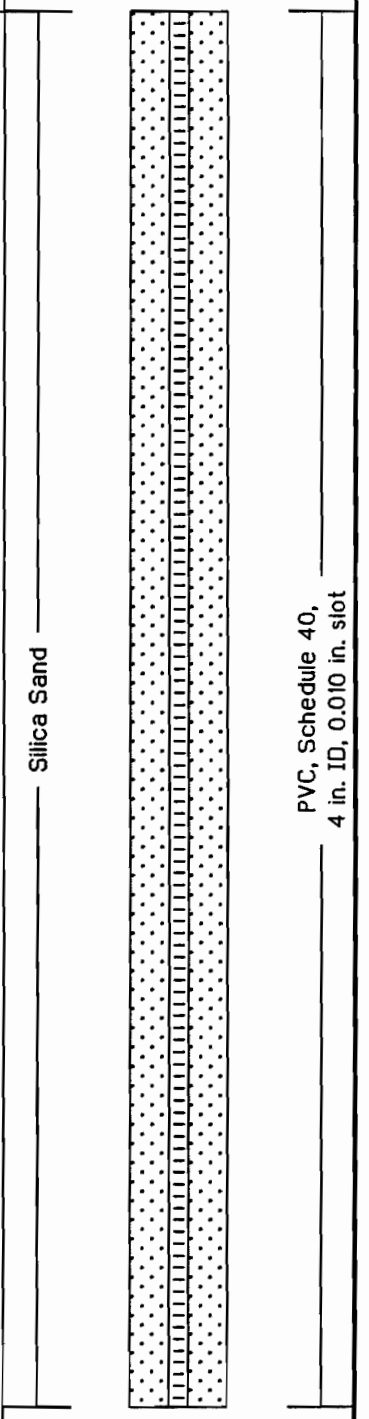
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
91		Run 4	101	57			LIMESTONE: White, slightly weathered, coarse-grained Weathered horizontal fracture at 90.1 Weathered horizontal fracture at 90.2 Weathered horizontal fracture at 90.3 Weathered horizontal fracture at 90.6 Slightly weathered horizontal fracture at 90.8 Slightly weathered horizontal fracture at 91.2 Slightly weathered horizontal fracture at 91.6 Slightly weathered horizontal fracture at 91.8 Broken and weathered from 92.1 to 92.3 20 degree fracture at 92.8 20 degree fracture at 92.9 Slightly weathered 20 degree fracture at 93.1 LIMESTONE: Dark gray, fine-grained; weathered horiz. fract. at contact LIMESTONE: White, slightly weathered, coarse-grained; weathered horiz. fracture at contact LIMESTONE: Dark gray, fine-grained .8=93.7 LIMESTONE: White, slightly weathered, coarse-grained; brown styolite at contact. Slightly weathered horizontal fracture at 94.3 LIMESTONE: Dark gray, coarse-grained LIMESTONE: White, slightly weathered, coarse-grained; weathered 30 degree fracture at contact. Weathered horizontal fracture at 94.7 Weathered horizontal fracture at 94.8
92							
93							
94							
95							



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

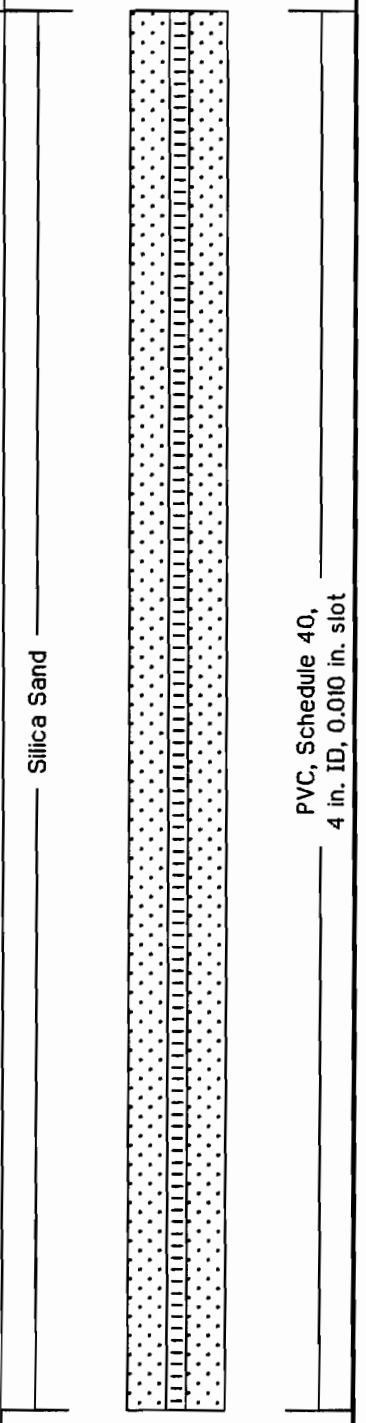
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
96							Weathered horizontal fracture at 95.2 Horizontal fracture at 95.3 LIMESTONE: Medium gray, medium-grained LIMESTONE: Light gray, coarse-grained; weathered horizontal fracture at contact. LIMESTONE: Intermixed light and dark gray, Cherty LIMESTONE: Medium gray, medium grained
97		Run 4					LIMESTONE: Dark gray, fine-grained, non-weathered 8IMESTONE: Medium gray marbled with dark gray, coarse-grained Slightly weathered horizontal fracture
98							LIMESTONE: Medium gray marbled with dark gray, Cherty; weathered horizontal fracture at contact.
99							LIMESTONE: Dark gray, fine-grained; brown styolite at contact LIMESTONE: Medium gray marbled with dark gray, Cherty; weathered 30 degree fracture at contact.
100							LIMESTONE: Dark gray, fine-grained; slightly weathered horizontal fracture at contact. LIMESTONE: Medium gray marbled with dark gray, Cherty Begin core run #5 at 100'



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

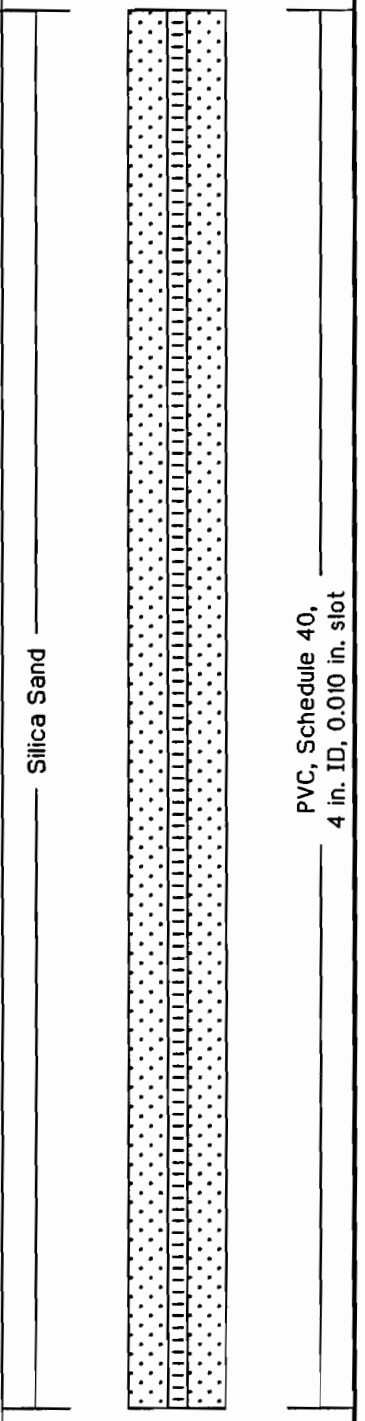
Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

BORING LOG MW-11
Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
			102	49			LIMESTONE: Medium gray, medium grained
							LIMESTONE: Medium gray marbled with dark gray, Cherty; weathered horizontal fracture at contact
101							LIMESTONE: Medium gray, medium grained Weathered horizontal fracture at 101 Weathered horizontal fracture at 101.5
102							LIMESTONE: Intermixed light and dark gray, medium grained, fossiliferous weathered horizontal fracture at contact.
		Run 5					LIMESTONE: Dark gray, fine-grained, and white, intermixed with Cherty LIMESTONE divided by 70 degree fracture, with a weathered horizontal fracture at the contact.
103							LIMESTONE: White/light gray, Cherty Weathered horizontal fracture at 102.9 Weathered horizontal fracture at 103.1
							CHERT: Medium gray, Limey; weathered horizontal fracture at contact.
104							LIMESTONE: Medium gray, medium grained, slightly weathered Weathered horizontal fracture at 104.1 Weathered horizontal fracture at 104.4
105							LIMESTONE: Dark gray, fine-grained; weathered horizontal fracture at contact.

Monitoring Well: MW-11



Client: SUNRAY Services, Incorporated
Location: Tontitown, Arkansas
Date Drilled: 6/8/922
Drilled by: Layne Western

Surface Elevation: 1280.21 ft, MSL
Coordinates: E-1153.254; N-1371.782
Total corehole depth: 110 ft.
Logged by: Joe Hoffmeister

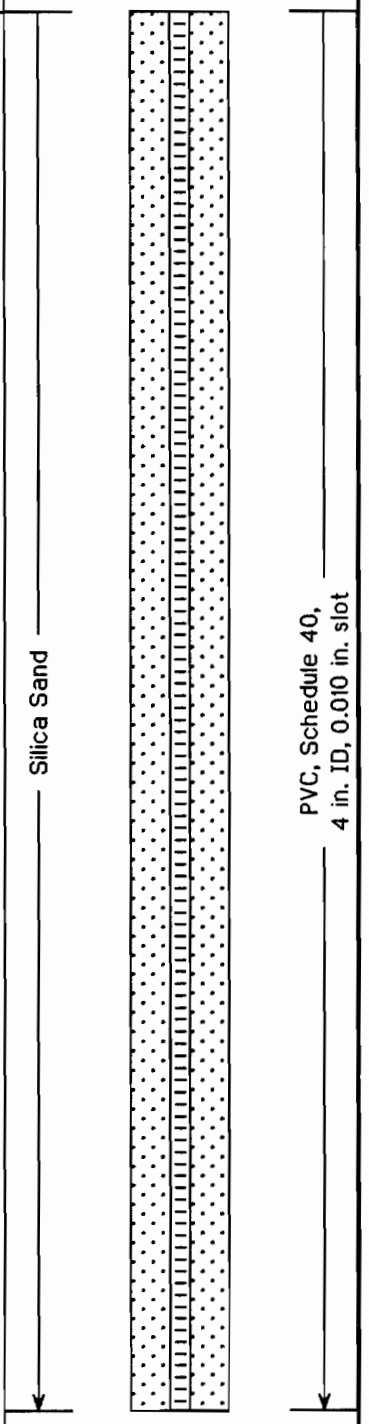
BORING LOG MW-11

Project No: 0889015.06

SCS ENGINEERS

DEPTH (ft.)	ELEVATION (ft, MSL)	SAMPLE INTERVAL (ft.)	% RECOVERY	BLOWS/RQD (%)	SYMBOL LOG	PACKER TEST RESULTS (cm/sec)	DESCRIPTION
106		Run 5					LIMESTONE: White, weathered, coarse-grained; weathered horizontal fracture at contact. Slightly weathered horizontal fracture at 105.4 Broken and weathered from 105.8 to 105.8 Weathered horizontal fracture at 106.2
107							LIMESTONE: Dark gray, fine-grained, non-weathered; weathered horiz. fracture and brown styolite at contact.
108							LIMESTONE: White, weathered, coarse-grained LIMESTONE: Intermixed dark gray and white divided by an 80 degree cemented fracture, with a weathered horiz. fract. at contact. CHERT: White, non-weathered; weathered horizontal fracture at contact.
109							LIMESTONE: Dark gray, fine-grained, non-weathered LIMESTONE: White, weathered, coarse-grained Fractured and weathered from 109.0 to 109.3
110							LIMESTONE: Dark gray, fine-grained; weathered horizontal fracture at the contact. Mechanically broken from 109.7 to 110.0

Monitoring Well: MW-11

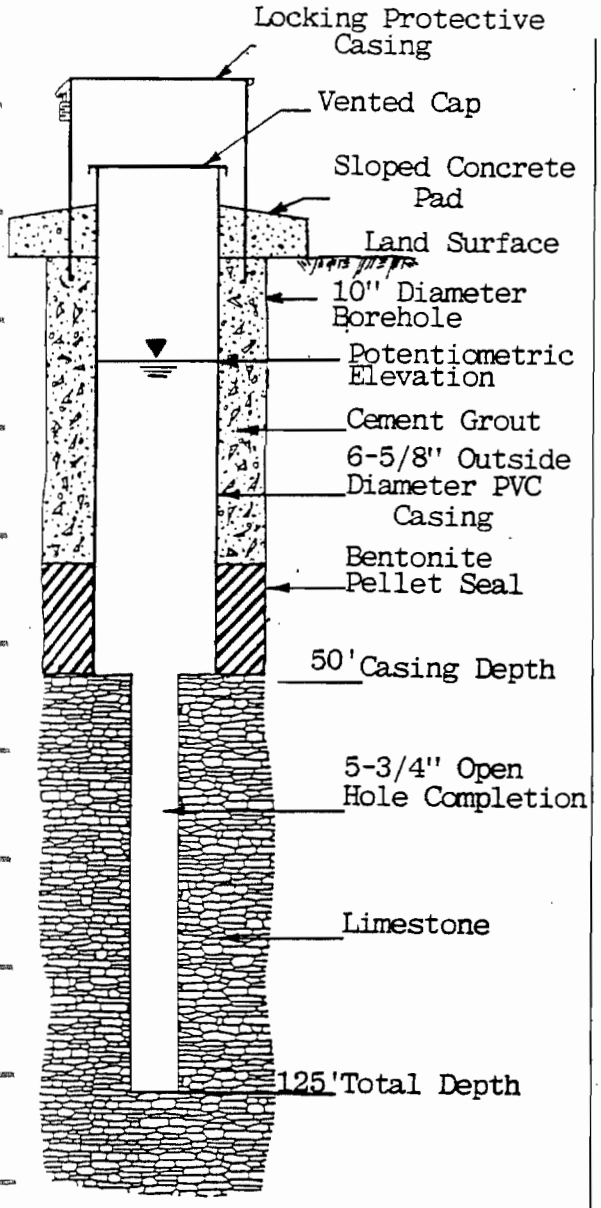


APPENDIX B

WELL CONSTRUCTION LOGS

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell # 3 Well MW-1

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1292.07 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/23/87

Drilling Method Auger - Air Rotary

Drilling Contractor Enviromed/Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/23/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

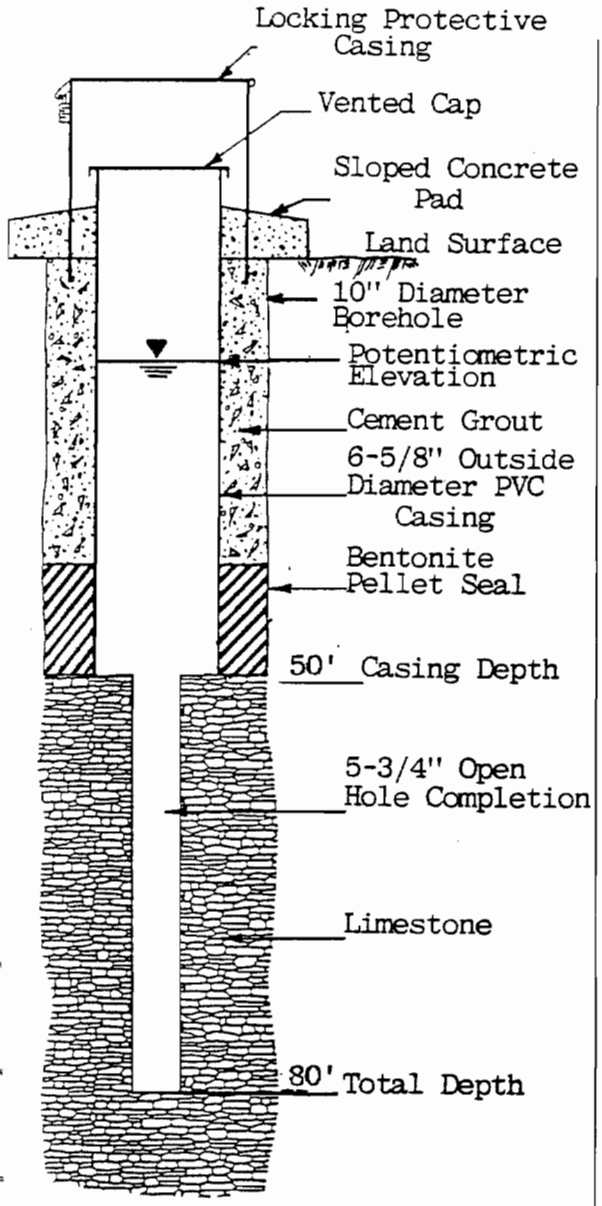
Well Purpose Upgradient Ground-Water Monitoring

Remarks Potentiometric Elevation 1217.05 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell #3 Well MW-2

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1238.95 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/23/87

Drilling Method Auger - Air Rotary

Drilling Contractor Enviromed/Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/23/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

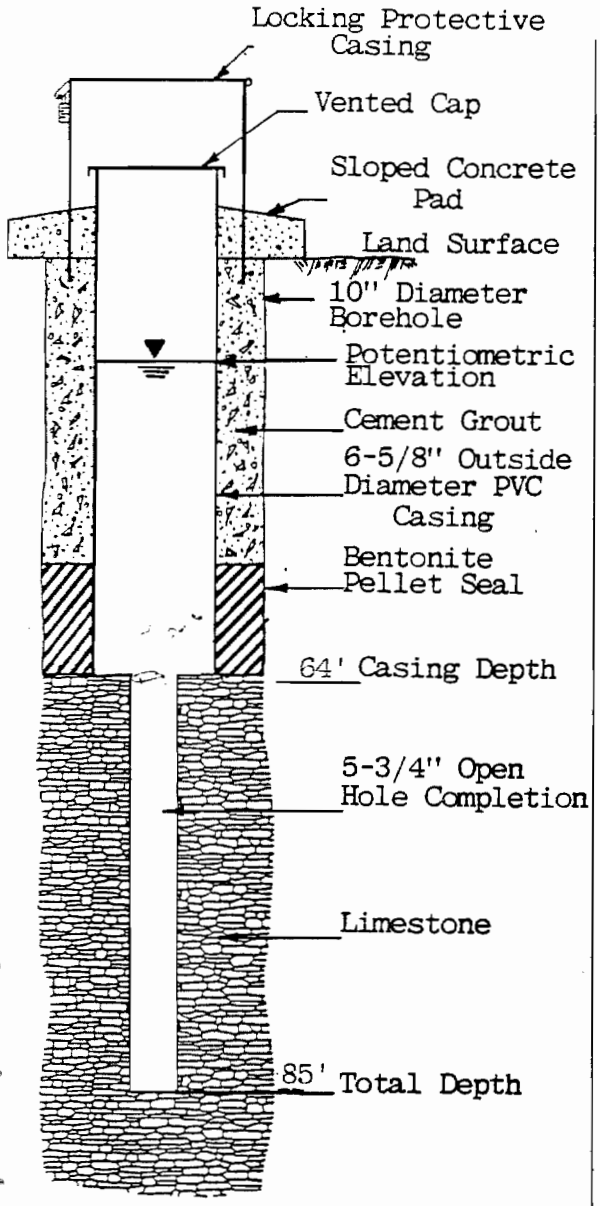
Well Purpose Piezometric Ground-Water Monitoring

Remarks Potentiometric Elevation 1205.24 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell # 3 Well MW-3

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1209.94 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/23/87

Drilling Method Auger - Air Rotary

Drilling Contractor Enviromed/Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/23/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

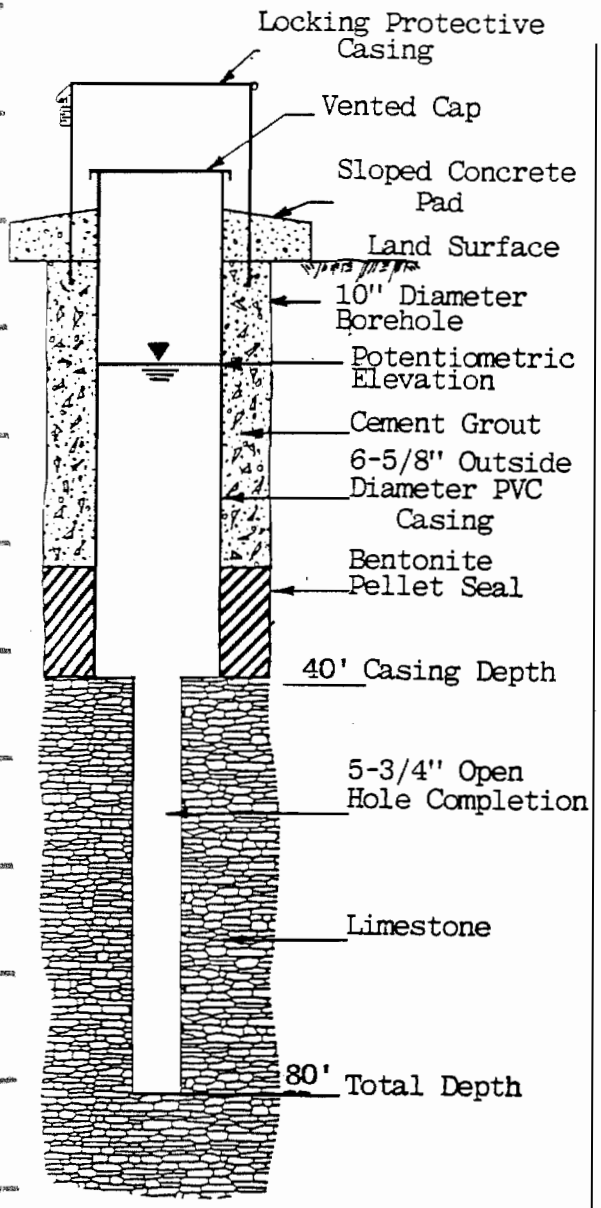
Well Purpose Downgradient Ground-Water Monitoring

Remarks Potentiometric Elevation 1170.91 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell # 3 Well MW-4

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1205.58 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/23/87

Drilling Method Auger - Air Rotary

Drilling Contractor Enviromed/Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/23/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

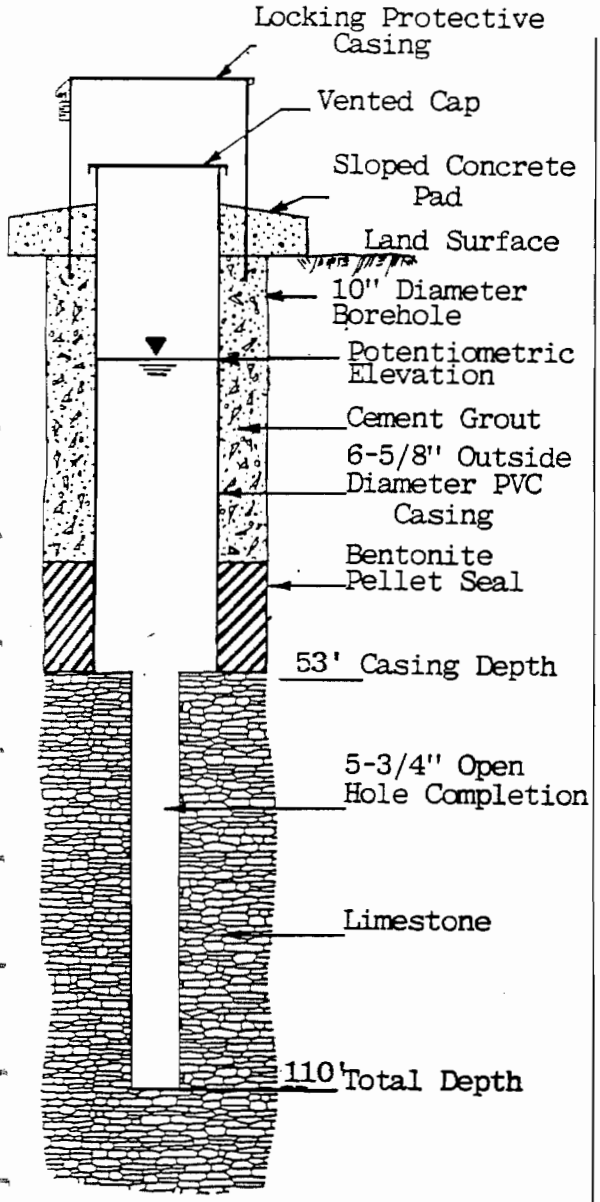
Well Purpose Downgradient Ground-Water Monitoring

Remarks Potentiometric Elevation 1173.27 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell #4 Well MW-5

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1293.16 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/29/87

Drilling Method Air Rotary

Drilling Contractor Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/29/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

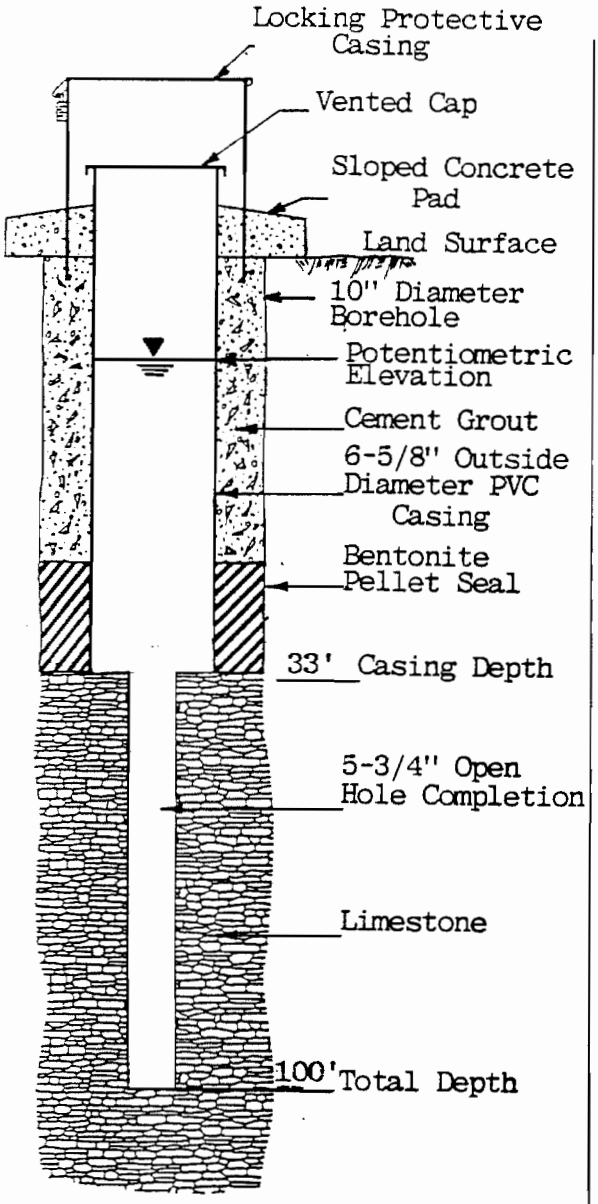
Well Purpose Upgradient Ground-Water Monitoring

Remarks Potentiometric Elevation 1225.78 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell #4 Well MW-6

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation and Datum 1226.35 feet ☒ surveyed ☐ estimated

Installation Dates(s) 7/29/87

Drilling Method Air Rotary

Drilling Contractor Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)
Air Lifting 7/29/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

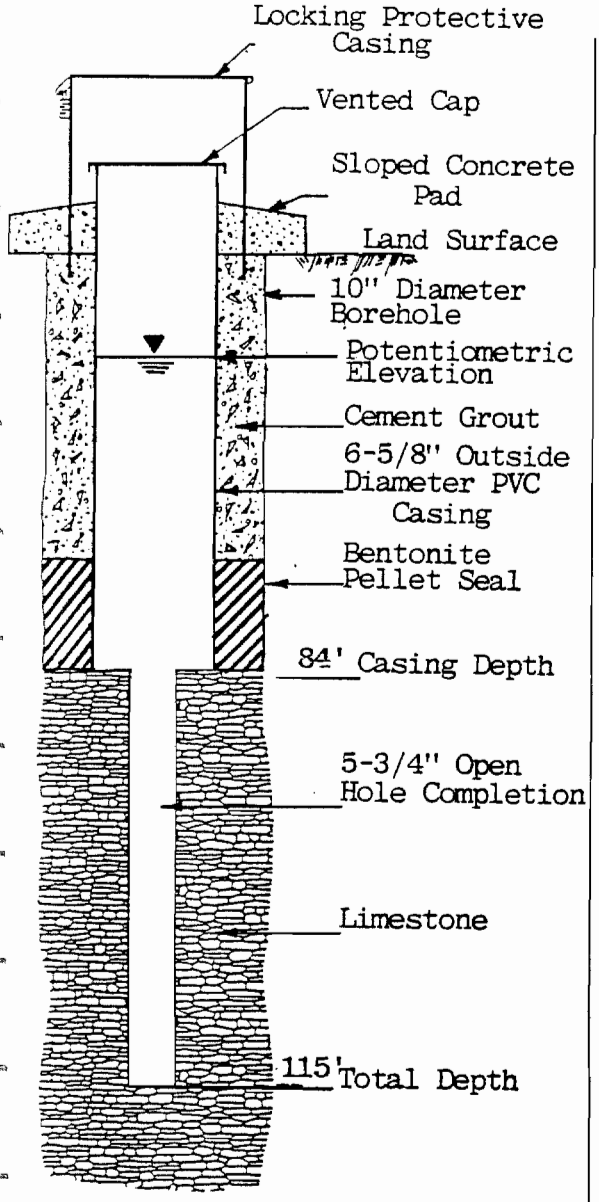
Well Purpose Piezometer Ground-Water Monitoring

Remarks Potentiometric Elevation 1200.48 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell #4 Well MW-7

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1243.60 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/31/87

Drilling Method Air Rotary

Drilling Contractor Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/31/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

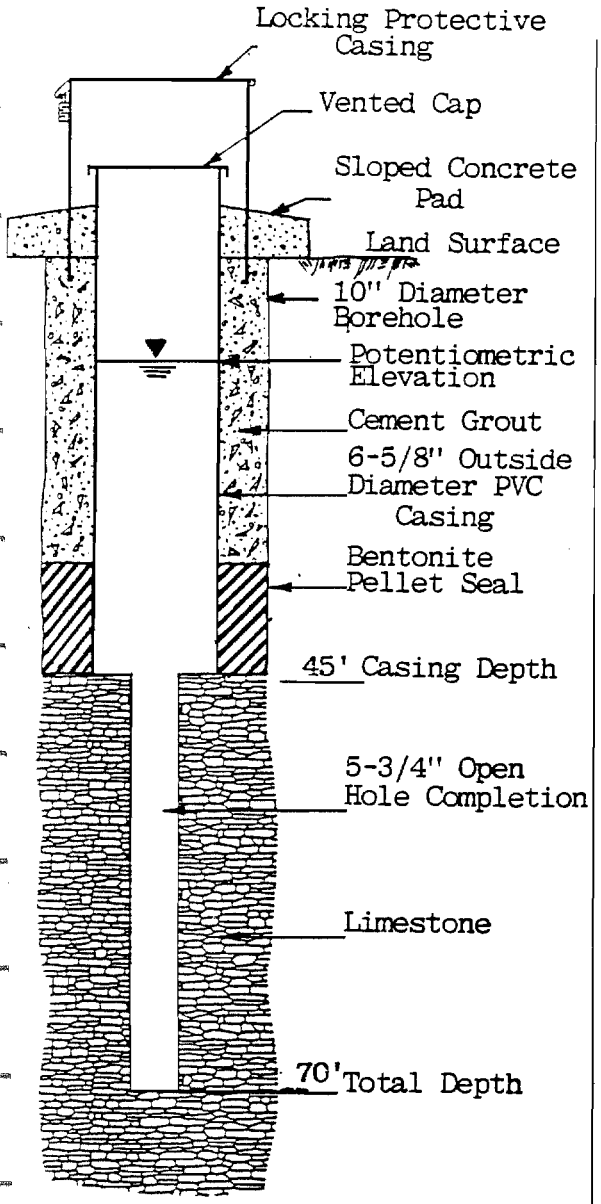
Well Purpose Down-Gradient Ground-Water Monitoring

Remarks Potentiometric Elevation 1154.13 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell #4 Well MW-8

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1186.59 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/31/87

Drilling Method Air Rotary

Drilling Contractor Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/31/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

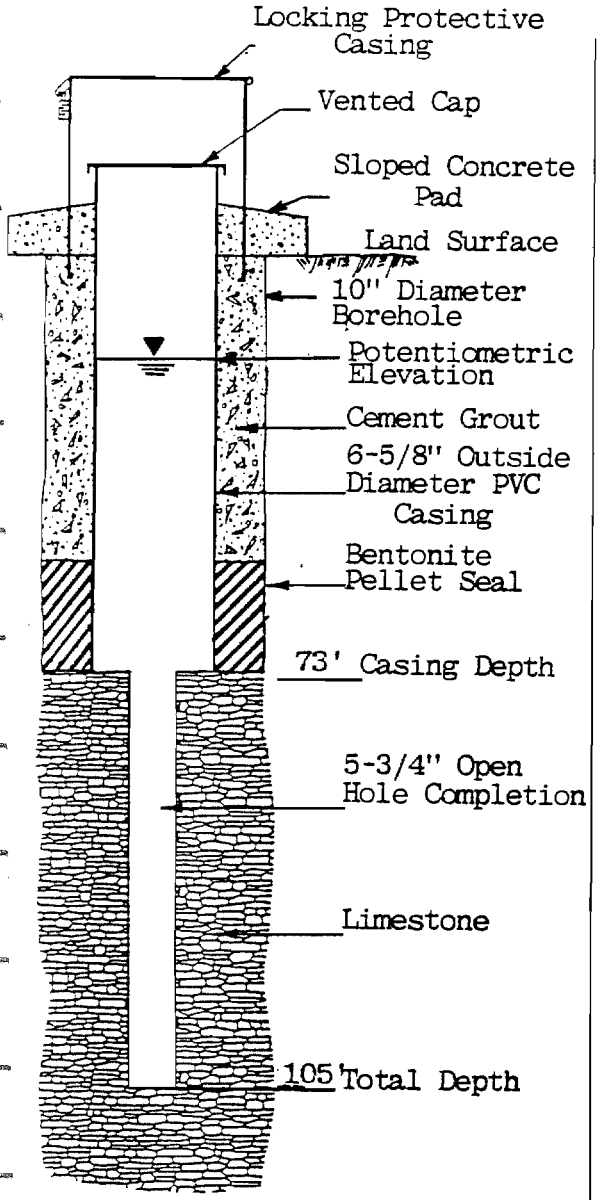
Well Purpose Downgradient Ground-Water Monitoring

Remarks Potentiometric Elevation 1150.20 ft msl 8/8/87

Prepared by Brad King

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Sunray Landfill Cell #4 Well MW-9

Town/City Tontitown

County Washington State Arkansas

Permit No. _____

Land-Surface Elevation

and Datum 1271.82 feet ☒ surveyed

_____ ☐ estimated

Installation Dates(s) 7/30/87

Drilling Method Air Rotary

Drilling Contractor Mokat

Drilling Fluid _____

Development Techniques(s) and Date(s)

Air Lifting 7/30/87

Fluid Loss During Drilling _____ gallons

Water Removed During Development _____ gallons

Static Depth to Water _____ feet below M.P.

Pumping Depth to Water _____ feet below M.P.

Pumping Duration _____ hours

Yield _____ gpm Date _____

Specific Capacity _____ gpm/ft

Well Purpose Piezometric Ground-Water Monitoring

Remarks Potentiometric Elevation 1203.12 ft msl 8/8/87

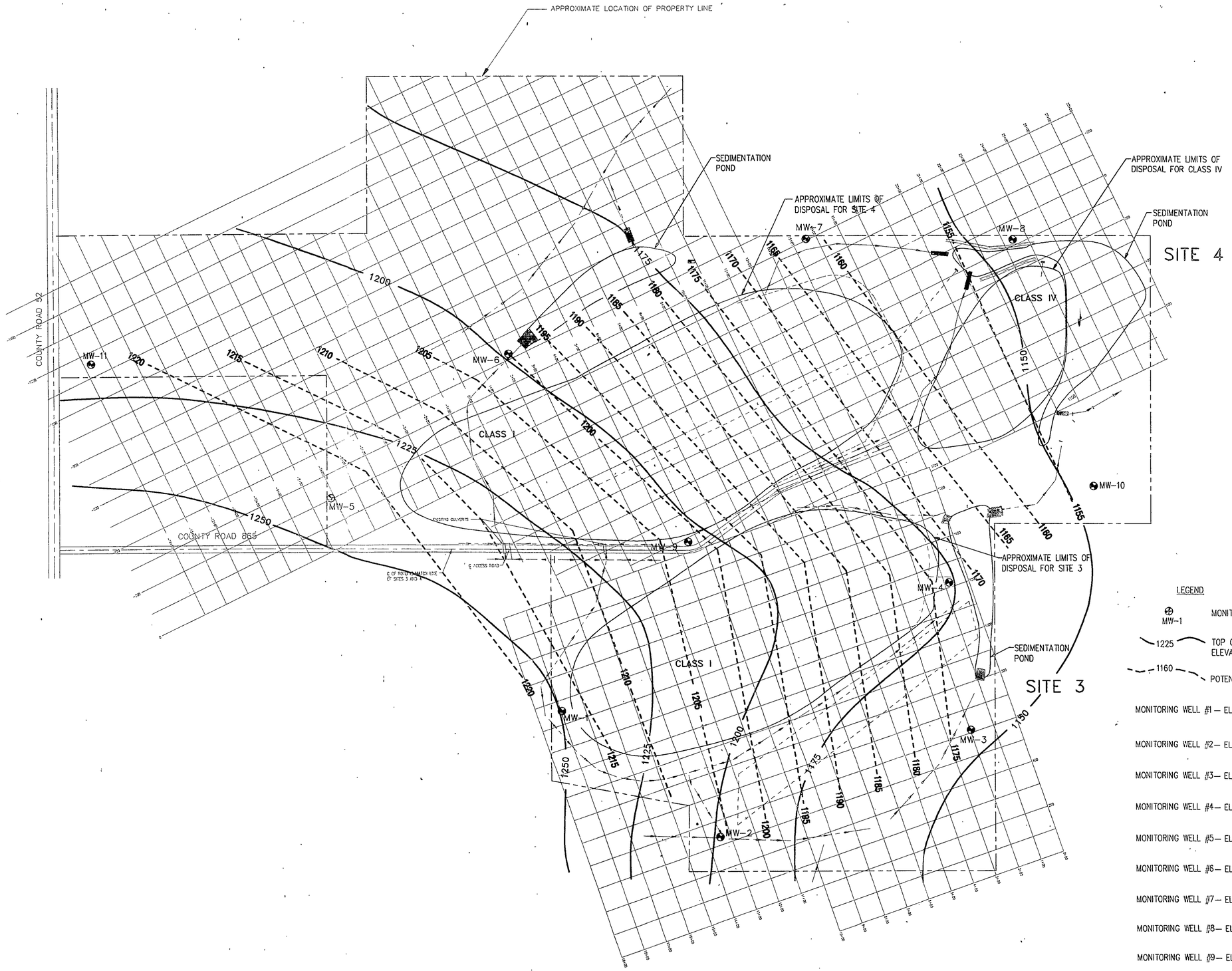
Prepared by Brad King

APPENDIX C

PACKER TEST DATA

Hole No.	Test Zone (ft)	L (ft)	r (ft)	Pressure (Psi)	H (ft)	Q avg (gpm)	K (cm/s)	K(AVG) (cm/s)
MW-10	100.34-106.34	6.00	0.13	12	131.03	0.05	3.478E-05	
			0.13	25	161.03	0.26	1.449E-04	8.984E-05
	94-100	6.00	0.13	10	120.00	0.04	3.615E-05	
				20	143.15	0.30	2.165E-04	
				30	166.23	0.35	2.175E-04	1.567E-04
	88-94	6.00	0.13	20	137.15	0.35	2.636E-04	
				30	160.23	0.43	2.740E-04	2.688E-04
	82-88	6.00	0.13	20	131.15	0.30	2.363E-04	
				30	154.23	0.40	2.679E-04	2.521E-04
	76-82	6.00	0.13	14	111.31	0.18	1.670E-04	
				20	125.15	0.30	2.435E-04	
				30	148.23	0.41	2.857E-04	2.321E-04
	70-76	6.00	0.13	14	105.31	0.25	2.452E-04	
				20	119.15	0.35	3.034E-04	
				30	142.23	0.50	3.631E-04	3.039E-04

Hole No.	Test Zone (ft)	L (ft)	r (ft)	Pressure (Psi)	H (ft)	Q avg (gpm)	K (cm/s)	K(AVG) (cm/s)
MW-11	73-80'	7.00	0.13	10	99.58	0.18	1.71E-04	
		7.00	0.13	20	122.65	0.08	6.18E-05	
		7.00	0.13	30	145.73	0.02	1.30E-05	
		7.00	0.13	40	168.81	0.033	1.85E-05	1.577E-05
	66-73'	7.00	0.13	10	92.58	0.10	1.02E-04	
		7.00	0.13	20	115.65	0.14	1.15E-04	
		7.00	0.13	30	138.73	0.19	1.30E-04	
		7.00	0.13	40	161.81	0.18	1.05E-04	1.167E-04
	59-66'	7.00	0.13	10	85.58	0.04	4.43E-05	
		7.00	0.13	20	108.65	0.01	8.73E-06	
		7.00	0.13	30	131.73	0.01	7.20E-06	
		7.00	0.13	40	154.81	0.00	0.00E+00	1.506E-05



POTENTIOMETRIC SURFACE CONTOURS,
TOP OF LIMESTONE ELEVATIONS AND
EXISTING MONITORING WELL LOCATIONS

SCALE: 1"=200'-0"

LEGEND

MW-1 MONITORING WELL LOCATIONS

1225 TOP OF LIMESTONE ELEVATIONS

1160 POTENTIOMETRIC SURFACE ELEVATIONS

MONITORING WELL #1 — EL. 1219.15 (5-26--92)

MONITORING WELL #2— EL. 1205.74 (5-26--92)

MONITORING WELL #3— EL. 1172.52 (5-26--92)

MONITORING WELL #4— EL. 1173.22 (5-26--92)

MONITORING WELL #5— EL. 1224.37 (5-26--92)

MONITORING WELL #6— EL. 1200.67 (5-26--92)

MONITORING WELL #7— EL. 1160.78 (5-26--92)

MONITORING WELL #8— EL. 1152.60 (5-26--92)

MONITORING WELL #9— EL. 1203.02 (5-26--92)

MONITORING WELL #10 — EL. 1151.85 (6-26--92)

MONITORING WELL #11 — EL. 1223.30 (6-26--92)

REV.	DATE	DESCRIPTION	CK. BY

SHEET TITLE: POTENTIOMETRIC SURFACE CONTOURS, TOP OF LIMESTONE ELEVATIONS AND EXISTING MONITORING WELL LOCATIONS

PROJECT TITLE: HYDROGEOLOGIC INVESTIGATION WORKPLAN
SUNRAY SERVICES SANITARY LANDFILL
TONTITOWN, ARKANSAS

CLIENT
SUNRAY SERVICES, INC.
105 OLD MISSOURI ROAD
SPRINGDALE, ARKANSAS 72765
(501) 361-2926

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT
CONSULTING ENGINEERS
10401 HOLMES ROAD, SUITE 400, KANSAS CITY, MISSOURI 64131
PH. (816) 941-7550 FAX NO. (816) 941-8025

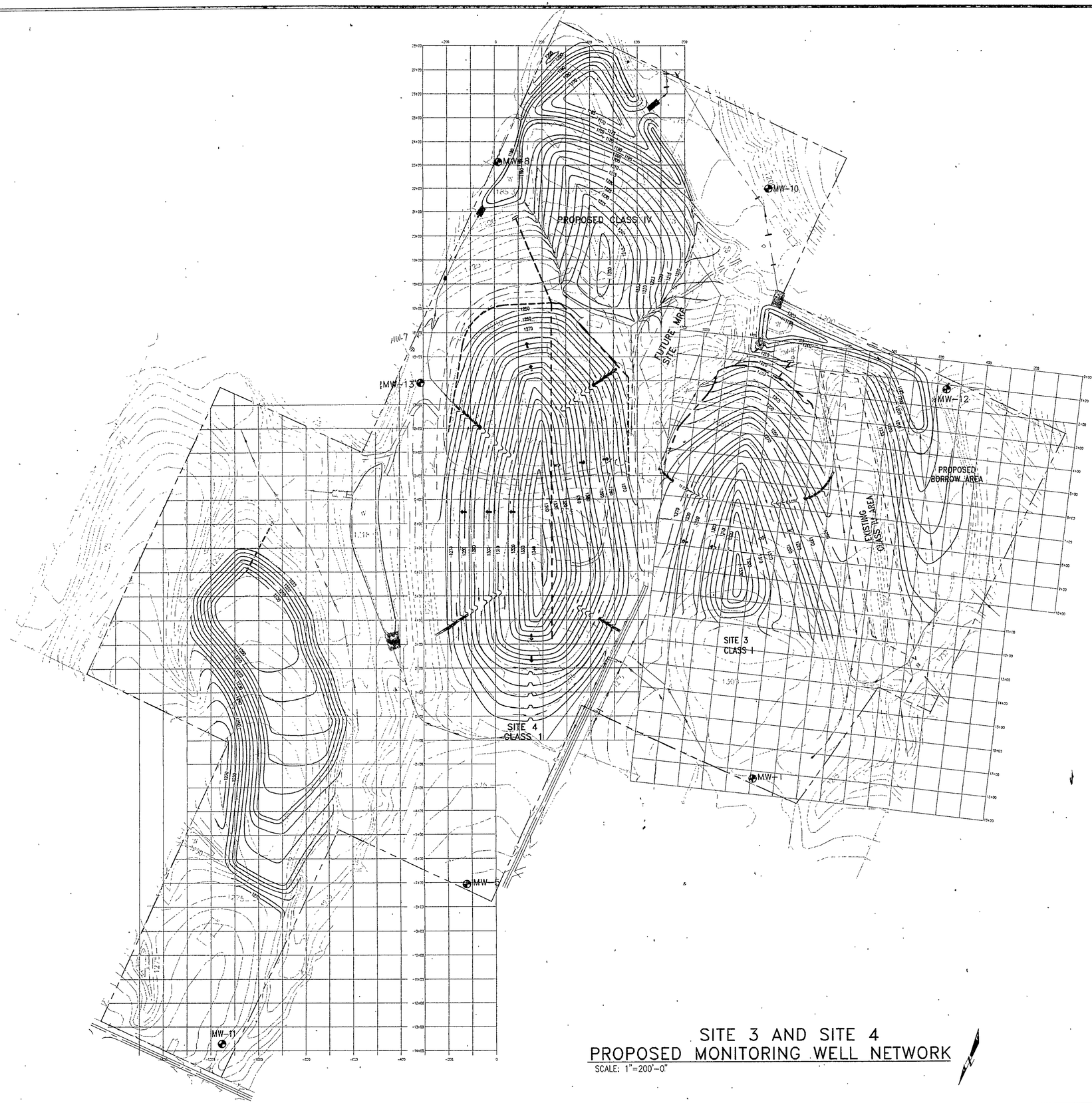
PROJ. NO. 03-99015.06
DSN. BY: GAN
CHK. BY: SKEYLDL
DSGN. BY: JEB
O/A DWG BY: JDW
APP. BY:

CADD FILE: SUN20
DATE: AUGUST 1992
SCALE: 1"=200'-0"
DRAWING NO. 1 of 2

SUN20 1=200 8-19-20

LEGEND

⊕ MW-1 MONITORING WELLS



SITE 3 AND SITE 4
PROPOSED MONITORING WELL NETWORK
SCALE: 1"=200'-0"

SUN21 1=200 8-19-92

REV.	DATE	DESCRIPTION	CK. BY
1			
2			
3			
4			
5			

SHEET TITLE
SITE 3 AND SITE 4
PROPOSED MONITORING WELL NETWORK

PROJECT TITLE
FINAL CLOSURE MODIFICATIONS
SITES 3 AND 4
PERMIT NUMBERS 123SR2, 162SR2
TONTITOWN ARKANSAS

CLIENT
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105 OLD MISSOURI ROAD
SPRINGDALE, ARKANSAS 72765
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SCS ENGINEERS
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PROJ. NO. 03-89015.05
DSN. BY: JEB
DWN. BY: GAN
CHK. BY: SCE\LDL
D/A RVW BY: JDW
APP. BY:

CADD FILE: SUN21

DATE: AUGUST 1992

SCALE: 1"=200'-0"

DRAWING NO. 2 of 2