Appendix A

Groundwater Monitoring Program
Titan Environmental Corporation
June 1996

TITAN Environmental

Groundwater Monitoring Program

Sequoyah Fuels Facility
Gore, Oklahoma

Prepared For:

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June 1996

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SEQUOYAH FUELS CORPORATION FACILITY

GORE, OKLAHOMA

1.0 INTRODUCTION

This document presents the recommended groundwater monitoring program for the Sequoyah Fuels Corporation (SFC) facility near Gore, Oklahoma (Figure 1). The program represents a refinement over the *Groundwater Monitoring Interim Measures Workplan* (GMIM) (SFC, 1993) and provides the technical rationale for:

- updating the total number of monitoring wells;
- refining the constituents to be analyzed at each well;
- sampling frequency; and
- installing wells in locations warranting additional monitoring.

This groundwater monitoring program maintains adequate site monitoring over the areas of impacted groundwater and continues to monitor the plumes evolution and track changes in constituent concentrations while eliminating wells which are redundant, have the potential for cross-contamination of the groundwater zones, or produce inconclusive or, possibly, erroneous data.

Over 250 monitoring wells have been installed at the SFC facility. The data from these wells have contributed to the overall understanding of site conditions, such as hydrogeology, presence or absence of constituents of concern, plume geometry, and temporal changes in plume concentration and geometry. With site conditions defined, the objective of future monitoring will be to observe changes in concentrations or movement of the plumes rather than to continue defining plume geometries. This objective can be met by monitoring fewer wells, less frequent-

ly, and with fewer analyses than were needed when an understanding of the site was not as advanced as it is now.

Wells recommended for elimination from the GMIM Workplan are:

- screened across more than one groundwater zone (across Unit 1 Sandstone) and could cause cross-contamination of the waters;
- redundant and contributing little to the understanding of plume movement;
- completed in a fashion which may compromise the interpretation of groundwater quality data; or
- have historically produced little or no water (periodically dry).

The rationale for installation of additional monitoring wells is also presented. The locations of the proposed wells will provide information about constituent concentrations in the southwest portion of the site where a limited number of monitoring wells exist.

The net result of the proposed refinement to the monitoring program will be a reduction in the number of monitoring wells by 28 percent (from 205 wells to 147 wells), reduction of analyzed constituents by 10 percent, and continuation of annual sampling only thus eliminating semi-annual, quarterly, or monthly sampling of monitoring wells (except as described in Section 5.3).

2.0 HISTORICAL BACKGROUND

Groundwater monitoring was initiated at the SFC site in 1973. Between the 1973 and 1990, approximately 108 groundwater monitoring wells were installed and monitored on the facility and on neighboring properties. Between 1990 and 1992, the Facility Environmental Investigation (FEI) resulted in the addition of 173 groundwater monitoring wells.

Many of the monitoring wells installed in the 1970s and 1980s have been plugged for various reasons. Most of the remaining wells were replaced by FEI groundwater monitoring wells as design and installation deficiencies of the pre-FEI wells were recognized. Those deficiencies included inappropriate screen lengths, inadequate surface and borehole annulus seals, damaged well casings, and incomplete or missing completion details.

Currently, 205 monitoring wells covering the 200-acre Industrial Area are being monitored in accordance with the GMIM monitoring program. The wells are sampled annually during April or May with some wells being sampled semi-annually during October. Selection of wells for semi-annual monitoring rather than annual was based on one or more of the following criteria:

- Well location is either upgradient or downgradient of a plume and was expected to provide information about plume evolution.
- The well, located in a source area, provided information about the source's activity.
- A historical groundwater monitoring database was being established for the facility.

Additionally, 19 monitoring wells in the fertilizer pond area and five wells in other areas of the facility are being monitored quarterly pursuant to SFC's Nuclear Regulatory Commission license. Two of the five wells also are monitored monthly for uranium and nitrate.

Special sampling events were conducted as part of the FEI to determine if additional constituents were present in facility groundwaters. The special sampling events included broad-based testing for metals and organic constituents. Arsenic was added to the list of routine parameters beginning in October, 1991, based on results from a special sampling event.

As part of the GMIM sampling program, routine sampling events occurring annually (and to a lesser extent semi-annually, quarterly, or monthly) included analysis for total concentrations of uranium, nitrate (as nitrogen), fluoride, and arsenic.

3.0 SITE HYDROGEOLOGY

The site hydrogeology plays an important role in the refinement of a monitoring plan. Site hydrogeologic conditions were used to identify areas of groundwater flow and constituent transport, areas where groundwater zones are separated, and areas where waters have the potential for interaction. Identification of these areas is essential to interpret constituent concentrations, evaluate potential transport off-site, and support future remediation efforts, if needed, or support justification for a no-action option.

Based on the data presented in the Draft Site Characterization Report (SFC, 1996a), there are three primary groundwater zones identified at the SFC site. These zones are: 1) the Terrace zone, 2) the Shallow Bedrock zone, and 3) the Deep Bedrock zone. Cross-sections showing the positioning of these zones and related hydrostratigraphy are included in Appendix A. The groundwater in the zones is described as being of poor to fair quality and is considered to be "least favorable" in terms of groundwater development (SFC, 1996a).

The Terrace zone includes the terrace deposits and the Unit 1 Shale. The depth to groundwater in the Terrace zone is variable, ranging from 5 to over 12 feet below ground surface (bgs), and decreases towards the west. Groundwater present in this zone is perched on top of the highly cemented Unit 1 Sandstone which appears to be a confining unit separating the Terrace zone from the underlying Shallow Bedrock zone. Groundwater flow directions in this zone approximate radial flow outward from the center of the process area, following the topography of the Unit 1 Sandstone (SFC, 1996a).

The Shallow Bedrock zone underlies the Terrace zone and is confined between the Unit 1 Sandstone on the top and the Unit 4 Sandstone on the bottom. This groundwater zone consists of an interbedded series of shales and sandstones. Depth to groundwater in this zone generally ranges from 10 to 40 feet bgs. The groundwater flow direction in the Shallow Bedrock zone is generally toward the west, with some southwesterly and northwesterly components.

The Deep Bedrock zone underlies the Shallow Bedrock zone. These two zones are hydraulically separated by the Unit 4 Sandstone confining unit. The Deep Bedrock zone consists of Unit 5 Shale. Depth to groundwater is generally greater than 50 feet bgs in the Process Area and the flow direction is also generally toward the west, with some southwesterly components.

In the central portion of the facility, all three groundwater zones are hydraulically separated by the aforementioned confining units (Unit 1 Sandstone and Unit 4 Sandstone); thus the hydraulic communication between the groundwater zones is either absent or curtailed. Exceptions may occur where historical boreholes or monitoring wells were completed across more than one zone.

Moving toward the western and southwestern boundary of the site, the Unit 1 Sandstone (the upper confining unit) has been eroded away and is not present. In this region, the groundwater of the Terrace and Shallow Bedrock zones have the potential for interaction because there is not a continuous, competent confining unit separating the groundwater zones. The area where shallow groundwaters (Terrace and Shallow Bedrock) have the potential for interaction is shown in Figure 2.

Moving further west and southwest, the Unit 4 Sandstone (the lower confining unit) has also been eroded away. In this area, there is a potential for interaction of the groundwater from the Terrace, Shallow Bedrock, and Deep Bedrock zones, as indicated on Figure 2.

4.0 WELL SELECTION RATIONALE

The technical rationale for the selection of wells for the monitoring program was based on the following screening criteria:

- Wells located in close proximity to other wells, with similar constituent concentrations and completed in similar formations, were eliminated to avoid obvious redundancies.
- Boundary and background wells were kept to retain baseline measurements.

- Wells completed across two different groundwater zones which may have the potential for cross-contamination were eliminated.

- Monitoring wells with questionable or incomplete well completion records were eliminated to avoid acquisition of unreliable information.

- Wells that are periodically dry were eliminated. The lack (or limited quantities) of water in a monitoring well indicates that constituents, if present, have little potential for mobilization.

Tables 1, 2, and 3 present lists of the monitoring wells from the current GMIM groundwater monitoring program which represent the Terrace, Shallow Bedrock, and Deep Bedrock zones, respectively. The tables provide the rationale for elimination of wells based on the above screening criteria. Wells recommended to be retained are those which measure constituent concentrations in source areas, are positioned down or upgradient of the plumes to detect constituent mobility, and those that provide background or baseline concentrations. Site boundary wells in the direction of groundwater flow were also retained to detect constituent mobility off the SFC property.

4.1 Additional Monitoring Wells

The Cherokee Nation wells, located on US Army Corps of Engineers property along the west perimeter of the facility (Wells STA-1 through STA-11), are not included in the recommended monitoring program due to inadequate data provided on the well boring logs and questionable well completions. In addition, some of the wells are located in low lying areas which are subject to flooding from the Robert S. Kerr Reservoir.

TEC recommends the addition of three monitoring wells located southwest and west of the Fertilizer Pond Area. These wells (proposed MW1, MW2, and MW3, as shown in Figure 1) are recommended for installation to provide additional coverage of the nitrate plume which has been identified in this area. These wells should be completed in a similar fashion to those installed as part of the FEI program. The wells should be two inches in diameter and completed

approximately 30 feet in depth with 10 feet of screen. At this depth, the wells will monitor the Shallow Bedrock zone and may be in an area where there is a potential for interaction between waters of the Terrace zone and Shallow Bedrock zone, as shown on Figure 2.

5.0 GROUNDWATER MONITORING PROGRAM

5.1 Monitoring Wells

Wells included in the recommended groundwater monitoring program are summarized in Table 4. As shown, a total of 147 wells are selected for monitoring, this includes: 58 Terrace zone monitoring wells, 75 Shallow Bedrock wells, 11 Deep Bedrock monitoring wells, and 3 new Shallow Bedrock wells recommended for installation. Wells not retained in the groundwater monitoring program will be available for sampling on an intermittent basis, if needed, to provide additional definition of plume geometries.

5.2 Constituents

During each sampling event, the groundwater monitoring wells presented in Table 4 should be analyzed to determine the total concentration of one or more of the following constituents: uranium, nitrate (as nitrogen), fluoride, and arsenic. Parameters recommended for analysis per individual well are also included in Table 4. Selection of parameters was based on:

- Position of monitoring well in relation to the constituent plumes. For example, wells located upgradient of a nitrate plume would not need to be sampled for nitrate. Background wells are excluded since these wells are used for tracking baseline water quality.

- A review of historic data. Parameters indicating historically non-detected concentrations were eliminated.

Quality Assurance/Quality Control measures, as described in detail in the GMIM Workplan, are recommended for continuation as part of this groundwater monitoring program.

5.3 Frequency and Sampling

The wells recommended for future monitoring and presented in Table 4 should be sampled annually. Based on a review of historical data trends and on the slow groundwater flow velocities (SFC, 1993; SFC, 1996a), annual sampling of wells will be sufficient to detect changes in constituent movement or concentrations. If annual sampling indicates anomalous results, sampling frequencies may be temporarily changed for affected wells. Also, confirmatory samples may be obtained when analytical results indicate potential outliers.

Sampling protocol for future sampling events should be based on RCRA's document *"Technical Enforcement Guidance Document"*. The protocol is described in detail in the GMIM.

6.0 CONCLUSION

This groundwater monitoring program of 147 wells with a refined number of constituents provides ample information about the site's groundwater conditions and preserves the overall quality of groundwater monitoring. The program will continue to contribute to the development of a coherent picture of groundwater impacts. The recommendation to install additional wells where data are lacking will also enhance the understanding of the impacts to groundwater in this area.

7.0 REFERENCES

Sequoyah Fuels Corporation (SFC), 1993, "Groundwater Monitoring Interim Measures Workplan", November 19, 1993.

SFC, 1995, "Draft RCRA Facility Investigation Report", December 26, 1995.

SFC, 1996a, "Draft Site Characterization Report", February 2, 1996.

SFC, 1996b, "Selected Document Review for SFC Groundwater Monitoring Program", April 3, 1996.

Table 1
Groundwater Monitoring Program
Terrace Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW001	SE/Main Process Bldg.	Terrace, 1 Shale	0.008-0.03	<5.0	1.3-1.7	1.0	Yes	Similar or lower concentration as MW003 located downgradient in close proximity.
MW002	SE/Main Process Bldg.	Terrace, 1 Shale	0.008-0.02	<5.0	1.0-1.4	ND	Yes	Similar concentration as MW003 located downgradient in close proximity.
MW003	**S/Main Process Bldg.**	**1 Shale**	**<0.005-0.03**	**<5.0**	**<1.0**	**0.8-1.3**	**No**	
MW004	SE/Main Process Bldg.	Terrace, 1 Shale	0.0075	<5.0-5.5	<1.0	ND	Yes	Similar concentration as MW003 located approximately 125' away.
MW005	**SE/Main Process Bldg.**	**Terrace, 1 Shale**	**<0.005**	**<5.0**	**<1.0**	**0.2**	**No**	**Background well.**
MW006	E/Main Process Bldg.	Terrace, 1 Shale	<0.005	<5.0	0.9-1.3	ND	Yes	Similar concentration as MW005 & 7 located approximately 100' from each.
MW007	**NE/Main Process Bldg.**	**1 Shale**	**<0.005**	**<5.0**	**1.3-1.5**	**0.7**	**No**	**Background well.**
MW008	**E/Main Process Bldg.**	**1 Shale**	**<0.005**	**<5.0**	**32-52**	**ND**	**No**	
MW009	S/Main Process Bldg.	Terrace, 1 Shale	0.009-0.28	<5.0-26.0	<1.0	0.5	Yes	Similar concentration as MW032 located approximately 150' downgradient.
MW010	**SW/Main Process Bldg.**	**Terrace, 1 Shale**	**0.05-0.15**	**7000-14000**	**3-16**	**1.4-3.7**	**No**	**Indicator of extraction well effectiveness.**
MW011	SW/Main Process Bldg.	Terrace, 1 Shale	0.01-0.02	<5.0	<1.0	ND	Yes	Similar or lower concentrations as MW018 located approximately 25' away.
MW012	**NW/Main Process Bldg.**	**1 Shale**	**<0.005**	**500-230**	**150-170**	**0.7-1.2**	**No**	
MW013	W/Main Process Bldg.	1 Shale	0.03-0.06	8-20	75-140	1.0	Yes	Similar concentration as MW012 located approximately 125' away.
MW014	**NW/Main Process Bldg.**	**Terrace, 1 Shale**	**0.006-.008**	**1600-12000**	**30-50**	**1-13**	**No**	
MW015	**N/Main Process Bldg.**	**Terrace, 1 Shale**	**0.02-0.04**	**<5.0**	**650-800**	**0.3-0.7**	**No**	
MW016	N/Main Process Bldg.	1 Shale	0.02-0.12	<5.0	5.0-13.0	0.7-1.3	Yes	Similar concentration as MW017 located approximately 90' away.
MW017	**N/Main Process Bldg.**	**1 Shale**	**0.08-0.16**	**6.5-7.0**	**1.4-2.0**	**ND**	**No**	
MW018	**SW/Main Process Bldg.**	**Terrace, 1 Shale**	**0.02-0.16**	**24-2750**	**18-31**	**0.9-2.6**	**No**	

Table 1
Groundwater Monitoring Program
Terrace Groundwater System
(Continued)

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW019	SW/Main Process Bldg.	Terrace, 1 Shale	<0.005-0.01	<5.0-12.5	<1.0-1.0	0.4-0.6	No	
MW020	E/Main Process Bldg.	Terrace, 1 Shale	0.007-0.02	<5.0	<1.0	ND	Yes	Similar concentration as MW003 located in close proximity.
MW021	NE/Main Process Bldg.	Terrace, 1 Shale	<0.005-0.385	<5.0-38.0	<1.0-1.1	0.7-3.0	Yes	Concentrations have returned to near background which is monitored at MW007.
MW022	S/Main Process Bldg.	Terrace, 1 Shale	0.009-0.17	<5.0-7.3	<1.0-1.5	0.8	Yes	Similar concentration as MW003.
MW023	N/Main Process Bldg.	1 Shale	0.009-0.05	<5.0	<1.0-1.8	0.9-1.2	No	
MW024	W/Solvent Extraction Bldg.	1 Shale	<0.005-0.034	<5.0-47.0	466-605	ND	No	
MW025	N/Solvent Extraction Bldg.	1 Shale	<0.005	9330-57700	572-628	0.6-1.1	No	
MW026	S/Solvent Extraction Bldg.	1 Shale	<0.005	<5.0	<1.0-1.1	ND	No	
MW027	E/Solvent Extraction Bldg.	1 Shale	<0.005	<5.0-5.3	23-30	0.5-0.8	Yes	Area is adequately monitored by MW025 and MW012. Both wells are located approximately 90' away.
MW028	S/Main Process Bldg.	Terrace, 1 Shale	0.03-0.25	<5.0	<1.0-0.7	0.6	Yes	Similar concentration as MW003 located in close proximity.
MW029	N/Decorative Pond	Terrace	0.007-0.04	<5.0	<1.0	<1.0	Yes	Similar or lower concentrations as MW032 located approximately 50' away.
MW030	NW/Decorative Pond	Terrace	0.02-0.05	<5.0	<1.0	<1.0	No	
MW031	NW/Decorative Pond	Terrace, 1 Shale	<0.005	<5.0	<1.0	ND	No	
MW032	NE/Decorative Pond	Terrace, 1 Shale	0.07-0.16	<5.0	<1.0	ND	No	
MW035	N/ Pond 1 Spoils	Terrace	<0.005-0.08	88-6510	2-150	ND	No	
MW036	W/Sanitary Lagoon on Pond 1 Spoils	Terrace, 1 Shale	<0.005-0.017	<5.0	29-33	0.3-0.4	No	
MW037	NW/Pond 1 Spoils	Terrace	0.008	ND	ND	ND	No	Limited data. Periodically dry.

Table 1
Groundwater Monitoring Program
Terrace Groundwater System
(Continued)

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW038	W/Pond 1 Spoils	Terrace	<0.005-0.02	<5.0	<1-2	0.3-0.8	Yes	Periodically dry. Similar concentration as MW039 located approximately 150' away.
MW039	N/Clarifier A and W/Pond 1 Spoils	Terrace	<0.005	<5.0	1.0-7.0	0.5-1.3	No	
MW040	N/Clarifier 1A	Terrace	0.10-0.63	<5.0	1420-1440	10-17	No	
MW041	W/Pond 2	Terrace	ND	ND	ND	ND	Yes	No data. Periodically dry.
MW042	S/South Yellowcake Sump	Terrace	1.7-7.7	<5.0-5.9	0.3-4.0	3-11	No	
MW043 (1)	S/Outfall 001	2 Shale	0.2-0.5	<5.0	<1.0-2.4	0.8-1.1	No	
MW045	NE/Pond 2	Terrace	0.007	ND	1.0	ND	No	Limited data. Periodically dry.
MW046	N/Pond 2	1 Sandstone, 2 Shale	ND	ND	ND	ND	No	
MW047	NW/Pond 2	Terrace	0.017	<5.0	<1.0	0.2	No	
MW048 (1)	W/Pond 2	2 Sandstone	ND	<5.0	2.5	ND	No	
MW049 (1)	S/Fluoride Basin #2	Terrace, 2 Shale	<0.005-0.1	<5.0	<1.0	ND	No	
MW050 (1)	N/Fluoride Basin #2	Terrace, 2 Shale	<0.005	<5.0	1.1	ND	No	
MW051 (1)	W/Pond 2	Terrace, 2 Sandstone	0.063	<5.0	433	1.2	No	
MW052 (1)	W/Fluoride Basin #2	Terrace, 2 Shale, 2 Sandstone	ND	ND	ND	ND	No	Periodically dry.
MW053	S/Emergency Basin	Terrace, 1 Shale	<0.005	12-53	1.5-3.6	1.2	No	
MW054	W/Pond 1 Spoils Pile	Terrace, 1 Shale	0.09-0.22	<5.0-7.4	575-754	0.7-0.9	No	
MW055	N/Clarifier 4A	Terrace, 1 Shale	0.05-0.08	<5.0	115-202	0.4	No	
MW056 (1)	NW/Incident Sod Storage Area	2 Shale	ND	ND	ND	ND	Yes	No data. Periodically dry.

Table 1
Groundwater Monitoring Program
Terrace Groundwater System
(Continued)

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW057	SW/Pond 2	Terrace	<0.005	<5.0	<1.0	0.3	No	
MW058 (1)	S/Pond 2	Terrace, 2 Shale	ND	ND	ND	ND	No	Periodically dry.
MW062 (1)	S/Fluoride Basin #1	Terrace, 2 Sandstone	0.02-0.04	<5.0	ND	0.5	No	
MW063 (1)	S/Lime Neutralization Area	2 Sandstone	<0.005-0.02	<5.0	ND	<0.2-6.5	No	
MW064	E/Fluoride Basin #1	Terrace	3.5	ND	ND	ND	No	
MW065	S/Fluoride Clarifier Basin	Terrace	0.1-0.2	<5.0	<1.0-1.7	0.6-0.8	No	
MW066	S/Yellowcake Storage Pad	1 Shale	0.02-0.12	<5.0	1.2-2.4	ND	No	
MW067	NW/Solid Waste Burial #2	Terrace	<0.005	<5.0	1.2-1.7	1.3	No	
MW068	NE/Solid Waste Burial #2	Terrace	ND	42.2	0.7	ND	No	
MW069	N/Interim Storage Cell	Terrace	<0.005	<5.0	<1.0	ND	Yes	Similar concentration as MW068 located approximately 190' away.
MW070	NE/DUF$_4$ Bldg.	Terrace, 1 Shale	<0.005	ND	1.3-2.4	ND	Yes	Background is adequately monitored by MW072 located approximately 190' away.
MW072	E/DUF$_4$ Bldg.	Terrace, 1 Shale	<0.005-0.006	<5.0	<1.0-2.4	0.7	No	Background well.
MW073	E/OG&E Yard	1 Shale	<0.005	ND	2.2-3.1	ND	Yes	Background is adequately monitored by MW072 located in close proximity.
MW074 (1)	E/Lime Neutralization Area	2 Sandstone	0.007-0.011	5.3	1.3	0.8	Yes	Similar concentration as MW063 located approximately 100' away. Periodically dry.
MW075	S/Incinerator	Terrace, 1 Shale	<0.005-0.37	<5.0	3.2-3.3	ND	No	
MW076	Yellowcake Strg. Pad	Terrace, 1 Shale	<0.005	10.0-11.6	1.0-1.5	ND	No	
MW077	NW/DUF$_4$ Bldg.	Terrace, 1 Sandstone	<0.005	<5.0	<1.0-0.4	ND	No	
MW078	SE/Solid Waste Burial #2	Terrace	0.011-0.013	7.0-16.0	<1.0-0.9	ND	No	

Table 1
Groundwater Monitoring Program
Terrace Groundwater System
(Continued)

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW079	**UF_6 Cylinder Pad**	**Terrace, 1 Shale**	**<0.005-0.126**	**8-13**	**<1.0**	**1.1-1.6**	**No**	
MW080	W/DUF_4 Bldg.	Terrace, 1 Shale	<0.005	<5.0	<1.0	ND	Yes	Background is adequately monitored by MW072.
MW082	**E/Pond 2**	**Terrace**	**0.01-0.09**	**17-30**	**85-106**	**ND**	**No**	
MW083	SE/DUF_4 Bldg.	Terrace, 1 Shale	<0.005	<5.0	<1.0	ND	Yes	Background is adequately monitored by MW072.
MW084	**SW/Misc. digestion on Yellowcake Pad**	**1 Shale**	**<0.005**	**7-17**	**<1.0**	**1.1**	**No**	
MW085	SW/Main Process Bldg. on Yellowcake Pad	1 Shale	<0.005	<5.0-9.2	<1.0	ND	Yes	Similar concentration as MW019 located in close proximity.
MW086	NE/Cooling Tower	Terrace, 1 Shale	<0.005-0.01	<5.0	<1.0-11.4	0.4-0.8	Yes	Similar concentration as MW079.
MW087	**SE/Solid Waste Burial #2**	**Terrace**	**0.05-0.1**	**<5.0-20.3**	**<1.0**	**0.7**	**No**	
MW097	**W/Pond 2 at Property Line**	**Terrace**	**ND**	**<5.0**	**<1.0**	**0.2**	**No**	**Boundary well.**
MW102	**S/Clarifier 2A**	**1 Shale**	**<0.005-0.006**	**7.0-9.0**	**<1.0-1.7**	**0.6-1.1**	**No**	
MW103	**W/Clarifier 3A**	**Terrace**	**ND**	**<5.0**	**287-453**	**ND**	**No**	
2301A	NW/Emergency Basin	1 Shale, 1 Sandstone	<0.53-0.04	<5.0-33.5	<1.0-1.6	0.4	Yes	Similar concentration as MW087 located approximately 160' away.
2302A	**SW/Emergency Basin**	**Terrace**	**<0.005-0.008**	**<5.0**	**<1.0-1.2**	**<0.2-0.3**	**No**	

Notes:

mg/l = milligram per liter.

ug/l = microgram per liter.

Elim. = Eliminated

ND = No data available.

DUF_4 = Depleted Uranium Tetrafluoride.

UF_6 = Uranium Hexafluoride.

(1) Well samples water from the terrace and shallow ground water zones.

Bold type indicates wells included in the ground water monitoring program.

Table 2
Groundwater Monitoring Program
Shallow Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW002A	SE/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0-8.2	1.5-2.0	ND	Yes	Similar concentration as MW005A located approximately 110' away. Screened in similar formation.
MW003A	S/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.02	<5.0	2.2	ND	No	
MW004A	SE/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.1	<5.0	1.5-2.0	ND	Yes	Similar concentration as MW003A. Screened in similar formation.
MW005A	SE/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	1.1-1.8	0.5	No	Background Well.
MW006A	E/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	<1.0-3.0	ND	Yes	Similar concentration as MW005A & 7A located approximately 100' from each.
MW007A	NE/Main Process Bldg.	2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	2.6	0.8	No	Background well.
MW008A	E/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	3.3-4.0	0.6	No	
MW009A	S/Main Process Bldg.	2 Shale, 2 Sandstone, 3 Shale	0.1-0.13	<5.0	2.5	0.6	Yes	Similar concentration as MW003A.
MW010A	SW/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.02	<5.0	3-4	0.6	No	Indicator of recovery well efforts.
MW011A	SW/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.02	<5.0	7-16	ND	Yes	Similar or lower concentrations as MW 018A located approximately 50' away.
MW012A	NW/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.03	11500-21200	83-144	0.4	No	
MW013A (1)	W/Main Process Bldg.	1 Shale, 1 Sandstone, 2 Shale,	0.02-0.18	20-35	15-30	0.5-1.3	No	
MW014A	NW/Main Process Bldg.	2 Shale, 2 Sandstone, 3 Shale	<0.005-0.016	95-7360	24-84	0.6-2.2	No	
MW016A	N/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.02	<5.0-36.5	3-6	ND	Yes	Similar concentration as MW017A located approximately 90' away. Screened in similar formation.
MW017A	N/Main Process Bldg.	2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0-30	1.2	ND	No	
MW018A	SW/Main Process Bldg.	2 Shale, 2 Sandstone, 3 Shale	0.01-0.13	<5.0	4-5	0.5	No	Indicator of recovery well efforts.
MW019A	SW/Main Process Bldg.	2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	<1.0-1.4	ND	Yes	Similar concentration as MW010A. Screened in similar formation.
MW020A	E/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	2.0-2.5	ND	Yes	Similar concentration as MW005A located approximately 125' away. Screened in similar formation.
MW021A	NE/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	1.8-2.6	ND	No	
MW022A	S/Main Process Bldg.	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.03	<5.0	2-6	ND	Yes	Similar concentration as MW003A. Screened in similar formation.
MW024A (1)	W/Solvent Extraction Bldg.	1 Shale, 1 Sandstone, 2 Shale, 2 Sandstone	<0.005-0.05	43-1950	255-346	ND	No	

Table 2
Groundwater Monitoring Program
Shallow Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW025A	N/Solvent Extraction Bldg.	2 Shale, 2 Sandstone	<0.005-0.01	930-1582	247-312	0.4	No	
MW026A	S/Solvent Extraction Bldg.	2 Shale, 2 Sandstone	0.006-0.05	12-15	9-100	ND	Yes	Solvent Extraction bldg. is adequately monitored by MW024A and MW025A.
MW027A (1)	E/Solvent Extraction Bldg.	1 Shale, 1 Sandstone, 2 Shale, 2 Sandstone	<0.005	11-33	72-112	0.3	Yes	Area adequately monitored by MW025A and 012A. Both wells are located approximately 90' away. Completed across terrace and shallow systems.
MW028A	S/Main Process Bldg.	2 Shale, 2 Sandstone, 3 Shale	0.01-0.2	<5.0	4-5	0.6	Yes	Similar concentration as MW018A located approximately 90' away. Screened in similar formation.
MW030A	NW/Decorative Pond	2 Shale, 2 Sandstone, 3 Shale	0.03-0.11	<5.0	2.4-2.8	ND	Yes	Similar concentration as MW032A located approximately 110' away.
MW031A	NW/Decorative Pond	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	0.03-0.11	<5.0	1.9-2.4	ND	No	
MW032A	NE/Decorative Pond	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	0.03-0.14	<5.0	2.6-2.8	ND	No	
MW035A	N/ Pond 1 Spoils	2 Sandstone, 3 Shale 3 Sandstone	0.006-0.062	<5.0-14.0	22-389	ND	No	
MW036A	W/Sanitary Lagoon on Pond 1 Spoils	2 Shale, 2 Sandstone	<0.005	<5.0	30.0-32.5	ND	No	
MW037A	NW/Pond 1 Spoils	4 Shale, 4 Sandstone	<0.005	<5.0	50-70	ND	No	
MW038A	W/Pond 1 Spoils	2 Sandstone, 3 Shale	<0.005-0.013	<5.0	2.6-144	0.6	Yes	Similar concentration as nearby wells MW037A & 39A located in close proximity.
MW039A	N/Clarifier A and W/Pond 1 Spoils	3 Sandstone, 4 Shale	<0.005	<5.0	60-70	ND	No	
MW040A	N/Clarifier 1A	2 Shale, 2 Sandstone	<0.005-0.009	<5.0	100-110	ND	No	
MW041A	W/Pond 2	2 Sandstone, 3 Sandstone, 4 Shale	<0.005	<5.0	<1.0-2.0	ND	Yes	Periodically dry. Similar concentration as MW051A located 190' away.
MW042A	S/South Yellowcake Sump	2 Shale, 2 Sandstone 3 Sandstone	<0.053-0.12	<5.0	17-19	0.5-1.7	No	
MW045A	NE/Pond 2	2 Shale, 2 Sandstone	<0.005	22-23	3.0-4.0	ND	Yes	Periodically dry. Similar concentration as 2303A.
MW046A	N/Pond 2	3 Shale, 3 Sandstone	0.06-0.3	<5.0	810-1680	ND	No	
MW047A	NW/Pond 2	2 Shale, 2 Sandstone 3 Sandstone	0.02-0.08	21.8	44-163	0.3	No	
MW048A	W/Pond 2	3 Shale, 3 Sandstone	<0.005	ND	ND	ND	Yes	Periodically dry. Insufficient data.
MW049A	S/Fluoride Basin #2	2 Sandstone, 3 Sandstone, 4 Shale	<0.005	<5.0-7.1	20-31	ND	No	

Table 2
Groundwater Monitoring Program
Shallow Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW050A	N/Fluoride Basin #2	3 Sandstone	<0.005-0.02	485-800	20-21	<1.0	No	
MW051A	W/Pond 2	3 Shale, 3 Sandstone	0.2-0.6	<5.0-8.2	1530-2100	<1.0	No	
MW052A	W/Fluoride Basin #2	2 Sandstone, 3 Shale, 3 Sandstone, 4 Shale	<0.005	<5.0	<1.0	ND	No	
MW053A	S/Emergency Basin	1 Sandstone, 2 Shale, 2 Sandstone	<0.005	<5.0	48-95	0.3-0.5	No	
MW057A	SW/ Pond 2	2 Sandstone, 3 Sandstone, 4 Shale	<0.005	5.8-6.2	2690-3480	3.4-3.5	No	
MW058A	S/Pond 2	2 Sandstone, 3 Sandstone, 4 Shale	1.1-2.5	<5.0-7.5	2860-4330	2.4-2.6	No	
MW059A	SW/Pond 2	2 Sandstone, 3 Sandstone, 4 Shale	1.6-2.7	<5.0	1620-2890	2.6-3.2	No	
MW060A	SE/Pond 2	3 Shale, 3 Sandstone, 4 Shale	<0.005-0.22	<5.0	98-135	0.4-0.6	No	
MW061A	W/Fluoride Basin #1	3 Shale, 3 Sandstone, 4 Shale	0.52-1.52	<5.0	<1.0-1.1	1.1-2.1	No	
MW062A	S/Fluoride Basin #1	2 Sandstone, 3 Sandstone, 4 Shale	0.05-0.3	<5.0	<1.0	0.5-1.0	No	
MW063A	S/Lime Neutralization Area	3 Sandstone, 4 Shale	<0.005	<5.0	<1.0	0.4-0.6	No	
MW064A	E/Fluoride Basin #1	2 Sandstone, 3 Shale, 3 Sandstone, 4 Shale	1.2-3.5	<5.0	5-11	0.6-12.0	No	
MW065A	S/Fluoride Clarifier Basin	2 Sandstone, 3 Sandstone, 4 Shale	0.78-1.02	<5.0	1.4-4.8	1.2-1.9	No	
MW066A (1)	S/Yellowcake Storage Pad	1 Shale, 1 Sandstone, 2 Shale	0.02-0.08	<5.0	2.0-3.0	ND	No	
MW067A	NW/Solid Waste Burial #2	2 Shale, 2 Sandstone 3 Shale	<0.005	15-27	<1.0	1.2	No	
MW068A	NE/Solid Waste Burial #2	2 Shale, 2 Sandstone	0.005-0.01	<5.0-8.7	<1.0	ND	No	
MW069A	N/Interim Storage Cell	2 Shale, 2 Sandstone	<0.005	<5.0-5.5	<1.0	ND	Yes	Similar concentration as MW068A located approximately 190' away. Screened in similar formation.
MW070A	NE/DUF_4 Bldg.	2 Sandstone, 3 Shale, 3 Sandstone	<0.005	<5.0	2.4-4.6	ND	Yes	Background adequately monitored by MW072A located approximately 190' away.
MW071A	S/Port Road and S/Decorative Pond	2 Shale, 2 Sandstone, 3 Sandstone, 4 Shale	<0.005-0.013	<5.0	<1.0	ND	No	
MW072A (1)	E/DUF_4 Bldg.	1 Shale, 1 Sandstone, 2 Shale	<0.005	<5.0	<1.0-2.2	0.4	No	Background well.
MW073A	E/OG&E Yard	2 Shale, 2 Sandstone, 3 Shale	0.005-0.008	<5.0	3.9-6.0	ND	Yes	Background adequately monitored by MW072A located in close proximity.

Table 2
Groundwater Monitoring Program
Shallow Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW075A	S/Incinerator	2 Shale, 2 Sandstone, 3 Shale	<0.005	<5.0	22-46	ND	No	
MW076A (1)	Yellowcake Strg. Pad	1 Shale, 1 Sandstone, 2 Shale	<0.005	<5.0-41.0	<1.0-15.0	ND	No	
MW077A	NW/DUF_4 Bldg.	2 Shale, 2 Sandstone, 3 Sandstone, 4 Shale	<0.005	<5.0	<1.0	ND	No	
MW078A	SE/Solid Waste Burial #2	1 Sandstone, 2 Shale, 2 Sandstone, 3 Shale	<0.005-0.006	7.6-25.0	<1.0	ND	No	
MW079A	UF_6 Cylinder Pad	2 Shale, 2 Sandstone, 3 Sandstone, 4 Shale	<0.005	<5.0	2.6-3.6	ND	No	
MW080A	W/DUF_4 Bldg.	2 Shale, 2 Sandstone, 3 Sandstone, 4 Shale	<0.005	<5.0	1.3-1.8	ND	Yes	Similar or lower concentration as MW079A located in close proximity. Screened in similar formation.
MW081A	N/DUF_4 Bldg.	2 Shale, 2 Sandstone, 3 Sandstone, 4 Shale	<0.005	27-36	<1.0	ND	No	
MW082A	E/Pond 2	2 Shale, 2 Sandstone, 3 Shale	<0.053-0.11	<5.0-22.0	112-502	0.4-0.6	No	
MW083A	SE/DUF_4 Bldg.	2 Shale, 3 Shale, 4 Shale	<0.005	<5.0	<1.0	ND	Yes	Similar or lower concentration as MW079A located in close proximity.
MW084A	S/Misc. digestion Yellowcake Pad	2 Shale	<0.005	<5.0	<1.0	0.3	No	
MW085A	SW/Main Process Bldg. on Yellowcake Pad	2 Shale	<0.005-0.12	<5.0	1.0-1.6	ND	Yes	Similar concentration as MW066A.
MW086A	NE/Cooling Tower	2 Shale, 3 Shale	<0.005-0.006	194-270	44-79	0.3	Yes	Similar or lower concentration as MW012A.
MW087A	SE/Solid Waste Burial #2	3 Sandstone, 4 Shale	<0.005-0.08	12-54	<1.0-2.3	0.4	No	
MW088A	N/Fluoride Basin #2	2 Shale, 2 Sandstone, 3 Sandstone	<0.005-0.005	<5.0-17.0	<1.0-1.0	ND	No	
MW089A	NW/Fluoride Basin #2	3 Sandstone	<0.005	<5.0	0.5-2.1	0.4-0.6	No	
MW091A	N/Stormwater Res.	3 Shale, 3 Sandstone, 4 Shale	<0.005-0.009	<5.0	<1.0	ND	No	
MW092A	S/Pond 2	3 Shale, 3 Sandstone, 4 Shale	<0.005	<5.0-46	2.0-68.0	<0.2-0.4	No	
MW093A	SW/Pond 2	3 Sandstone, 4 Shale	<0.005-0.006	<5.0	7.5-49.0	ND	No	
MW094A (1)	N/Pond 2 at Property Line	4 Shale, 4 Sandstone, 5 Shale	<0.005	<5.0	8-22	0.5	No	Boundary well.
MW095A	SW/Port Rd. at Property Line of Port Road	Terrace, 4 Shale, 4 Sandstone	<0.005-0.065	<5.0	9-507	<0.2-0.3	No	Boundary well.

Table 2
Groundwater Monitoring Program
Shallow Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW096A	N/Utility Line at Property Line	3 Sandstone, 4 Shale	<0.005	<5.0	3.3-6.0	ND	No	
MW097A	W/Pond 2 at Property Line	3 Sandstone, 4 Shale	<0.005	<5.0	<1.0	ND	No	Boundary well.
MW099A	N/Fluoride Basin #2	2 Sandstone, 3 Shale	0.005	<5.0	0.9-1.1	ND	No	
MW101A	SE/Fluoride Basin #1	3 Shale, 3 Sandstone, 4 Shale	<0.005	<5.0	<1.0	0.4-0.5	No	
MW102A	S/Clarifier 2A	1 Sandstone, 2 Shale, 2 Sandstone, 3 Sandstone, 4 Shale	<0.005-0.154	<5.0	2.4-3.6	0.6	No	
MW103A	W/Clarifier 3A	2 Shale, 2 Sandstone, 3 Sandstone, 4 Shale	<0.053-0.114	<5.0	340-453	ND	No	
2301B	NW/Emergency Basin	3 Shale, 3 Sandstone	<0.005-0.062	<5.0-88	0.7-7.0	0.4-0.5	No	
2302B	SW/Emergency Basin	2 Shale, 2 Sandstone	<0.005-0.006	<5.0-5.0	45-74	0.3-0.5	No	
2303A	N/Clarifier 4A	2 Sandstone, 3 Shale, 3 Sandstone	<0.005	8.2-24.0	61-114	0.3-1.2	No	
2322A	NW/Pond 3W Fertilizer Pond Area	4 Shale, Sandstone Interbed 4 Shale	0.005	<5.0	136-2580	0.2-0.5	Yes	Questionable well completion.
2340A	SW/Pond 5 Fertilizer Pond Area	Shale, 3 Sandstone, 4 Shale	0.005-0.398	<5.0-6.9	38-2920	0.2-0.4	No	
2341	W/Pond 5 Fertilizer Pond Area	Sandstone Interbed, 4 Shale	0.005-0.023	<5.0-5.4	200-1420	0.2-0.4	No	
2342	S/Pond 5 Fertilizer Pond Area	4 Shale, 4 Sandstone	0.005	<5.0	0.9-40.5	0.2	Yes	Questionable well completion.
2343	W/Pond 6 Fertilizer Pond Area	Unknown	0.03-0.4	<5.0-5.3	1160-1860	0.2-0.5	Yes	No available completion record details.
2344	SW/Pond 6 Fertilizer Pond Area	Sandstone Interbed, 4 Shale, Sandstone Interbed	0.005	<5.0	27-36	0.2-0.4	No	
2345	S/Pond 5 Fertilizer Pond Area	Sandstone Interbed, 4 Shale	0.005	<5.0	<1.0-1.3	<0.2-0.4	No	
2346	SW/Pond 6 Fertilizer Pond Area	Sandstone Interbed, 4 Shale, Sandstone Interbed	0.005	5.3-8.6	92-360	0.2-0.3	No	
2347 (1)	E/Pond 6 Fertilizer Pond Area	1 Shale, 1 Sandstone, 2 Shale	0.005-0.213	<5.0	8-30	0.2-0.5	Yes	Area monitored by 2350. Completed across Terrace and Shallow ground water zones.
2348	NW/Pond 3E Fertilizer Pond Area	Sandstone Interbed, 4 Shale, Sandstone Interbed	0.018-0.025	<5.0	1190-3740	0.3-0.5	No	

Table 2
Groundwater Monitoring Program
Shallow Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
2349	**NW/Pond 4 Fertilizer Pond Area**	**Sandstone Interbed, 4 Shale, Sandstone Interbed**	**0.005**	**<5.0**	**107-399**	**<0.2-1.1**	**No**	
2350	**E/Pond 4 Fertilizer Pond Area**	**2 Sandstone, 3 Shale**	**0.005**	**<5.0**	**<1.0-2.3**	**0.3-0.5**	**No**	
2351	W/Pond 4 & E/Pond 3E Fertilizer Pond Area	3 Shale	0.016-0.714	<5.0	2030-4360	0.3-1.0	Yes	Poor Construction.
2352	W/Pond 4 & E/Pond 3E Fertilizer Pond Area	4 Shale	0.005	<5.0-9.9	1660-3170	0.2-0.3	Yes	Poor Construction.
2353	W/Pond 3E & E/Pond 3W Fertilizer Pond Area	Sandstone Interbed, 4 Shale	0.008	<5.0	124-282	0.2-0.4	Yes	Poor Construction.
2354	W/Pond 3E & E/Pond 3W Fertilizer Pond Area	3 Sandstone, 4 Shale	0.005-0.244	<5.0	414-1230	<0.2-0.5	Yes	Poor Construction.
2355	W/Pond 3W & E/Pond 5 Fertilizer Pond Area	3 Sandstone, 4 Shale	0.055	<5.0	29-496	0.2-0.4	Yes	Poor Construction.
2356	W/Pond 3W & E/Pond 5 Fertilizer Pond Area	Sandstone Interbed, 4 Shale	0.014	<5.0-7.2	65-786	0.3-0.4	Yes	Poor Construction.
FTP-2B	S/Pond 3W Fertilizer Pond Area	3 Sandstone, 4 Shale	ND	<5.0	<1.0-1.4	0.6-0.9	Yes	Area monitored by MW104B.

Notes:
mg/l = milligram per liter.
ug/l = microgram per liter.
Elim. = Eliminate
ND = No data available.
DUF_4 = Depleted Uranium Tetrafluoride.
UF_6 = Uranium Hexafluoride.
(1) Well is screened across two separated ground water zones.
Bold type indicates wells included in the ground water monitoring program.

Table 3
Groundwater Monitoring Program
Deep Groundwater System

Wells	Direction/Site Location	Screening Interval	As (mg/l)	U (ug/l)	NO3 (mg/l)	F (mg/l)	Elim.	Justification
MW007B	**NE/Main Process Bldg.**	**5 Shale**	**<0.005-0.01**	**<5.0-10.0**	**1.7-3.5**	**0.9-2.2**	**No**	**Background well.**
MW012B	**NW/Main Process Bldg.**	**5 Shale**	**0.011-0.015**	**15-20**	**10.5**	**2.0**	**No**	
MW050B	**N/Fluoride Basin #2**	**5 Shale**	**<0.005**	**<5.0**	**<1.0-1.7**	**2.0-2.3**	**No**	
MW059B	**SW/Pond 2**	**5 Shale**	**0.019-0.035**	**8-29**	**<1.0-3.8**	**2.2-2.6**	**No**	
MW062B	**S/Fluoride Basin #1**	**5 Shale**	**<0.005**	**<5.0**	**<1.0-1.1**	**0.9-1.4**	**No**	
MW072B	**E/DUF$_4$ Bldg.**	**5 Shale**	**<0.005**	**<5.0**	**<1.0-1.2**	**0.9-2.4**	**No**	**Background well.**
MW090B (1)	**NW/Pond 5 Fertilizer Pond Area**	**4 Sandstone, 5 Shale**	**<0.005-0.007**	**<5.0-5.1**	**<1.0-1.1**	**2.0-2.4**	**No**	
MW098B	**W/Pond 2 at Property Line**	**5 Shale**	**<0.005**	**<5.0**	**<1.0-1.7**	**ND**	**No**	**Boundary well.**
MW100B	**W/Fluoride Basin #2**	**4 Sandstone,5 Shale**	**<0.005**	**<5.0**	**<1.0-1.1**	**ND**	**No**	
MW104B	**S/Pond 3E Fertilizer Pond Area**	**5 Shale**	**<0.005-0.023**	**<5.0-8.0**	**<1.0-1.5**	**0.9-1.6**	**No**	
MW105B	**W/Pond 5 Fertilizer Pond Area**	**5 Shale**	**<0.005**	**<5.0**	**<1.0-1.2**	**0.9-2.1**	**No**	

Notes:
mg/l = milligram per liter.
ug/l = microgram per liter.
Elim. = Eliminate
DUF$_4$ = Depleted Uranium Tetrafluoride.
ND = No data available.
Bold type indicates wells included in the ground water monitoring program.
(1) Well MW090A reclassified as Deep Groundwater System Well MW090B based on geology of screened interval.

Groundwater Monitoring Program
Monitoring Wells and Constituents for Analysis

Well Identification	Constituents for Analysis
Terrace:	
MW003	U, NO3, As, F
MW005 (1)	U, NO3, As, F
MW007 (1)	U, NO3, As, F
MW008	NO3
MW010	U, NO3, As, F
MW012	U, NO3, F
MW014	U, NO3, F
MW015	NO3
MW017	As
MW018	U, NO3, As, F
MW019	U, NO3, As
MW023	F
MW024	U, NO3, F
MW025	U, NO3, As, F
MW026	U, NO3
MW030	U, NO3, As
MW031	U, NO3
MW032	As
MW035	U, NO3, As
MW036	U, NO3, As, F
MW037	U, NO3, As
MW039	U, NO3, As, F
MW040	U, NO3, As, F
MW042	U, NO3, As, F
MW043	U, NO3, As, F
MW045	U, NO3, F
MW046	U, NO3, F
MW047	U, NO3, F

Well Identification	Constituents for Analysis
MW048	U, NO3
MW049	U, NO3, As
MW050	U, NO3, As
MW051	U, NO3, As, F
MW052	U, NO3
MW053	U, NO3
MW054	U, NO3, As, F
MW055	U, NO3, As, F
MW057	U, NO3, F
MW058	U, NO3, As
MW062	U, As, F
MW063	U, As, F
MW064	U, As, F
MW065	U, NO3, As, F
MW066	U, NO3, As
MW067	U, NO3
MW068	U, NO3
MW072 (1)	U, NO3, As, F
MW075	U, NO3, As
MW076	U, NO3
MW077	U
MW078	U, NO3
MW079	U, NO3, F
MW082	U, NO3, As
MW084	U, NO3, As
MW087	U, NO3, As
MW097	U, NO3, As
MW102	U, NO3, As
MW103	U, NO3
2302A	U, NO3, As

Table 4

Groundwater Monitoring Program

Monitoring Wells and Constituents for Analysis

Well Identification	Constituents for Analysis
Shallow Bedrock Wells:	
MW003A	U, NO3, As
MW005A [1]	U, NO3, As, F
MW007A [1]	U, NO3, As, F
MW008A	NO3
MW010A	U, NO3, As, F
MW012A	U, NO3, As
MW013A	U, NO3, As
MW014A	U, NO3, F
MW017A	U
MW018A	U, NO3, As
MW021A	NO3
MW024A	U, NO3, As
MW025A	U, NO3, As, F
MW031A	U, NO3, As
MW032A	NO3, As
MW035A	U, NO3, As
MW036A	U, NO3
MW037A	U, NO3
MW039A	U, NO3
MW040A	U, NO3
MW042A	U, NO3, As, F
MW046A	U, NO3, As
MW047A	U, NO3, As, F
MW049A	U, NO3
MW050A	U, NO3, As, F
MW051A	U, NO3, As, F
MW052A	U, NO3

Well Identification	Constituents for Analysis
MW053A	U, NO3, F
MW057A	U, NO3, As, F
MW058A	U, NO3, As, F
MW059A	U, NO3, As, F
MW060A	U, NO3, As, F
MW061A	U, NO3, As, F
MW062A	U, NO3, As, F
MW063A	U, NO3, As, F
MW064A	U, NO3, As, F
MW065A	U, NO3, As, F
MW066A	U, NO3, As
MW067A	U, NO3, As, F
MW068A	U, NO3, As
MW071A	U, NO3
MW072A [1]	U, NO3, As, F
MW075A	U, NO3
MW076A	U, NO3
MW077A	U
MW078A	U, NO3
MW079A	U, NO3
MW081A	U
MW082A	U, NO3, As
MW084A	U, NO3, As
MW087A	U, NO3, As
MW088A	U, NO3
MW089A	U, NO3
MW091A	U, NO3, As
MW092A	U, NO3, As

Table 4

Groundwater Monitoring Program

Monitoring Wells and Constituents for Analysis

Well Identification	Constituents for Analysis
<u>Shallow Bedrock Wells (cont'd):</u>	
MW093A	U, NO3, As
MW094A	U, NO3, As
MW095A	U, NO3, As
MW096A	U, NO3
MW097A	U, NO3, As
MW099A	U, NO3
MW101A	U, NO3, As
MW102A	U, NO3, As
MW103A	U, NO3, As
2301B	U, NO3, As
2302B	U, NO3, As
2303A	U, NO3, As
2340A	NO3, As
2341	NO3, As
2344	NO3, As
2345	NO3, As
2346	NO3, As
2348	NO3, As
2349	NO3, As
2350	NO3, As

Well Identification	Constituents for Analysis
<u>Deep Bedrock Wells:</u>	
MW007B (1)	U, NO3, As, F
MW012B	U, NO3, As
MW050B	U, NO3, As
MW059B	U, NO3, As
MW062B	U, NO3, As, F
MW072B (1)	U, NO3, As
MW90B	U, NO3
MW098B	U, NO3, As
MW100B	U, NO3, As
MW104B	U, NO3, As
MW105B	U, NO3, As
<u>Recommended Wells:</u>	
Proposed MW1	NO3, As
Proposed MW2	NO3, As
Proposed MW3	NO3, As

<u>Notes:</u>

All listed wells will be monitored annually.

(1) Background Wells

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED: FIG. 1 DWG. NO. 6108-E1 MONITORING PROGRAM FOR SEQUOYAH FUELS FACILITY GORE, OKLAHOMA WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER: FIG. 1 6108-E1

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED:

FIG. 2 DWG. NO. 6108-E2 POTENTIAL INTERACTION OF GROUNDWATER ZONES FOR SEQUOYAH FUELS FACILITY GORE, OKLAHOMA

WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER:

FIG. 2 6108-E2

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

APPENDIX A

Cross-Sections of Primary Groundwater Zones

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED: GEOLOGICAL CROSS SECTION E-E', F-F' WITHIN THIS PACKAGE

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

D-4

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED: GEOLOGICAL CROSS SECTION LOCATION MAP WITHIN THIS PACKAGE

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

Appendix B

Well Completion Diagrams

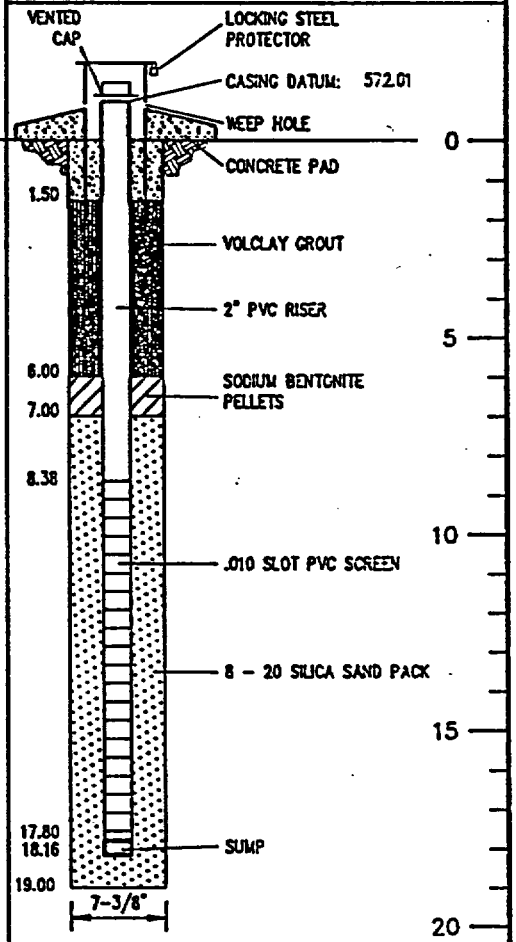
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION
		GROUND SURFACE: 569.90	
	0	CLAYEY SANDY SILT: 10 YR 4/2, DARK GRAYISH BROWN, ROOTLETS, GRASS, 65% SILT, 20% CLAY, 15% SAND	ML
	1.5	CLAYEY SILTY GRAVEL: 5 YR 5/8, YELLOWISH RED, SLIGHTLY MOIST, 50% GRAVEL, 30% CLAY, 20% SILT	GC
	3.0	SILTY CLAY: 2.5 Y 6/4, LIGHT YELLOWISH BROWN, LOW PLAST., SLIGHTLY MOIST, GRAVEL LENSES 5.0–6.0'	CL
	5		
	8.0	SHALE: 2.5 Y 5/4, LIGHT OLIVE BROWN INTERBEDDED WITH 2.5 Y 3/0, VERY DARK GRAY, HIGHLY WEATHERED, FRACTURED, OXIDATION ALONG BEDDING PLANES AT 9.0' TO TD.	SHALE
	10		
	15		
	20	T.D. 20.0'	
		NOTE: SANDSTONE AT 20.0'	
	25		
	30		
	35		

GRAPHIC LOG

SAMPLE INTERVAL	"N" VALUE
1	3.0
2	NR
3	0.8
	NR
4	0.5
	NR
5	0.5

WELL COMPLETION DETAIL



NOTE: WELL INSTALLED IN SEPARATE BOREHOLE APPROXIMATELY 5 FEET FROM LITHOLOGICAL BOREHOLE. WELL BOREHOLE DRILLED TO 19.00 FEET.

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH \ 90067*

BORING NUMBER *MW-7 (BH-14)*

DATE DRILLED 9/27/90
DRILLING METHOD HSA
DRILLED BY PSI/SE
LOGGED BY JMB
CHECKED BY BJS
DRAWN BY: SAR

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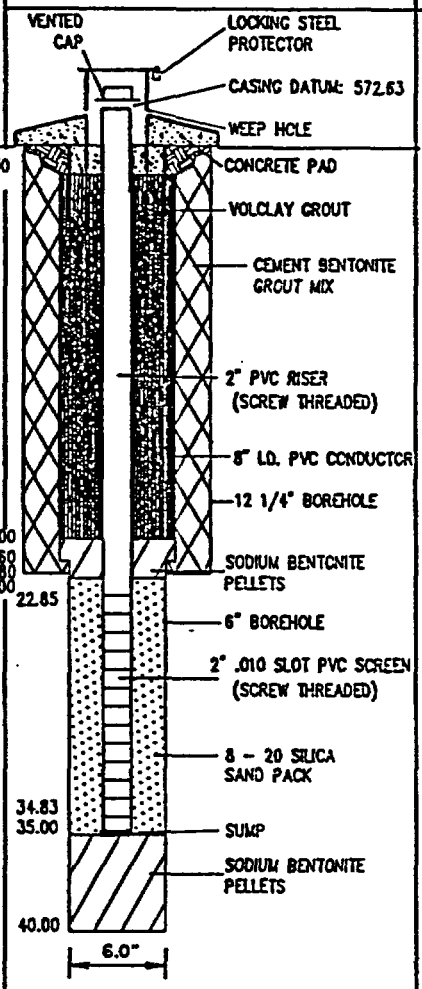
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		GROUND SURFACE: 570.20				
	0	CLAYEY SANDY SILT: 10 YR 4/2, DARK GRAYISH BROWN, ROOTLETS, GRAVEL, 65% SILT, 20% CLAY, 15% SAND	OL		1 3.0	
	1.5		GC		2	
	3.0	CLAYEY SILTY GRAVEL: 5 YR 5/8, YELLOWISH RED, SLIGHTLY MOIST, 50% GRAVEL, 30% CLAY, 20% SILT	CL		NR	
					3 0.8	
	8.0	SILTY CLAY: 2.5 Y 6/4, LIGHT YELLOWISH BROWN, LOW PLAST., GRAVEL LENSE AT 5.0–6.0', SLIGHTL MOIST	SHALE		NR	
	10	SHALE: 2.5 Y 5/4, LIGHT OLIVE BROWN, INTER-BEDDED 2.5 Y 3/0, VERY DARK GRAY, HIGHLY WEATHERED, FRACTURED, OXIDIZED ZONES, GROUNDWATER AT 15.2–15.4', OXIDATION ALONG BEDDING PLANES AT 9.0 TO T.D.			4 0.5	
10/5/90 ▽ 15.2'					NR	
					5 0.5	
					NR	
	20	SANDSTONE: 10 YR 5/3, BROWN, VERY FINE GRAIN VERY HARD	SANDSTONE		NS	
	20.8	SHALE: 7.5 YR 4/0, DARK GRAY, VERY HARD, SLIGHTLY MOIST, MINOR VERY FINE GRAIN SAND, INCREASES WITH DEPTH	SHALE		1	
	24.0	SILTY SANDSTONE: VERY FINE GRAIN SAND, 40% SILT, 7.5 YR 4/0, DARK GRAY, SLIGHTLY MOIST, HARD	SILTY SANDSTONE		2	
					NS	
	29.0					
	30	SANDSTONE: VERY FINE GRAIN, 7.5 YR 3/0, VERY DARK GRAY, VERY HARD, SLIGHTLY MOIST	SANDSTONE		3	
	32.0	SANDY SHALE: 20% VERY FINE GRAIN SAND, 7.5 YR 4/0, DARK GRAY, SLIGHTLY MOIST, HARD	SANDY-SHAL		NS	
					4	
					NS	
	40	T.D. 40.0' WATER LEVEL 33.7' AFTER DRILLING				
	50					
	60					
	70					

WELL COMPLETION DETAIL



CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-7A (BH-14 & BH-14A)*

DATE DRILLED 10/5/90
DRILLING METHOD AIR ROTARY
DRILLED BY POOL
LOGGED BY WEP
CHECKED BY BJS
DRAWN BY: SAR PAGE 1 OF 1

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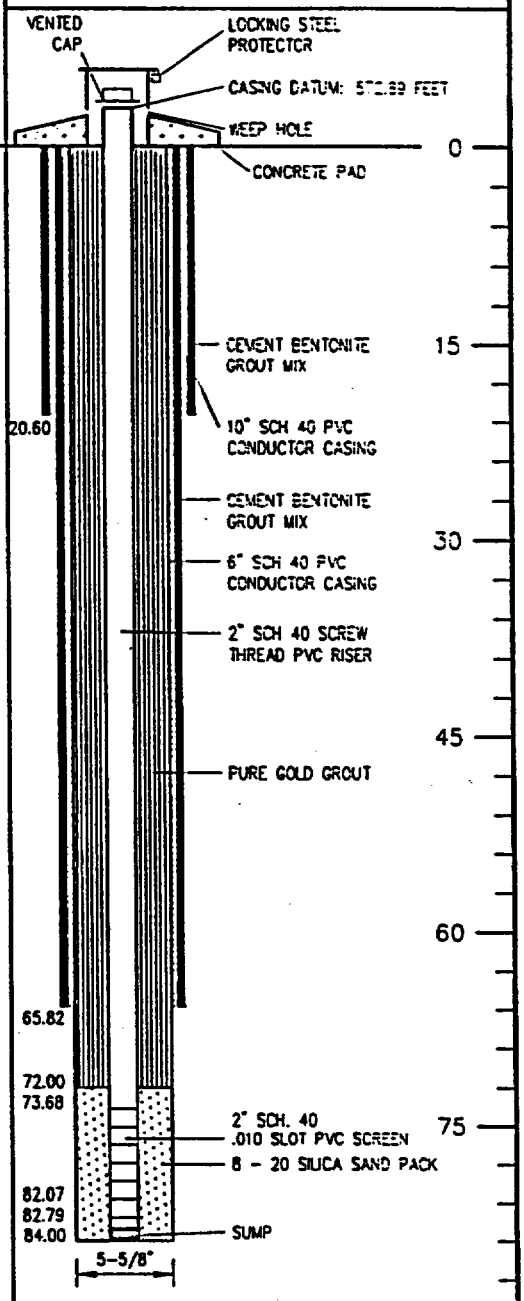
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION
		GROUND SURFACE: 570.29 FEET	
	0	CLAYEY SANDY SILT:	ML
	1.5	CLAYEY SILTY GRAVEL:	GW
	3.0	CLAY:	CH
▽ 9.8	7.0	SHALE:	SHALE
	15		
	20.0	SANDSTONE:	SANDSTONE
	22.4	SHALE:	SHALE
	24.0	SANDSTONE:	SANDSTONE
	25.7	SHALE:	SHALE
	29.4 30	SANDSTONE:	SANDSTONE
▽ 34.58			
	36.8	SANDY SHALE:	SHALE
	38.5	SANDSTONE:	SANDSTONE
	45	SHALE:	SHALE
	60		
	61.2	SANDSTONE:	SANDSTONE
	70.8	SHALE:	SHALE
	75		
	84.0	TOTAL DEPTH: 84.0 FEET FOR COMPLETE LITHOLOGIC DESCRIPTION, SAMPLE INTERVAL AND "N" VALUE SEE BH-113.	
	90		
	105		

GRAPHIC LOG | SAMPLE INTERVAL | "N" VALUE

WELL COMPLETION DETAIL



CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)
NR: NO RECOVERY

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JOB NAME/NUMBER *SEQUOYAH FUELS 93092.11*

BORING NUMBER *MW-7B (BH-113)*

DATE DRILLED 2/7/95, 2/27-3/3/95
DRILLING METHOD HSA/AIR ROTARY
DRILLED BY LWC
LOGGED BY MJL
CHECKED BY BJS
DRAWN BY: RML
DRAWING NO. 93092.11 B01
PAGE 1 OF 1

WELL COMPLETION RECORD

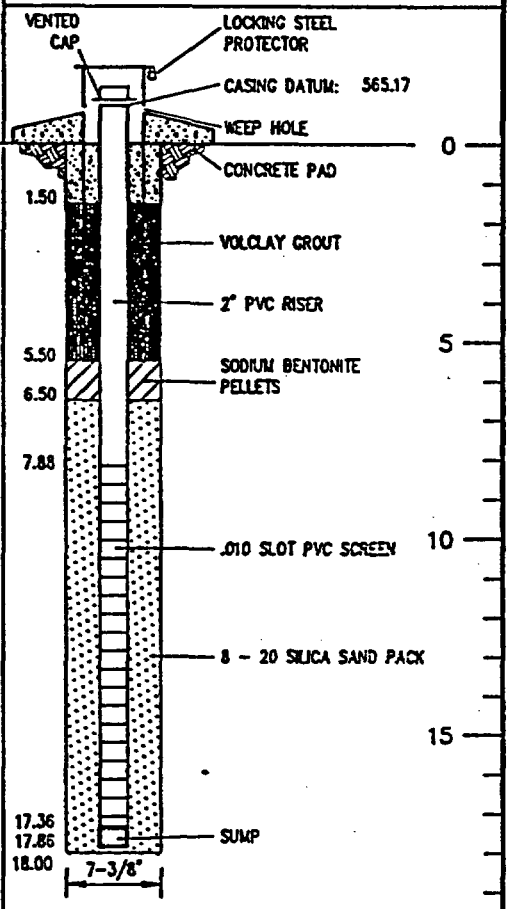
GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION
		GROUND SURFACE: 562.80	
	0	CLAYEY SANDY SILT: 10 YR 3/2, VERY DARK GRAYISH BROWN, ROOTLETS, MOIST, 55% SILT, 30% CLAY, 15% SAND	QL
	0.5	GRAVELLY SILTY CLAY: SOFT, MOIST, HIGH PLAST., 10 YR 3/3, DARK BROWN (5.0–5.6'), 5 YR 5/6, YELLOWISH RED (5.6–6.6') AND 10 YR 3/3 (6.6–7.5'), 5 YR 5/6 (7.5–15.0').	CH
	5		
▽ 9.0'			
	10		
	15	GRAVEL LENSE AT 15.0–15.5'	
	15.5	SHALE: 2.5 Y 5/4, LIGHT OLIVE BROWN, INTER-BEDDED WITH 2.5 Y 3/0, VERY DARK GRAY, HIGHLY FRACTURED, WEATHERED	SHALE
	19.5		
	20	T.D. 19.5'	
		NOTE: SANDSTONE AT 19.5'	
	25		
	30		
	35		

GRAPHIC LOG

SAMPLE INTERVAL

		"N" VALUE
1	0.5	NR
2	3.4	
3		NR
4	2.5	
5		NR
6	3.2	
7		NR

WELL COMPLETION DETAIL



NOTE: WELL INSTALLED IN SEPARATE BOREHOLE APPROXIMATELY 5 FEET FROM LITHOLOGICAL BOREHOLE. WELL BOREHOLE DRILLED TO 18.00 FEET.

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-10 (BH-9)*

DATE DRILLED 9/28/90
DRILLING METHOD HSA
DRILLED BY PSI/SE
LOGGED BY JMB
CHECKED BY BJS
DRAWN BY: SAR

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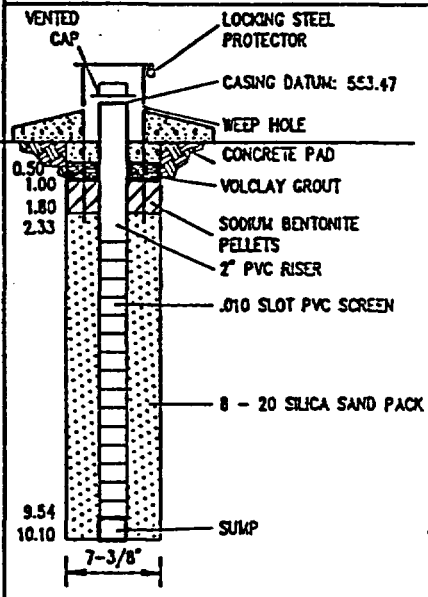
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		Start: 10:15 Stop: 10:35 GROUND SURFACE: 551.10				
	0	CLAYEY SILT: 10 YR 3/2, VERY DARK GRAYISH BROWN, MOIST, ROOTLETS TO 2.0', 70% SILT, 30% CLAY	OL		1	
					NR	
	5 5.2	GRAVELLY SILTY CLAY: 7.5 YR 5/8, STRONG BROWN, MOTTLED 7.5 YR 7/0, LIGHT GRAY, MOIST, MED. PLAST., FIRM 50% CLAY, 30% SILT, 20% GRAVEL	CL		2	4.5
					3	
	9.0	SHALE: 2.5 Y 5/6, LIGHT OLIVE BROWN AND 2.5 Y 3/2, VERY DARK GRAYISH BROWN, SILTY, WEATHERED, FRACTURED, GRAY CLAY LENSES AT 10.5'	SHALE		4	
	10				NR	
					5	1.5
	11.5	T.D. 11.5' AUGER REFUSAL AT 11.5' (SANDSTONE)				
	15					
	20					
	25					
	30					
	35					

WELL COMPLETION DETAIL



NOTE: WELL INSTALLED IN SEPARATE BOREHOLE APPROXIMATELY 5 FEET FROM LITHOLOGICAL BOREHOLE. WELL BOREHOLE DRILLED TO 10.10 FEET.

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
+ PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-31 (BH-32)*

DATE DRILLED 10/5/90
DRILLING METHOD HSA
DRILLED BY PSI/SE
LOGGED BY JMB
CHECKED BY BJS
DRAWN BY: SAR

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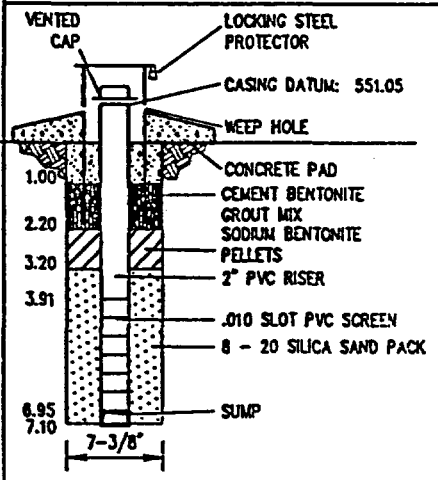
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		GROUND SURFACE: 548.40				
	0	TOPSOIL: SILTY LOAM			1 2.8	
	0.8	SANDY CLAYEY SILT: 5 YR 5/4, REDDISH BROWN, MOIST, LOW-PLAST., SLIGHLY MOTTLED, SOFT-FIRM, 15% SAND, VERY FINE-FINE GRAIN, RND-SUBRND., 30% CLAY, 55% SILT	ML			
▽2.5'	1.6	GRAVELLY SANDY SILT: 5 YR 4/4, REDDISH BROWN, SOFT-FIRM, MOIST TO WET TO SAT., SOME GRAVEL AT BASE, 10% GRAVEL, 30% SAND, VF-F GRAIN, RND-SUBRND, 60% SILT	ML		2 NR	
	5 5.1	CLAY: 5 YR 6/6 TO 6/1, REDDISH YELLOW TO GRAY, MOTTLED, FIRM, MOIST TO WET, H-PLAST., NON-STRAT. TO SLIGHTLY BLOCKY STRUCTURE	CH		3 2.1	
	7.1	T.D. 7.1' SANDSTONE ENCOUNTERED AUGER REFUSAL 7.1'				
	10					
	15					
	20					
	25					
	30					
	35					

WELL COMPLETION DETAIL



NOTE: WELL INSTALLED IN SEPARATE BOREHOLE APPROXIMATELY 5 FEET FROM LITHOLOGIC BOREHOLE. WELL BOREHOLE DRILLED TO 7.1 FEET.

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-40 (BH-50)*

DATE DRILLED 10/31/90
DRILLING METHOD HSA
DRILLED BY PSI
LOGGED BY TPC
CHECKED BY BJS
DRAWN BY: SAR

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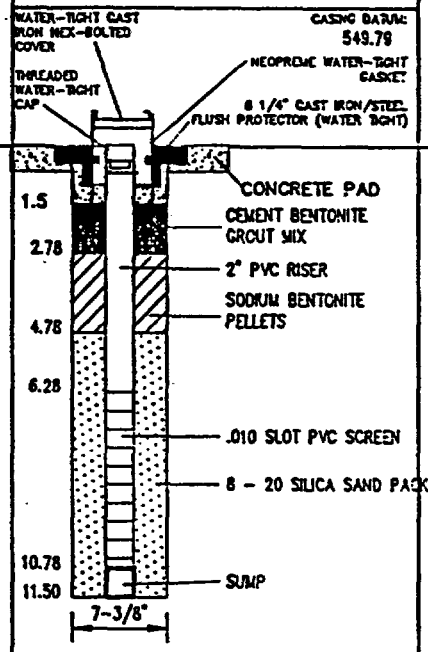
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
	0	GROUND SURFACE: 550.25				
	0.5	ASPHALT:			1	0.9
	0.9	SILTY SAND: BACKFILL, 2.5 YR 6/8, LIGHT RED, SATURATED, 20% SILT, 80% SAND, FINE-MED. GRAIN	SM			
		GRAVELLY SANDY SILTY CLAY: 2.5 YR 5/0, GRAY, SATURATED, POSSIBLE BACKFILL MAT., 10% GRAVEL, 20% SAND, 30% SILT, 40% CLAY GRAVELLY LENSE 5.0–5.5', 1–2 CM MAX. TRACE GRAVEL 5.5–8.0', LOW PLASTICITY	CL		NR	
	5				2	3.8
					3	
	8.0	SILTY CLAY: 2.5 YR 5/0, GRAY, WET, SOFT, SLIGHTLY BLOCKY STRUCT., HIGH PLAST., 30% SILT, 70% CLAY	CH		NR	
	10	CLAY: 10 YR 6/8, BROWNISH YELLOW, MOTTLED, FIRM, HIGH PLAST., MOTTLING LIGHT GRAY AND BLACK	CH		4	2.5
	12.5	SANDSTONE: 7.5 YR 7/8, REDDISH YELLOW, VERY HARD, FINELY LAMINATED QUARTZ CEMENTATION	SANDSTONE		NS 1	
	15					
	20					
	25					
	30					
	35					

WELL COMPLETION DETAIL



NOTE: WELL INSTALLED IN SEPARATE BOREHOLE APPROXIMATELY 5 FEET FROM LITHOLOGIC BOREHOLE. WELL BOREHOLE DRILLED TO 11.5 FEET.

DEPTH (FEET)

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-42 (BH-54)*

DATE DRILLED 11/9/90
DRILLING METHOD HSA
DRILLED BY PSI
LOGGED BY TPC
CHECKED BY BJS
DRAWN BY: SAR

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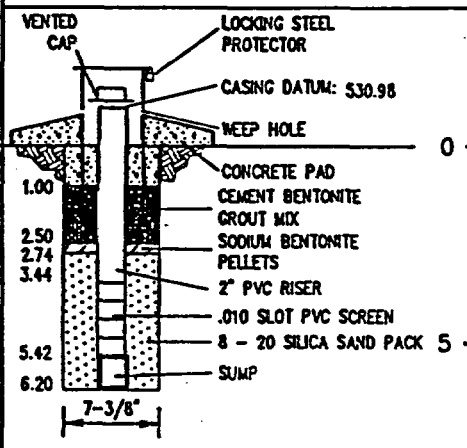
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		GROUND SURFACE: 528.30				
	0	TOPSOIL:			1 4.0	
	1.0	SILTY CLAY: 7.5 YR 7/6 TO 5/8, REDDISH YELLOW TO STRONG BROWN, MOIST TO WET, FIRM, M-H PLAST., 20% SILT, 80% CLAY, MOTTLED	CH-CL			
	2.5	SANDY SILT: 10 YR 4/2, DARK GRAYISH BROWN, MOIST TO WET, ROOTS IN UPPER .4', SOFT, EARTHY ODOR, 30% SAND, VERY FINE GRAIN, RND., 70% SILT	ML		2	
	3.4	WEATHERED SANDSTONE: 2.5 YR 4/2, VERY HARD, DENSE, WEAK RED FINES IN 5.0-5.5' SAMPLE (SILT, FINE GRAIN SAND)	SANDSTONE		NR	
	5				3 0.5	
	5.5	T.D. 5.7'	SHALE			
	10					
	15					
	20					
	25					
	30					
	35					

WELL COMPLETION DETAIL



NOTE: WELL INSTALLED IN SEPARATE BOREHOLE APPROXIMATELY 5 FEET FROM LITHOLOGIC BOREHOLE. WELL BOREHOLE DRILLED TO 6.2 FEET.

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

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NORMAN, OKLAHOMA 73072
(405) 321-7895

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-48 (BH-59)*

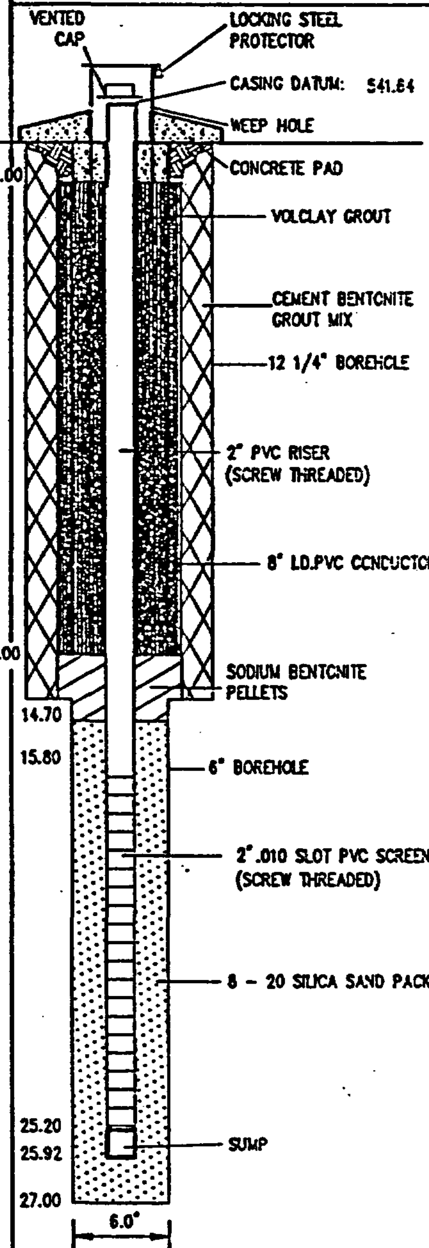
DATE DRILLED 11/16/90
DRILLING METHOD HSA
DRILLED BY PSI
LOGGED BY TPG
CHECKED BY BJS
DRAWN BY: SAR

WELL COMPLETION RECORD

GROUND SURFACE: 539.16

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	SAMPLE	INTERVAL	"N" VALUE
	0.3	GRAVELLY SAND: BACKFILL ROAD MATERIAL		1	2.5	
	0.9	CLAYEY SANDY SILT: 7.5 YR 6/6, REDDISH YELLOW, SOFT, MOIST, FAINTLY LAMINATED, TRACE GRAVEL, 20% CLAY, 20% SAND, VERY FINE GRAIN, RND-SUBRND., 60% SILT, LOW-PLAST.	ML / CL			
	2.2	SANDY SILTY CLAY: 7.5 YR 6/6, REDDISH YELLOW, SOFT-FIRM, MOIST, THIN LAMINATIONS, MOTTLED WITH RED AND BLACK, 15% SAND, VERY FINE-FINE GRIAN, RND-SUBRND., 40% SILT, 45% CLAY	CH	2 NR; 3	3.2	
	6.0	SILTY CLAY: 7.5 YR 6/6, REDDISH YELLOW, SOFT-FIRM, MOIST, M-PLAST., FAINT LAMINATIONS, MOTTLED WITH GRAY 5.5-6.0', HIGHLY WEATHERED SANDSTONE LENSE	CH	4; NR		
		CLAY: 7.5 YR 6/6 TO 7/0, REDDISH YELLOW TO LIGHT GRAY, MOIST, FIRM, MOTTLED, HIGH PLAST.				
	9.5	WEATHERED SHALE: 7.5 YR 3/0 TO 6/6, VERY DARK GRAY TO REDDISH YELLOW, THINLY BEDDED, HARD, DRY-MOIST	SHALE	5; NR	2.7	
	12.8	SANDSTONE: WEATHERED 7.5 YR 4/0 TO 4/4, DARK GRAY TO DARK BROWN, VERY HARD, SILICA CEMENTATION	SANDSTONE			
▽17.0'	14.2	CONDUCTOR CASING: SANDSTONE: 2.5 Y 6/1, GRAY, HARD, CEMENTED WITH SILICA, FINE GRAIN, WET MODERATELY HARD AT 17.0-20.0', AQUITARD CHARACTERISTICS	SANDSTONE	1; 2; 3; 4; 5; 6; 7		
	27.0	T.D. 27.0'				

WELL COMPLETION DETAIL



CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-50A (BH-53)*

DATE DRILLED 11/16/90
DRILLING METHOD AIR ROTARY
DRILLED BY POOL
LOGGED BY JMB
CHECKED BY BJS
DRAWN BY: SAR

PAGE 1 OF 1

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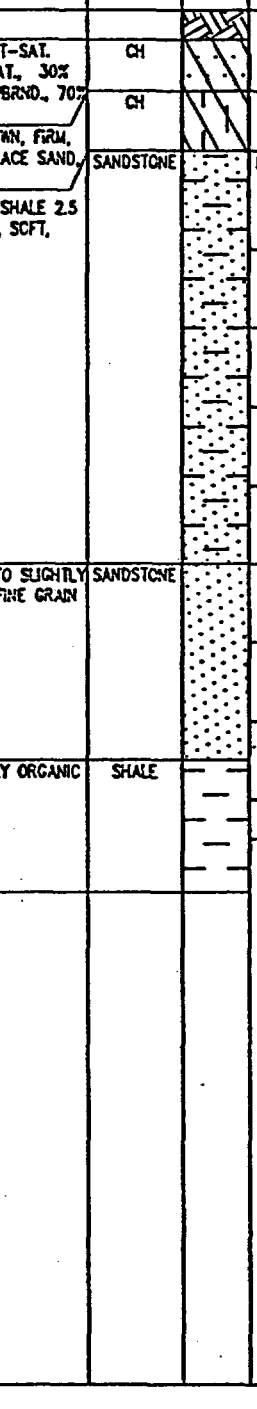
WELL COMPLETION RECORD

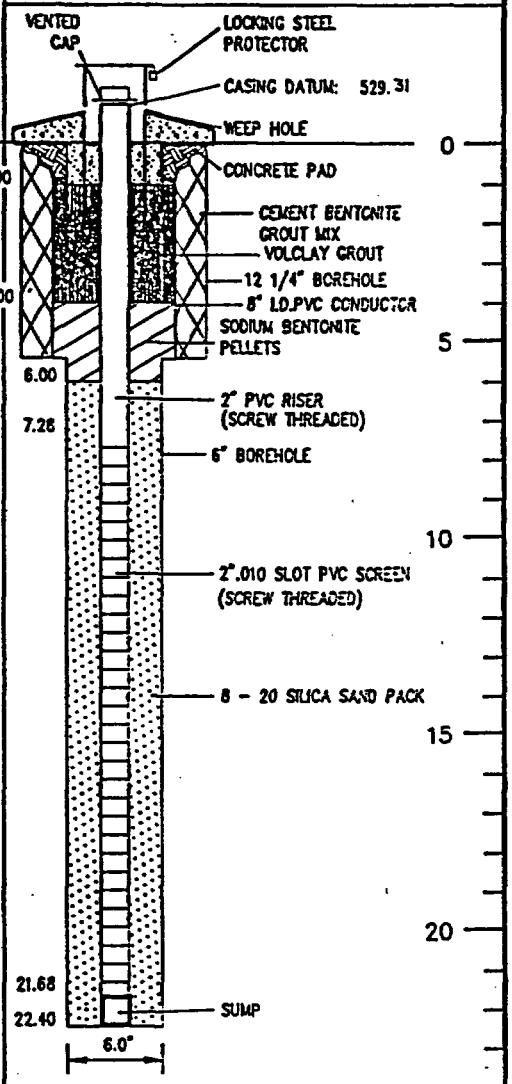
GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION
		GROUND SURFACE: 526.92	
	0	TOPSOIL:	
▽ 1.5'	0.7	SANDY CLAY: 7.5 YR 4/4, BROWN, WET-SAT. AT 1.5', SOFT, MED. PLAST., NON-STRAT., 30% SAND, VERY FINE-FINE GRAIN, RND-SUBRND., 70% CLAY	CH
	2.0	SILTY CLAY: 7.5 YR 5/6, STRONG BROWN, FIRM, MOIST-WET, MOTTLED, HIGH PLAST., TRACE SAND, FINE GRAIN, 30% SILT, 60-70% CLAY	CH
	3.5	SHALEY SANDSTONE: 2.5 Y 5/1, WITH SHALE 2.5 Y 5/4, GRAY AND LIGHT OLIVE BROWN, SOFT, MOIST TO WET, FINE GRAIN	SANDSTONE
	5	CONDUCTOR CASING SET AT 5.4'	
	10		
	14.0	SANDSTONE: 7.5 YR 5/1, GRAY, DRY TO SLIGHTLY MOIST, HARD, CEMENTED WITH SILICA, FINE GRAIN	SANDSTONE
	15		
▽ 19.0'	19.0	SHALE: 2.5 Y 2/0, BLACK, WET, HIGHLY ORGANIC	SHALE
	20		
	22.4	T.D. 22.4'	
	25		
	30		
	35		

GRAPHIC LOG



SAMPLE INTERVAL	"N" VALUE
1	3.5
2	
NS	1.00
1	4.00
2	5.40
3	
4	
5	
6	
7	
8	

WELL COMPLETION DETAIL



CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-59A (BH-67)*

DATE DRILLED 12/3/90 & 12/5/90
DRILLING METHOD HSA & AIR ROTARY
DRILLED BY PSI & POOL
LOGGED BY TPG & JMB
CHECKED BY BJS
DRAWN BY: SAR PAGE 1 OF 1

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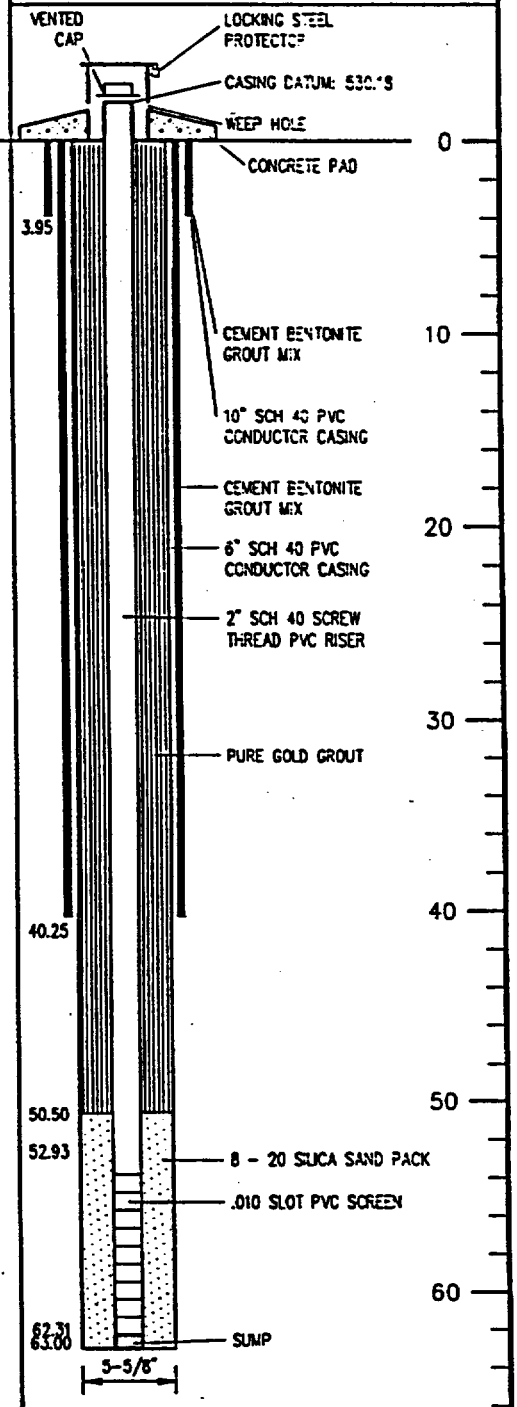
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION
	0	GROUND SURFACE: 527.42 FEET	
	0	SANDY CLAY:	CL
	2.5	SILTY CLAY:	CL
	3.7	SANDSTONE:	SANDSTONE
	21.0	SHALE:	SHALE
	36.5	SANDSTONE	SANDSTONE
	47.5	SHALE:	SHALE
	63.0	TOTAL DEPTH: 63.0 FEET FOR COMPLETE LITHOLOGIC DESCRIPTION, SAMPLE INTERVAL, AND "N" VALUE SEE BH-116	

GRAPHIC LOG | SAMPLE INTERVAL | "N" VALUE

▽ 27.0
▽ 28.23

WELL COMPLETION DETAIL



0 10 20 30 40 50 60 70

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)
NR: NO RECOVERY

SEQUOYAH FUELS

JOB NAME/NUMBER *93092.11*

BORING NUMBER *MW-59B (BH-116)*

DATE DRILLED 2/9/95, 3/23-24/95
DRILLING METHOD HSA/AIR ROTARY
DRILLED BY LWC
LOGGED BY MJL
CHECKED BY BJS
DRAWING NO. 93092.11 B04
DRAWN BY: RML
PAGE 1 OF 1

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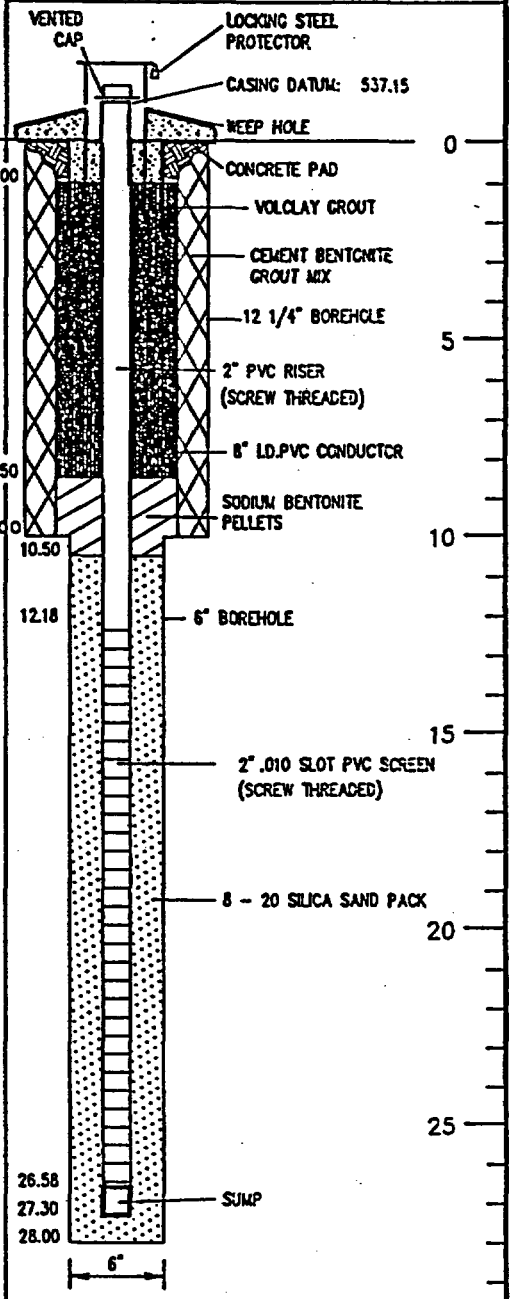
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		GROUND SURFACE: 534.67				
	0					
	0.4	TOPSOIL: FILL			1	4.5
		SANDY SILT: 7.5 YR 4/4, BROWN, SOFT, MOIST, NON-STRAT., 30% SAND, VERY FINE GRAIN, RND., 70% SILT	ML			
	2.0	SILTY CLAY: 7.5 YR 7/8, REDDISH YELLOW, MOIST, SOFT, H-M PLAST., MOTTLED, 30% SILT, 70% CLAY	CH-CL		2	
	3.2	SILTY SAND: 7.5 YR 3/0, VERY DARK BROWN, WET, SOFT, 45% SILT, 55% SAND, VERY FINE-FINE GRAIN, RND-SUBRND.	SM			
	4.2		ML		3	
	4.5	CLAYEY SANDY SILT: 7.5 YR 6/8, REDDISH YELLOW, WET, SOFT, NON-STRAT., 10% CLAY, 20% SAND, VERY FINE-FINE GRAIN, RND-SUBRND 70% SILT, GRADES TO	CH-CL		4	2.0
	5					
	6.4		SANDSTONE		NR	
	7.8	SILTY CLAY: 7.5 YR 6/6, REDDISH YELLOW, SOFT-FIRM, MOIST, MOTTLED, MN NODULES, NON STRAT., M-PLAST., TRACE SAND, VERY FINE-FINE GRAIN, 35% SILT, 65% CLAY				
	10	WEATHERED SANDSTONE: 7.5 YR 7/0, LIGHT GRAY, DENSE, HARD, NON-COMPENTENT UNTIL 7.8'	SANDSTONE		1	
		CONDUCTOR CASING: 10.0'				
		SANDSTONE: 2.5 YR 5/2, GRAYISH BROWN, SHALY, SOFT, SLIGHLTY MOIST, FINE GRAINED			2	
	15				3	
					4	
	17.8	SANDSTONE: 2.5 Y 5/0, GRAY, MODERATELY HARD, CEMENTED WITH SILICA, FINE GRAINED	SANDSTONE		5	
	20				6	
					7	
▽ 25.0'					8	
	25	SHALE: 2.5 Y 2/0, BLACK, FISSILE, SOFT, WET, HIGHLY ORGANIC	SHALE			
					9	
	28.0	T.D. 28.0'				
	30					
	35					

WELL COMPLETION DETAIL



CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-62A (BH-71)*

DATE DRILLED 12/11/90
DRILLING METHOD AIR ROTARY
DRILLED BY POOL
LOGGED BY JMB
CHECKED BY BJS
DRAWN BY: SAR

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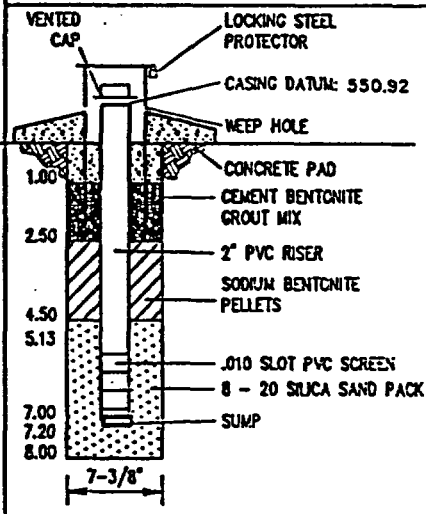
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		GROUND SURFACE: 549.88				
	0	GRAVELLY SANDY SILTY CLAY: 5 YR 5/6, YELLOWISH RED, MOIST, FIRM, NON-STRAT., HIGH PLAST., 15% GRAVEL, 3MM-3CM QTZ., 15% SAND, VERY FINE-VERY COARSE GRAIN, RND-SUBANG, 20% SILT, 50% CLAY	CH		1 3.5	
					2	
	2.8	SANDY SILT: 5 YR 7/8, REDDISH YELLOW, SOFT, NON-STRAT., GRADES TO SILTY CLAY BY 5.8', 30% SAND, VERY FINE-FINE GRAIN, RND-SUBRND, 70% SILT	ML		NR	
	5				3 3.0	
	5.8 6.2	SILTY CLAY: 5 YR 5/8, YELLOWISH RED, MOIST, FIRM, MED-HIGH PLAST., MOTTLED, NON-STRAT., 20% SILT, 80% CLAY	CH			
	8.0	CLAY: 5 YR 7/1 TO 6/8, LIGHT GRAY TO REDDISH YELLOW, MOIST, FIRM, MOTTLED, HIGH PLAST.			4 0.0	
		T.D. 8.0'				
	10	NO SAMPLES TAKEN FOR RSA				
	15					
	20					
	25					
	30					
	35					

WELL COMPLETION DETAIL



NOTE: WELL INSTALLED IN SEPARATE BOREHOLE APPROXIMATELY 5 FEET FROM LITHOLOGIC BOREHOLE. WELL BOREHOLE DRILLED TO 8.0 FEET.

- CME CONTINUOUS AUGER SAMPLER
- STANDARD PENETRATION TEST
- UNDISTURBED SAMPLE
- WATER TABLE (24 HOURS)
- WATER TABLE (TIME OF BORING)
- L LABORATORY TEST LOCATION
- \+ PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\90067*

BORING NUMBER *MW-87 (BH-98)*

DATE DRILLED 3/12/91
DRILLING METHOD HSA
DRILLED BY PSI
LOGGED BY TPG
CHECKED BY BJS
DRAWN BY: SAR

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WELL COMPLETION RECORD

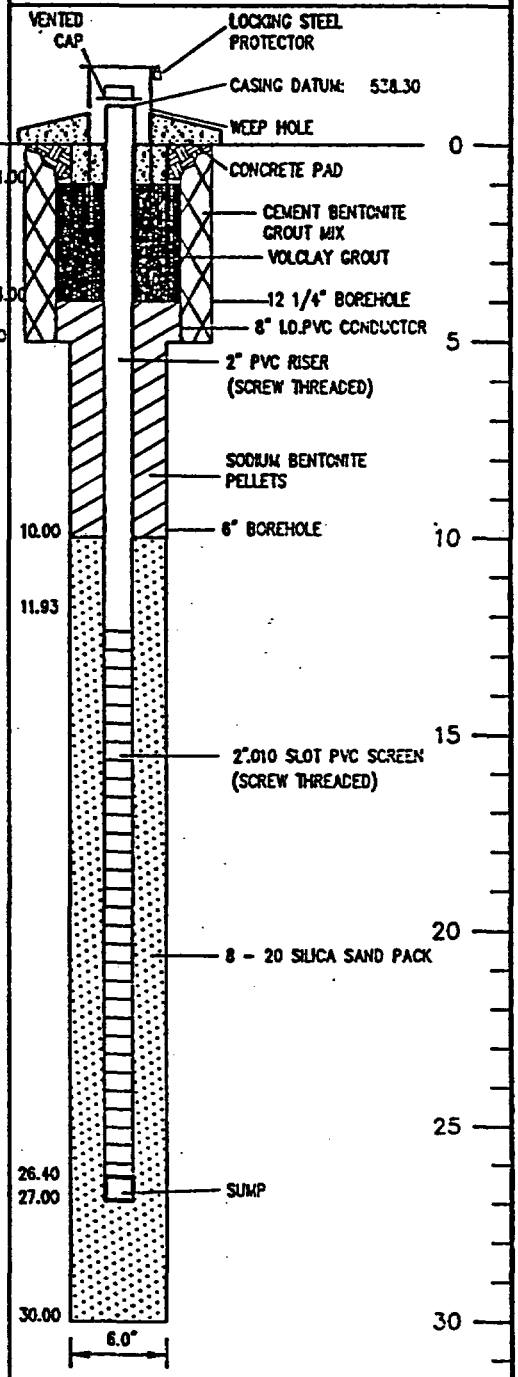
GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION
		GROUND SURFACE: 535.88	
	0		
	0.4	TOPSOIL: ROOTS, SANDY	
	1.2	SILTY CLAY: 7.5 YR 5/4, BROWN, MOIST, NON-STRAT., MOTTLED, FIRM, HIGH PLAST., 40% SILT, 60% CLAY, GRADES TO SILTY CLAY 2.5 YR	CH CL
	3.2	SILTY CLAY: 2.5 YR 4/8 RED TO 7.5 YR 8/2, PINKISH WHITE, DRY-MOIST, DENSE, MOTTLED, MED. PLAST., FIRM-HARD, 15% SILT, 85% CLAY	SANDSTONE
		SANDSTONE: CONDUCTOR CASING	
	5	WEATHERED SANDSTONE/SANDY SHALE: SAND-STONE TO 6.0', GRADES TO SANDY SHALE, INTERBEDDED SANDSTON AND SHALE	SANDSTONE /SHALE
	7.0	SANDSTONE SHALE: INTERBEDDED, 7.5 YR 7/0 TO 3/0, LIGHT GRAY TO VERY DARK GRAY GRADING TO 7.5 YR 6/0, GRAY AT 10.0', SOME SHALE	SANDSTONE
	10	FE XLN, FRIABLE, HARD, DENSE, SOME INTER-BEDDED SHALE LENSES	
	15		
	20		
	25		
	27.0	SHALE: BLACK, FRIABLE, 7.5 YR 2/0, BLACK	SHALE
	30	T.D. 30.0'	
	35		

GRAPHIC LOG

SAMPLE INTERVAL: 1 (3.0), 2 (NR), NS, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

"N" VALUE

WELL COMPLETION DETAIL



CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)

JOB NAME/NUMBER *SEQUOYAH\ 90067*

BORING NUMBER *MW-89A (BH-93)*

DATE DRILLED 3/15/91
DRILLING METHOD AIR ROTARY
DRILLED BY POOL
LOGGED BY TPG
CHECKED BY BJS
DRAWN BY: SAR

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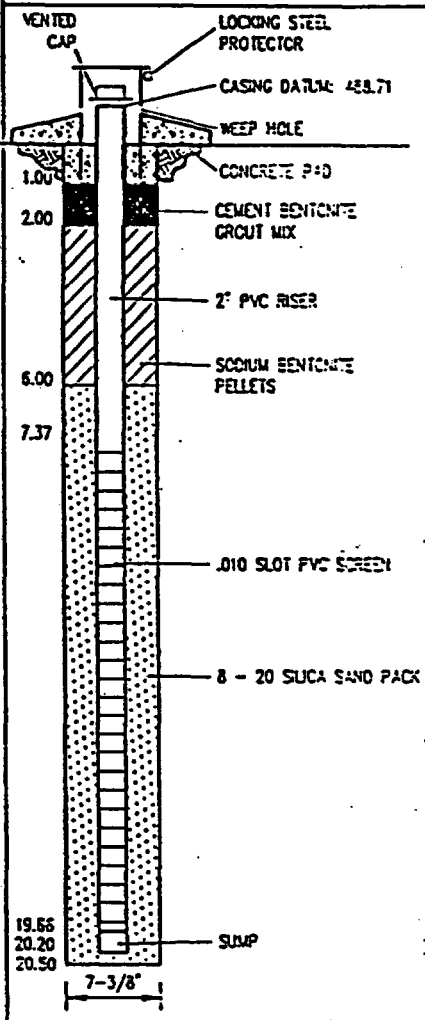
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		GROUND SURFACE: 486.12				
	0	SANDY SILT: 10YR3/2, VERY DARK GRAYISH BROWN, SOFT, ROOTLETS, MOIST, 70% SILT, 30% SAND	ML		1	
	0.8	SANDY CLAYEY SILT: 7.5YR6/6, REDDISH YELLOW, MOIST, CLAY NODULES, SOFT, 55% SILT, 30% SAND, 15% CLAY	ML		2 3 4 5	
	7.0	SILTY SAND: 7.5YR5/6, STRONG BROWN, MOIST TO WET, 80% SAND, 20% SILT, BECOMES CLAYEY SILTY AT 9.0', 50% SAND, 25% CLAY, 25% SILT	SM		6 7 8	
	13.0	SHALE: 2.5Y2/0, BLACK, MOIST TO WET, SOFT, FISSILE	SHALE		9 10 11	
	18.5	SANDSTONE: 2.5YS/0, (US/), GRAY, MOIST TO WET, MODERATELY HARD, FINE GRAIN	SANDSTONE		12	
	20.5	TOTAL DEPTH 20.5'				
		NOTE: GROUNDWATER NOT OBSERVED DURING DRILLING				

WELL COMPLETION DETAIL



465.92

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)
NR: NO RECOVERY
NS: NOT SAMPLED

JOB NAME/NUMBER *SEQUOYAH/90067.08*

BORING NUMBER *MW-95A (BH-105A)*

DATE DRILLED 9/24/91
DRILLING METHOD AIR ROTARY
DRILLED BY A.W. POOL
LOGGED BY JMB
CHECKED BY BJS
DRAWN BY: BDR PAGE 1 OF 1

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NORMAN, OKLAHOMA 73072
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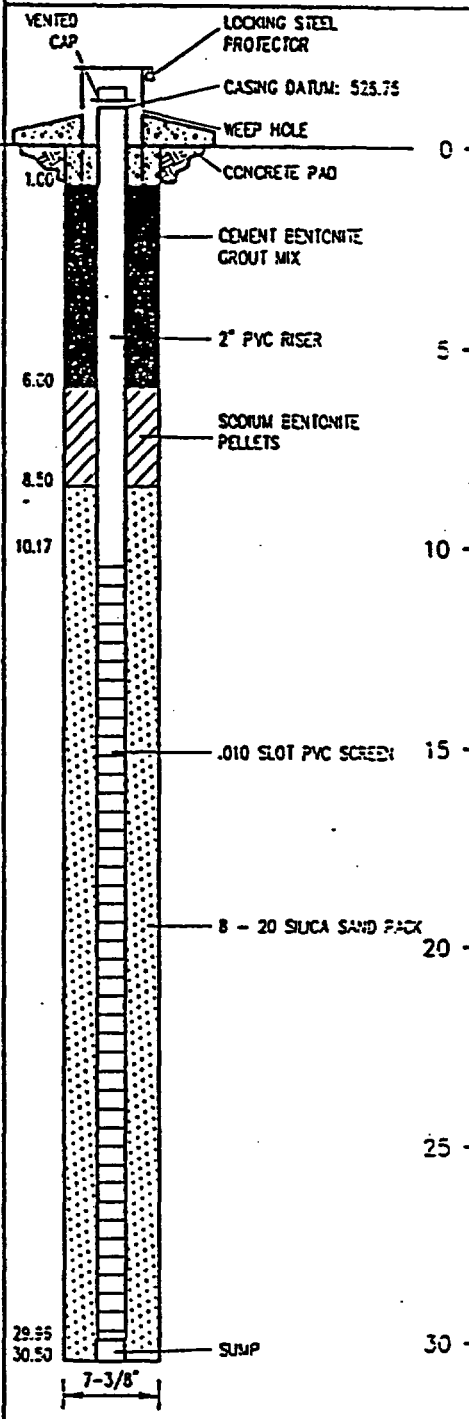
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
	0	GROUND SURFACE: 524.36				
	0	CLAYEY SILT: 10YR4/2, DARK GRAYISH BROWN, SOFT, MOIST, LOOSE, ROOTLETS	ML		1	
	1.0	GRAVELLY SILTY CLAY: 5YR5/6, YELLOWISH RED TO 10YR5/4, YELLOWISH BROWN, AT 3.5 TO 4.5', MOIST, LOW PLASTICITY, 50% CLAY, 30% SILT, 20% GRAVEL	SC		2 3 4 5 6 7 8	
	4.5	SANDSTONE: 2.5Y4/2, DARK GRAYISH BROWN, VERY SILTY, SLIGHTLY MOIST, MODERATELY HARD, FINE GRAINED, SLIGHTLY CEMENTED	SANDSTONE		9	
	5				10	
		-2.5Y4/0 (N4/), DARK GRAY, AT 14.0', NON-SILTY, CEMENTED WITH SILICA, VERY FINE GRAINED			11 12 13 14	
	10					
	15				15	
	19.0	SHALE: 2.5Y2/0, BLACK, WET, FISSILE, ORGANIC, SOFT	SHALE		16	
	20				17 18 19	
	25	SANDSTONE LENSES AT 27.0 TO 27.2'			20 21	
	30					
	30.5	TOTAL DEPTH 30.5'				
		NOTE: GROUNDWATER NOT OBSERVED DURING DRILLING				
	35					

WELL COMPLETION DETAIL



493.86

CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
L LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)
NR: NO RECOVERY
NS: NOT SAMPLED

JOB NAME/NUMBER *SEQUOYAH/90067.08*

BORING NUMBER *MW-96A (BH-106A)*

DATE DRILLED 9/24/91
DRILLING METHOD AIR ROTARY
DRILLED BY A.W. POOL
LOGGED BY JMB
CHECKED BY BJS
DRAWN BY: BDR

PAGE 1 OF 1

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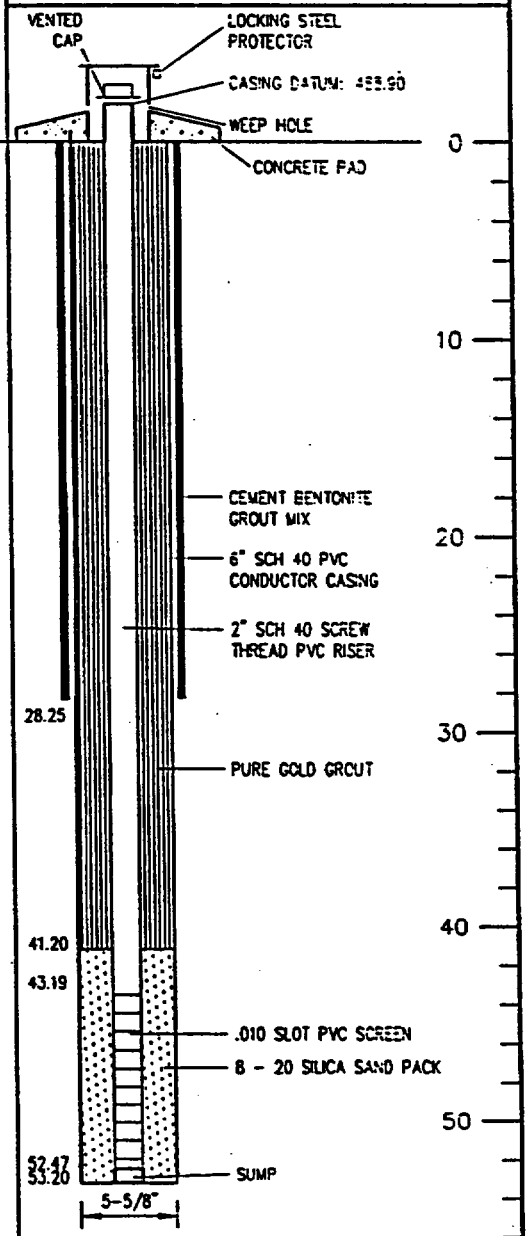
WELL COMPLETION RECORD

GEOLOG. UNIT	DEPTH (FEET)	LITHOLOGIC DESCRIPTION	UNIFIED SOIL CLASSIFICATION	GRAPHIC LOG	SAMPLE INTERVAL	"N" VALUE
		GROUND SURFACE: 466.52 FEET				
▽ 1.63	0					
	1.0	SILTY SAND:	SP			
	1.9	GRAVELLY SANDY CLAY:	CL			
	2.7	SANDSTONE:	SANDSTONE			
		SHALEY SANDSTONE:	SANDSTONE			
▽ 7.2	5.3	SHALE:	SHALE			
	10					
	20					
	23.4	SANDSTONE:	SANDSTONE			
	30					
	38.2	SHALE:	SHALE			
	40					
	50					
	53.2	TOTAL DEPTH: 53.2 FEET FOR COMPLETE LITHOLOGIC DESCRIPTION, SAMPLE INTERVAL, AND "N" VALUE SEE BH-119.				
	60					
	70					

WELL COMPLETION DETAIL



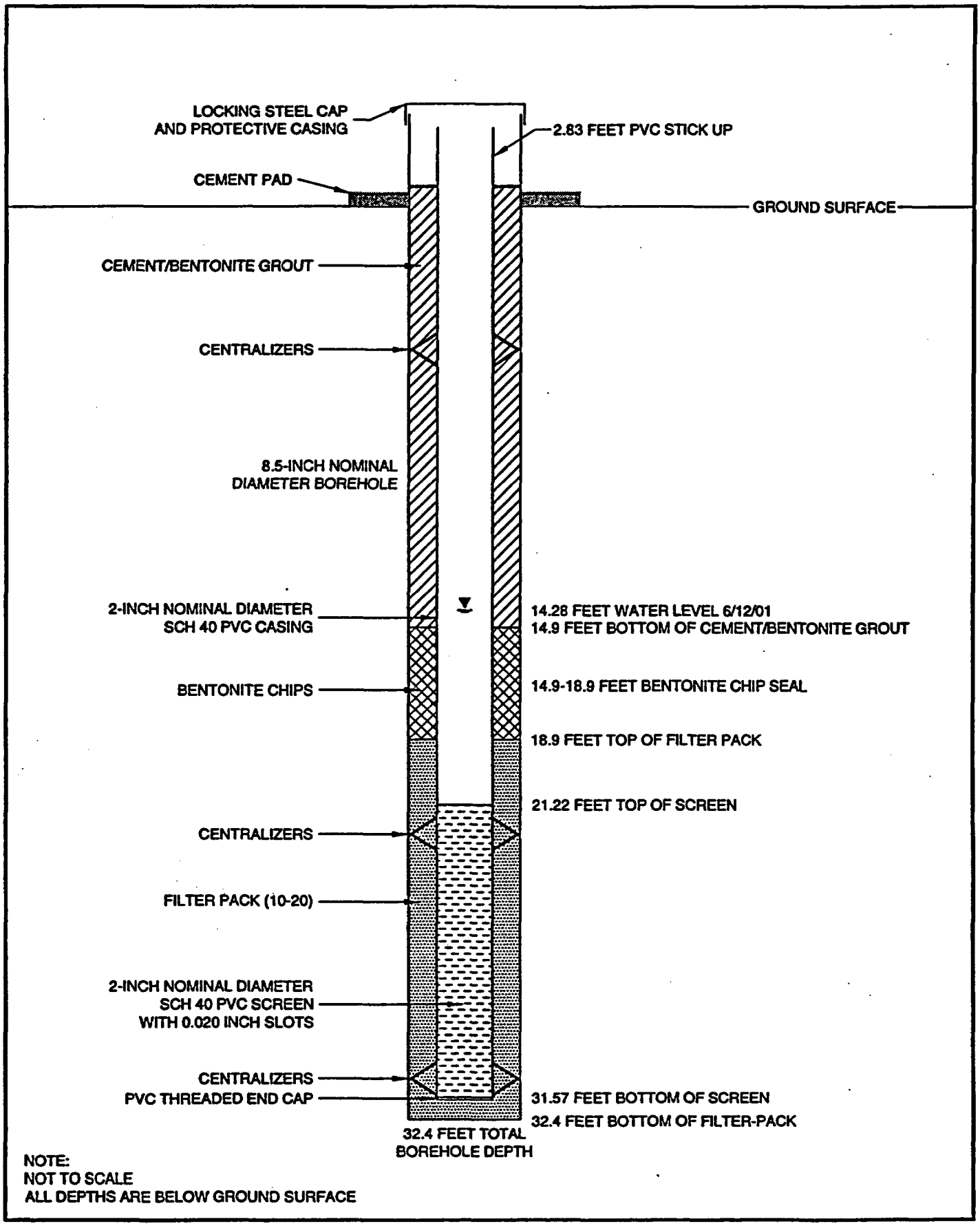
CME CONTINUOUS AUGER SAMPLER
STANDARD PENETRATION TEST
UNDISTURBED SAMPLE
WATER TABLE (24 HOURS)
WATER TABLE (TIME OF BORING)
LABORATORY TEST LOCATION
PENETROMETER (TONS/SQ. FT.)
NR: NO RECOVERY

ROBERTS/SCHORNICK & ASSOCIATES, INC.
ENVIRONMENTAL CONSULTANTS
3700 W. ROBINSON
NORMAN, OKLAHOMA 73072
(405) 321-3895

JOB NAME/NUMBER *SEQUOYAH FUELS 93092.11*

BORING NUMBER *MW-105B (BH-119)*

DATE DRILLED 2/13/95, 3/20-21/95
DRILLING METHOD HSA/AIR ROTARY
DRILLED BY L.W.C.
LOGGED BY M.J.L.
CHECKED BY B.J.S. DRAWING NO. 93092.11 B07
DRAWN BY: RML PAGE 1 OF 1



NOTE:
NOT TO SCALE
ALL DEPTHS ARE BELOW GROUND SURFACE

SHEPHERD MILLER
INCORPORATED

MW-112A

Date:	JUNE 2001
Project:	100734
File:	WC-MW

BORING LOG

SHEPHERD MILLER
INCORPORATED

BORING NO.
BH329 (mw112A)

PROJECT: SEQUOYAH FUELS PAGE: 1 of 2
PROJECT NO.: 100734 DATE: 5/17/01
NORTHING: 192596.3 EASTING: 2833765.8 GROUND ELEVATION: 482.5
DRILLING COMPANY: PETERSON DRILLING METHOD: HSA SPLIT SPOON -CORE
DRILLER: TROY LUCAS LOGGED BY: J. REED

DEPTH (FT)	GEOLOGY UNIT	TIME	(FT) RECOVERY	LITHOLOGY GRAPHIC	DESCRIPTION / NOTES
0		12:26	0		BLIND DRILED -NO RECOVERY.
2		12:30	1.8		SM - ML SILTY SAND TO SANDY SILT WITH SOME CLAY. SAND FINE GRAINED, INTERVAL YELLOW BROWN (10YR, 5/4), DRY, SLIGHTLY COHESIVE TO LOOSE, CONTAINS LESS THAN 5 % COARSE SAND. OCCASIONAL ROOTS THROUGHOUT.
4	A				
5	L	12:36	2.0		SEE ABOVE, NO COARSE SAND, MOTTLED FE STAINING (BROWN YELLOW 10YR, 6/8) PROMINENT.
6	L U	12:42	2.0		SEE ABOVE TO SLIGHTLY MOIST AT BOTTOM. VERY FEW ROOTS.
8	V I U	12:47	2.0		ML/CL - CLAYEY SILT WITH 5-10 % VERY FINE AND LESS THAN 5 % COARSE, RND. SAND. INTERVAL GRAY (10YR, 6/1) TO YELLOW BROWN (10YR, 5/8), DRY TO SLIGHTLY MOIST, COHESIVE, PLASTIC, SOFT, PLATEY APPEARANCE, NO ROOTS.
10	M	13:50	2.0		SEE ABOVE.
12		13:53	1.9		GC-GM - CLAYEY SILTY GRAVEL WITH ABOUT 50-60 % FINE TO MED. ANGULAR TO RND. QTZ., INTERVAL SLIGHTLY MOIST TO DRY, COHESIVE, PLASTIC, SOFT TO DENSE, GRAY (10YR, 6/1) TO YELLOW BROWN (10YR, 5/8) (FE STAIN).
14					
15		14:02	1.7		SEE ABOVE.
15.2					SHALE - BLACK (N1), SOFT, FISSILE, DRY, WEATHERED, TO YELLOW BROWN (10YR, 5/8, FE STAIN) ALONG PARTININGS.
16		14:09	2.0		SEE ABOVE, HIGHLY WEATHERED TO YELLOW BROWN (10YR, 5/8) FROM 16.3'-16.4' AND 17.3'-17.35'.
18		14:16	2.0		SHALE - HIGHLY WEATHERED, YELLOW BROWN (10YR, 5/8), SOFT, DRY.
20		14:28	1.9		SEE ABOVE, HARD AT BOTTOM, VERY SLIGHTLY MOIST AT 22.0'.
22	4 SH	14:39			SEE ABOVE. REFUSAL AT 23'.
23					SHALE - BLACK (N1), SOFT, FISSILE.
25		16:40	10.0		
30					
31					SEE ABOVE.

BORING LOG

SHEPHERD MILLER
INCORPORATED

BORING NO.
BH329 (mw11A)

PROJECT: SEQUOYAH FUELS PAGE: 2 of 2
PROJECT NO.: 100734 DATE: 5/17/01
NORTHING: 192596.3 EASTING: 2833765.8 GROUND ELEVATION: 482.5
DRILLING COMPANY: PETERSON DRILLING METHOD: HSA SPLIT SPOON -CORE
DRILLER: TROY LUCAS LOGGED BY: E. MULLER

DEPTH (FT)	GEOLOGY UNIT	TIME	(FT) RECOVERY	LITHOLOGY GRAPHIC	DESCRIPTION / NOTES
30					
31	4 SH				SEE ABOVE.
33					SANDSTONE - MED. LIGHT GRAY (N4) WITH DARK GRAY (N7) MOTTLING. HARD, THIN, VERTICAL, WIDELY SPACED FRACTURES, CALCITE CEMENTED. SHALE, BLACK (N1), SOFT, FISSLE, INTERBEDDED BETWEEN 33.6'-34.1' AND 35.9' TO 37.0'.
35	4 SS	19:15	8.7		
39.9					
40	5 SH				SHALE - BLACK (N1), SOFT, FISSLE.
41					TD
45					
50					
55					
60					