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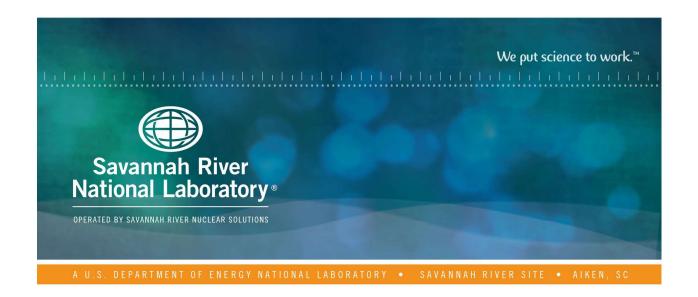
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Installation of Lysimeters Near Engineered Trench 3, Slit Trench 8, and Slit Trench 9

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May 2023

SRNL-STI-2023-00086, Revision 0

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May 2023



ACKNOWLEDGEMENTS

The authors thank Patti Bennett who helped with the GIS figures presented in this report.

EXECUTIVE SUMMARY

Nine new lysimeter stations were installed at the E-Area Low Level Waste Facility (ELLWF). Six lysimeter stations were installed near Engineered Trench 3 (ET3), one installed near Slit Trench 8 (ST8), and two installed near Slit Trench 9 (ST9) as shown in Figure ES-1. Two lysimeters were installed at each station at the depths shown in Table ES-1. Lysimeter placements were based on borehole lithology and were comparable to existing nearby lysimeter stations. The deepest lysimeter at each of the new lysimeter stations was designated as the action-level lysimeter.

Following installation, the lysimeters were purged and placed under vacuum for sampling. Sampling occurred in April 2023. Analytical results from the sampling will be provided in the Spring 2023 Lysimeter Tritium Data technical memo and the 2023 Annual Summary Report.

With the addition of the new lysimeters at ET3, ST8, and ST9, the vadose zone monitoring system is now comprised of 327 active lysimeters at 111 lysimeter stations. There are 102 action-level lysimeters at 111 stations.

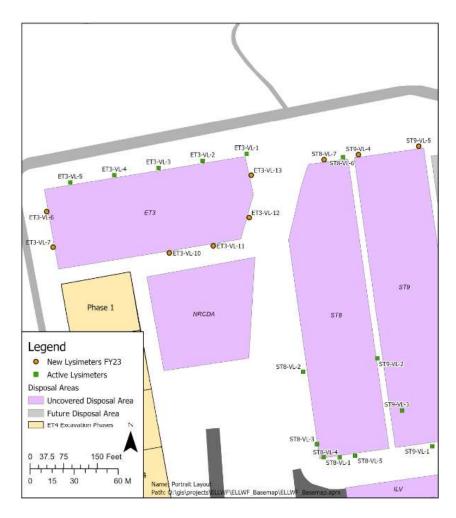


Figure ES-1. Layout of Lysimeter Stations Installed in FY23.

Table ES-1. Construction Details for FY23 Lysimeter Stations.

Station Name	SRS North (ft)	SRS East (ft)	Ground Elevation (ft msl)	Lysimeter Elevation (ft msl)	Lysimeter Depth (ft bgs)	Action Level (pCi/ml)
ET3-VL-6 (238)	78685.32	57503.89	276.22	238	38	-
ET3-VL-6 (219) ¹	78685.32	57503.89	276.22	219	57	43.7
ET3-VL-7 (240)	78613.77	57465.83	278.08	240	38	-
ET3-VL-7 (220) ¹	78613.77	57465.83	278.08	220	58	43.7
ET3-VL-10 (242)	78448.06	57671.99	279.77	242	38	-
ET3-VL-10 (222) ¹	78448.06	57671.99	279.77	222	58	43.7
ET3-VL-11 (241)	78401.64	57760.57	280.46	241	39	-
ET3-VL-11 (221) ¹	78401.64	57760.57	280.46	221	59	43.7
ET3-VL-12 (235)	78407.90	57860.51	279.72	235	45	-
ET3-VL-12 (223) ¹	78407.90	57860.51	279.72	223	57	43.7
ET3-VL-13 (232)	78482.50	57922.75	276.92	232	45	-
ET3-VL-13 (218) ¹	78482.50	57922.75	276.92	218	59	43.7
ST8-VL-7 (237)	78413.31	58073.94	276.07	237	39	-
ST8-VL-7 (220) ¹	78413.31	58073.94	276.07	220	56	46.9
ST9-VL-4 (238)	78377.51	58142.24	276.49	238	38	-
ST9-VL-4 (216) ¹	78377.51	58142.24	276.49	216	60	46.9
ST9-VL-5 (237)	78313.77	58261.45	276.12	237	39	-
ST9-VL-5 (220) ¹	78313.77	58261.45	276.12	220	56	46.9

¹Action-Level Lysimeter

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LIST OF ABBREVIATIONS

AL Action Level

bgs Below ground surface CIG Component-In-Grout

CPT Cone Penetrometer Technology

DOE Department of Energy

ELLWF E-Area Low Level Waste Facility

ET Engineered Trench

ft Feet

GSA General Separations Area
ILV Intermediate Level Vault
LAWV Low Activity Waste Vault

msl Mean sea level

MWMF Mixed Waste Management Facility

NRCDA Naval Reactor Component Disposal Area

PA Performance Assessment
pCi/ml Picocurie per milliliter
PVC Polyvinyl chloride

SRNL Savannah River National Laboratory
SRNS Savannah River Nuclear Solutions

SRS Savannah River Site

ST Slit Trench

SWM Solid Waste Management

WSRC Westinghouse Savannah River Company

1.0 Introduction

The E-Area Low-Level Waste Facility (ELLWF) is a radioactive waste disposal facility at the Savannah River Site (Figure 1). It is approximately 200 acres in size with a 100m buffer zone that extends out to the point of compliance. Disposal units within the footprint of the low-level waste facilities include the Slit Trenches (ST), Engineered Trenches (ET), Component-in-Grout Trenches (CIG), the Low-Activity Waste Vault (LAWV), the Intermediate-Level Vault (ILV), and the Naval Reactor Component Disposal Area (NRCDA) (WSRC, 2007). The facility provides disposal capacity for solid, low-level, non-hazardous radioactive waste and has been accepting waste since 1994 (WSRC, 2007). The ELLWF is situated within the General Separations Area (GSA) of the Savannah River Site (SRS) immediately north of the Mixed Waste Management Facility (MWMF).

The ELLWF is regulated under Department of Energy (DOE) Order 435.1 (DOE 1999) and is operated in accordance with a DOE approved Performance Assessment (PA) (WSRC, 2007). The E-Area Performance Monitoring Program provides assurance that the facility is operating as expected and predicted by the PA. As part of the Performance Monitoring Program, SRS operates a vadose zone monitoring system comprised of suction lysimeters to monitor the release of tritium from the disposal trenches. At most of the lysimeter stations, the deepest or second deepest lysimeter is designated as the Action-Level (AL) lysimeter.

In 2016 two lysimeter stations were installed on the north rim of ET3 amid ongoing waste disposal operations. In 2020, three additional lysimeter stations were added to the north rim of ET3. In 2022, the remaining disposal capacity of ET3 was filled and the trench was closed.

The closure of ET3 provided access to install six lysimeter stations along the remaining perimeter of ET3 as shown in Figure 2. A portion of ET3 is located north of ET4 and was not accessible for lysimeter installations in FY2023 due to ongoing waste disposal activities in ET4. Two lysimeter stations (ET3-VL-8 and ET3-VL-9) will be installed in this area in the future. In addition to the ET3 lysimeter stations, one lysimeter station was installed on the north end of Slit Trench 8 (ST8) and two lysimeter stations were installed on the north end of Slit Trench 9 (ST9).

The objective of this project was to install a total of nine vertical lysimeter stations along the perimeters of ET3, ST8, and ST9. This report provides the construction details and layout for the new lysimeters.

2.0 Summary of Field Activities

Drilling and lysimeter installation occurred during February and March 2023. Drilling services were provided by Cascade Environmental, LLC. Technical oversight of the drilling activities was provided by SRNL and SRNS personnel. Nine new lysimeter stations were installed including six stations along the perimeter of ET3, one station on the north end of ST8, and two stations on the north end of ST9. Figure 2 provides the layout of the lysimeter stations. Table 1 provides the construction details of the lysimeter stations.

2.1 Coring and Lithologic Logging

Prior to the start of drilling, a CPT push for lithology was conducted at seven of nine locations to assist with the placement of lysimeters. It was originally planned to conduct a CPT push at all lysimeter stations; however, excessive rainfall made ET3-VL-7 and ST9-VL-5 inaccessible to the CPT truck. The lithologic data obtained from the CPT pushes are plotted in Figure 3 through Figure 9. The vendor supplied CPT logs and CPT Field Reports are presented in Appendix A.

Vertical borings were completed at each lysimeter location using sonic drilling technology (Figure 10). Sonic drilling involves using a dual cased setup and high frequency mechanical vibration to collect continuous core. At each location, four-inch diameter steel casing was used to collect core through six-inch diameter steel override casing. All boreholes were dry drilled meaning no drilling mud or water was used to advance the casing or to remove cuttings from the borehole. Prior to drilling, each borehole was hand augured to a depth of 6 ft bgs. Then, each borehole was continuously cored from ground surface to total depth (~70 ft bgs). The resulting core was visually described, and detailed logs were documented for each borehole (Appendix B).

2.2 Lysimeter Installation

The lysimeters installed at the new stations were SoilMoisture® Equipment Corporation Model Number 1920F1 vacuum soil water samplers (Figure 11). The model 1920F1 suction lysimeter is constructed from 1.5" diameter polyvinyl chloride (PVC) and is supplied by the vendor completely assembled. The lysimeter is fitted with a 2-bar porous ceramic cup on one end and two 1/4" service ports on the other end. Polyethylene access tubes are used to apply pressure/vacuum (black tubing) and to collect water samples (green tubing). These tubes connect to the service ports on the lysimeter and extend from the lysimeter to above ground surface through 1-inch diameter PVC riser pipe. The riser pipe connects to the body of the lysimeter with a standard PVC reducing coupling.

The lysimeter assemblies (lysimeter, tubing, and riser pipe) were completely assembled at the ground surface prior to installation. The porous ceramic cup on each lysimeter was soaked in water for a minimum of two hours to saturate the ceramic cup (Figure 12). Once saturated, the lysimeters and connections were leak checked by applying pressure to the pressure/vacuum port. After the integrity of the lysimeter, tubing, and fittings were verified by leak check, the first section of 1-inch PVC riser pipe was connected to the lysimeter body using a reducing coupling. The lysimeter assembly was then lowered in the borehole and riser pipe was added as needed to reach the target depth.

Figure 13 presents a schematic diagram of lysimeter completion for the ET3, ST8, and ST9 lysimeter stations. Installation reports for all lysimeters are presented in Appendix C. At each lysimeter station, both the shallow and deep lysimeters were installed within the same borehole (Figure 13). Each borehole was drilled to a total depth of approximately 70 ft bgs and backfilled with bentonite hole plug and pellets to target depth. A slurry of silica flour was then added to ensure good contact between the ceramic cup of the lysimeter and surrounding soil (Figure 14). The lysimeter was placed into the borehole and firmly seated into the silica flour. Filter sand was

backfilled to cover the lysimeter in the borehole. The shallow lysimeter was installed in a similar manner as shown in Figure 13. A protective casing (6-inch PVC) was installed at the ground surface along with a concrete surface seal and pad. The final layout of the lysimeter stations is provided in Appendix D.

2.3 Lysimeter Placement

The conceptual model for placement of the new lysimeters at ET3 was to maintain consistency with the existing nearby lysimeter stations while honoring the local lithology observed in each new borehole. The existing nearby lysimeter stations each have two lysimeters with the deeper of the two lysimeters being designated the action level lysimeter. The strategy for placement was to locate the new lysimeters in sandy zones above silt/clay layers while maintaining consistency with the elevations of the existing lysimeters. This may improve the odds of collecting samples due to perched water at this interface. Lysimeters were not placed near the water table and capillary fringe due to the possibility they could be influenced by contaminants in the water table aquifer. The water table near ET3/ST8/ST9 was approximately 75 ft bgs surface at the time of installation.

The CPT logs (Appendix A) and core description (Appendix B) were all used to select the depth of installation for each lysimeter. More weight was given to the core description for lysimeter placement in cases where the logging results and the core description differed. The placement of the new lysimeters at each lysimeter station is shown in Figure 3 through Figure 9. CPT data were not obtained for ET3-VL-7 and ST9-VL-5. As a result, lysimeter placement for ET3-VL-7 is shown with ET3-VL-6 (Figure 3) and lysimeter placement for ST9-VL-5 is shown with ST9-VL-4 (Figure 9). Construction details for all lysimeters are presented in Table 1. Lysimeter depths were chosen to target intervals of likely water bearing sands underlain by less permeable silts or clays.

For ET3-VL-6, lysimeters were installed at 38 ft bgs (238 ft msl) and 57 ft bgs (219 ft msl) as shown in Figure 3. For ET3-VL-7, lysimeters were installed at 38 ft bgs (240 ft msl) and 58 ft bgs (220 ft msl) as shown in Figure 3. Each shallow lysimeter was placed based on the CPT log and field observation of soil cores. Good agreement is noted between the core description logs and the CPT log for ET3-VL-6. The shallow lysimeters were placed at 38 ft bgs for ET3-VL-6 and ET3-VL-7 and located above a competent silt layer observed on both in the field and CPT logs. The deep lysimeters for ET3-VL-6 and ET3-VL-7 were placed at 57 ft bgs and 58 ft bgs respectively and located above a clay layer observed from 58 to 67 ft bgs (Figure 3). This layer is noted in the core description at 57 ft bgs (Appendix B, Page B-9).

For ET3-VL-10, lysimeters were installed at 38 ft bgs (242 ft msl) and 58 ft bgs (222 ft msl) as shown in Figure 4. For ET3-VL-10, the CPT log is inconsistent with the core description (Appendix B). The CPT log shows shallow intervals of sand with little evidence of a confining layer to approximately 50 ft bgs. The shallow lysimeter at ET3-VL-10 was placed at 38 ft bgs according to field coring observation above a layer of firm silt and within a loose sand layer that is noted in the core description (Appendix B, Page B-11).

The deep lysimeter at ET3-VL-10 was placed at 58 ft bgs based primarily on the core description (Appendix B, Page B-12) though the CPT log for this location, shown in Figure 4, generally corresponds to field observations. From the core description, the sediments in this interval are

comprised of highly stratified sand and silt/clay. The lysimeter was placed in a sandier zone as indicated in the core description (Appendix B, Page B-12).

The ET3-VL-11, lysimeters were installed at 39 ft bgs (241 ft msl) and 59 ft bgs (221 ft msl) as shown in Figure 5. For ET3-VL-11, the CPT log and core description (Appendix B) are broadly consistent. The shallow lysimeter at ET3-VL-11 was placed at 39 ft bgs according to field coring observation above a layer of consolidated silt and within a loose sand layer that is noted in the core description (Appendix B, Page B-14).

The deep lysimeter at ET3-VL-11 was placed at 59 ft bgs based primarily on the core description (Appendix B, Page B-17). The lysimeter was placed in a sandier zone underlain by clay rich silt. This placement depth is in line with the other lysimeters installed during this event.

For ET3-VL-12, lysimeters were installed at 45 ft bgs (235 ft msl) and 57 ft bgs (223 ft msl) as shown in Figure 6. For ET3-VL-12, the CPT log is generally consistent with the core description (Appendix B). The shallow lysimeter at ET3-VL-12 was placed at 45 ft bgs according to field coring observation, above a layer of firm silt and within a loose sand layer that is noted in the core description (Appendix B, Page B18).

The deep lysimeter at ET3-VL-12 was placed at 58 ft bgs based primarily on the core description (Appendix B, Page 20). The CPT log for this location, shown in Figure 6, corresponds well to field observations. The deep lysimeter at ET3-VL-12 was placed in a loose sand layer just above a dense clay layer beginning at 59 ft bgs, as indicated in the core description (Appendix B, Page B-20).

For ET3-VL-13, lysimeters were installed at 45 ft bgs (232 ft msl) and 59 ft bgs (218 ft msl) as shown in Figure 7. For ET3-VL-13, the CPT log is consistent with the core description (Appendix B). The CPT log shows alternating layers of density that indicate interbedded layers of sand and silt/clay to depth. The shallow lysimeter at ET3-VL-13 was placed at 45 ft bgs according to field coring observation, above a layer of silt and within a sand layer that is noted in the core description (Appendix B, Page B-22).

The deep lysimeter at ET3-VL-13 was placed at 59 ft bgs based on the CPT log (Figure 7) and the core description (Appendix B, Page B-24). The lysimeter was placed in a sandier zone as indicated in the core description (Appendix B, Page B-24) above a denser layer of plastic clay.

Lysimeters at location ST8-VL-7 were installed at 39 ft bgs and 56 ft bgs as shown in Figure 8. The shallow lysimeter depth of 39 ft bgs was primarily informed by field core description above a small layer of hard silt layer seen at 40 ft bgs as noted in core logs (Appendix B, Page B-26). CPT logging for ST8-VL-8 also show evidence of this silt layer's presence.

The deep lysimeter at ST8-VL-7 was placed at 56 ft bgs. Both core description and CPT logging agree that a dense clay layer starting at approximately 61 ft bgs is overlain by loose sands from approximately 54 ft to 61 ft bgs. The interval of 56 ft bgs was chosen to target this sand layer.

For ST9-VL-4, lysimeters were installed at 38 ft bgs (238 ft msl) and 60 ft bgs (216 ft msl) as shown in Figure 9. For ST9-VL-5, lysimeters were installed at 39 ft bgs (237 ft msl) and 56 ft bgs

(220 ft msl) as shown in Figure 9. The shallow lysimeter was placed based on the CPT log and field observation of soil cores. Good agreement is noted between the core description logs and the CPT log for ST9-VL-4 and the descriptions for ST9-VL-4 and ST9-VL-5. Shallow lysimeters were placed at 38 ft bgs for ST9-VL-4 and 39 ft bgs at ST9-VL-5. Each shallow lysimeter was located above a competent silt layer observed on both the core description and CPT logs. The deep lysimeters for ST9-VL-4 and ST9-VL-5 were placed at 60 ft bgs and 56 ft bgs respectively and located above a clay layer observed in each core log (Appendix B, Pages B-30 and B-34).

3.0 Summary

Nine new lysimeter stations were installed at the E-Area Low Level Waste Facility (ELLWF). Six lysimeter stations were installed near Engineered Trench 3 (ET3), one installed near Slit Trench 8 (ST8), and two installed near Slit Trench 9 (ST9). Two lysimeters were installed at each station at the depths shown in Table ES-1. Lysimeter placements were based on borehole lithology and were comparable to existing nearby lysimeter stations. The deepest lysimeter at each of the new lysimeter stations was designated as the action-level lysimeter.

Following installation, the lysimeters were purged and placed under vacuum for sampling. Sampling occurred in April 2023. Analytical results from the sampling will be provided in the Spring 2023 Lysimeter Tritium Data technical memo and the 2023 Annual Summary Report.

With the addition of the new lysimeters at ET3, ST8, and ST9, the vadose zone monitoring system is now comprised of 327 active lysimeters at 111 lysimeter stations. There are 102 action-level lysimeters at 111 stations.

4.0 References

DOE, 1999. USDOE Order 435.1 Radioactive Waste Management Manual, U. S. Department of Energy, U.S. Department of Energy, Washington D.C., January 11, 2021.

WSRC, 2007. E-Area Low-Level Waste Facility DOE 435.1 Performance Assessment, WSRC-STI-2007-00306, Revision 0, Washington Savannah River Company, Aiken, SC, July 2008.

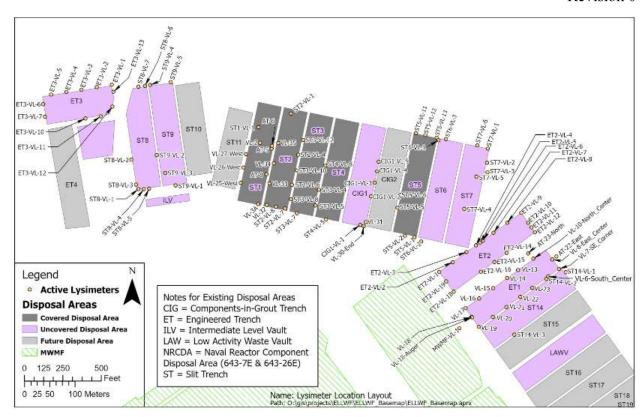


Figure 1. E-Area Low-Level Waste Facility.

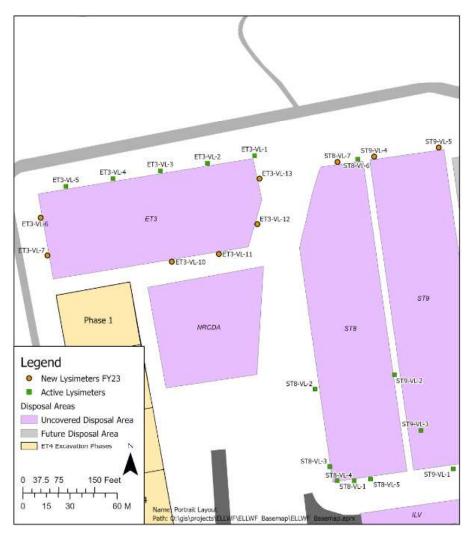


Figure 2. Layout of Lysimeter Stations Installed in FY23.

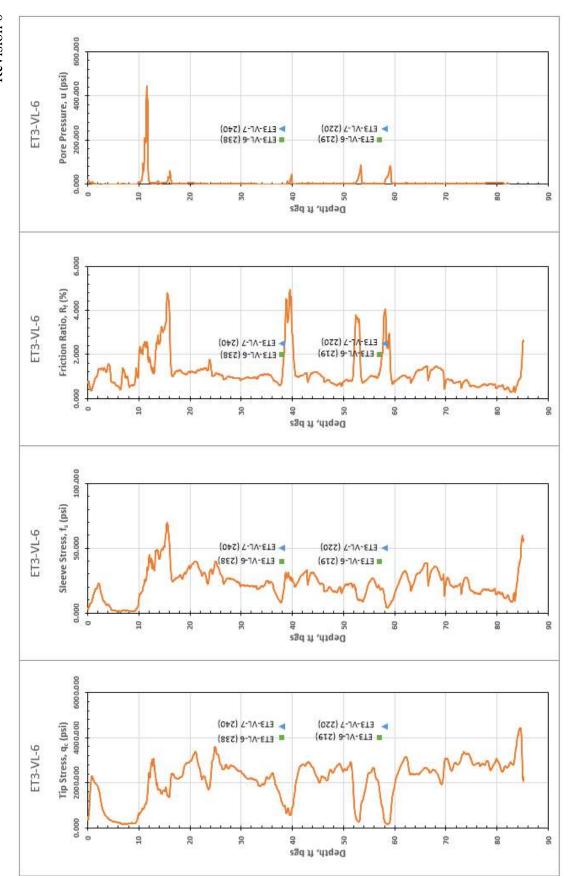


Figure 3. Lithologic Logs and Lysimeter Placement for ET3-VL-6 and ET3-VL-7

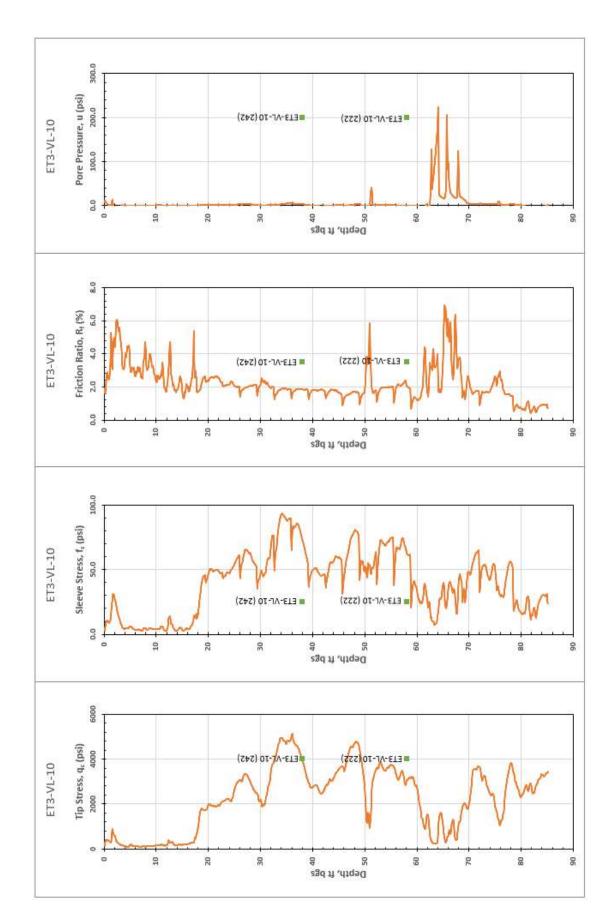


Figure 4. Lithologic Logs and Lysimeter Placement for ET3-VL-10

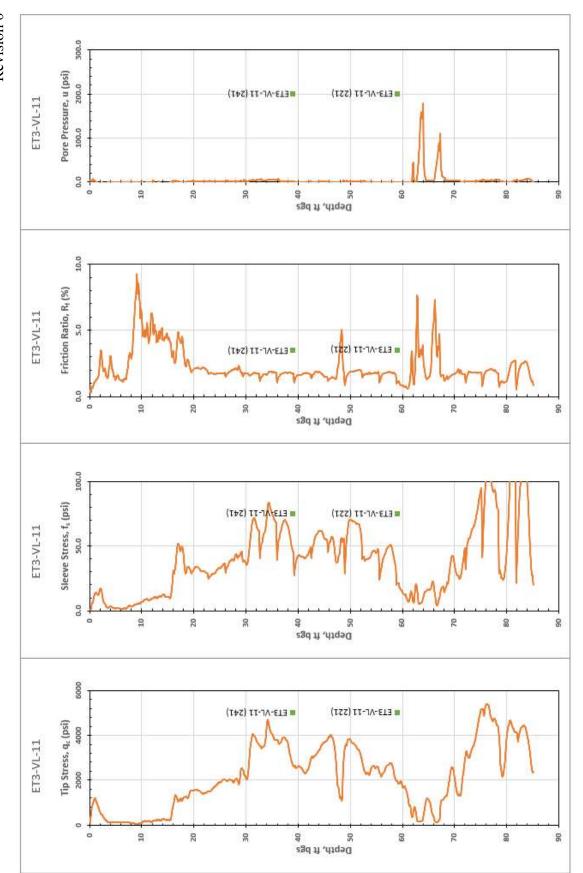


Figure 5. Lithologic Logs and Lysimeter Placement for ET3-VL-11

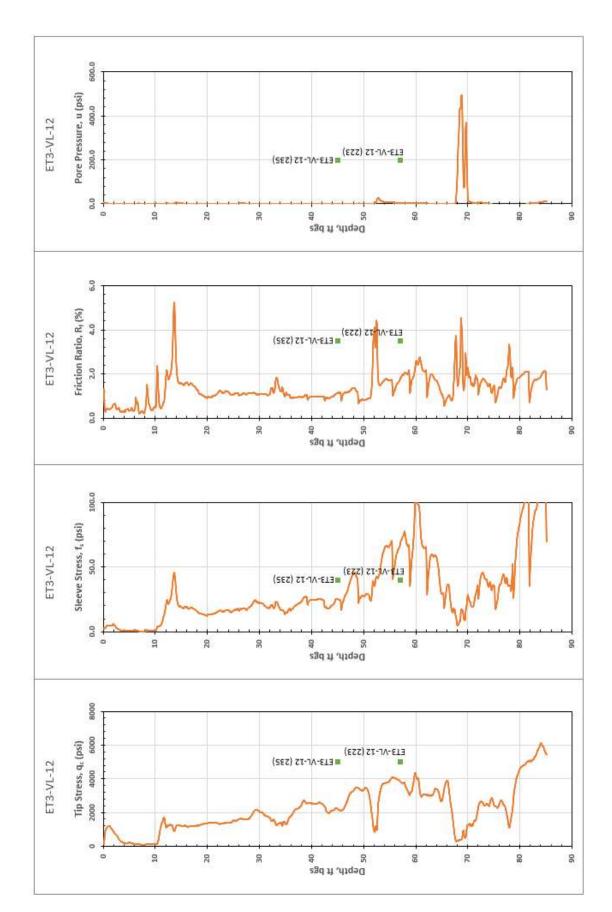


Figure 6. Lithologic Logs and Lysimeter Placement for ET3-VL-12

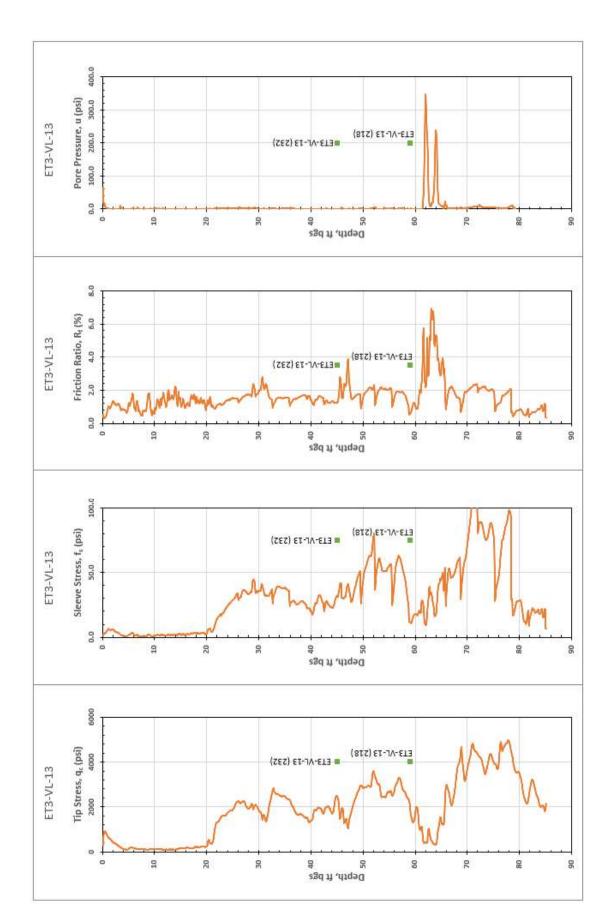


Figure 7. Lithologic Logs and Lysimeter Placement for ET3-VL-13

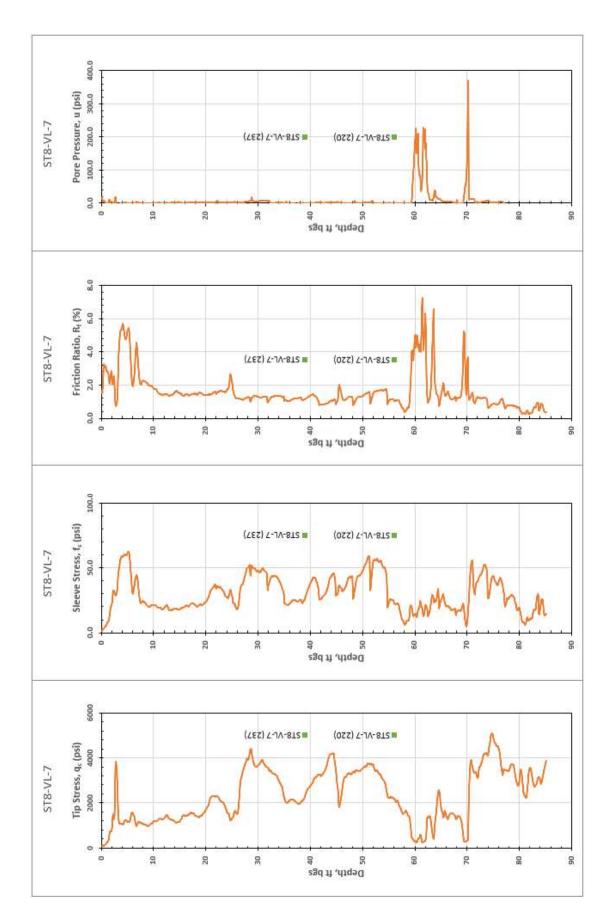


Figure 8. Lithologic Logs and Lysimeter Placement for ST8-VL-7

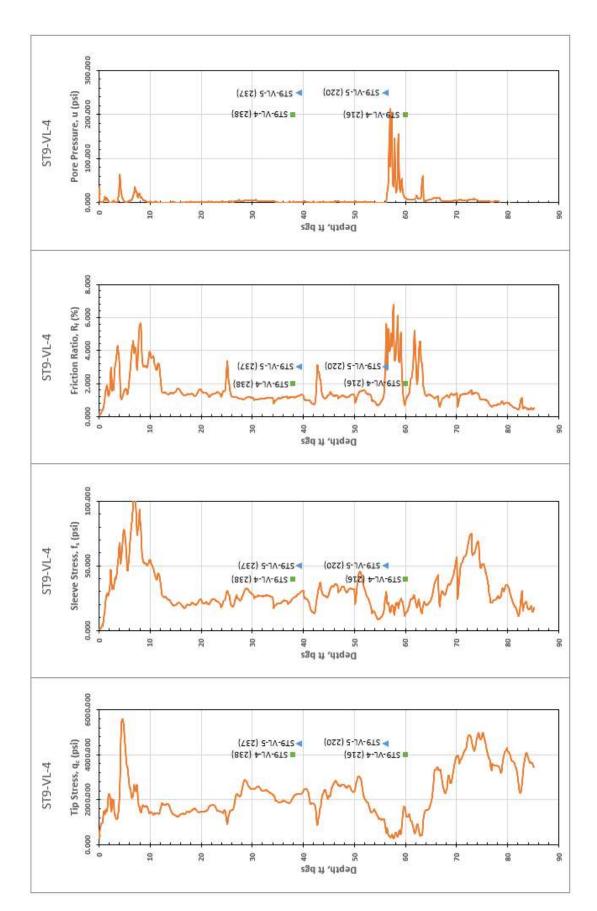


Figure 9. Lithologic Logs and Lysimeter Placement for ST9-VL-4 and ST9-VL-5



Figure 10. Sonic Drill Rig Used to Install New Lysimeters at ET3.



Figure 11. Model 1920F1 (SoilMoisture® Equipment Corp) Suction Lysimeter



Figure 12. Lysimeters were Saturated with Water Prior To Installation.

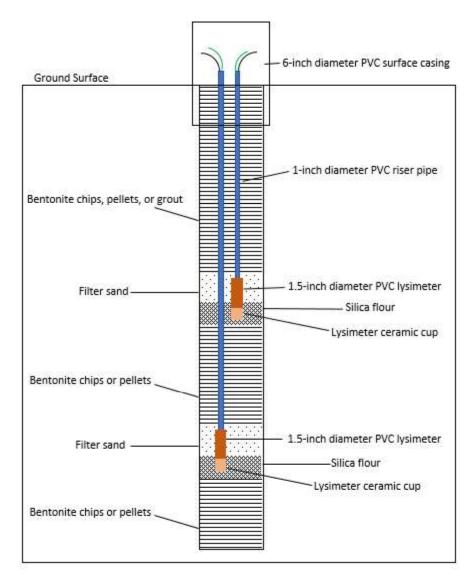


Figure 13. Generalized Schematic of Lysimeter Installation (not to scale).



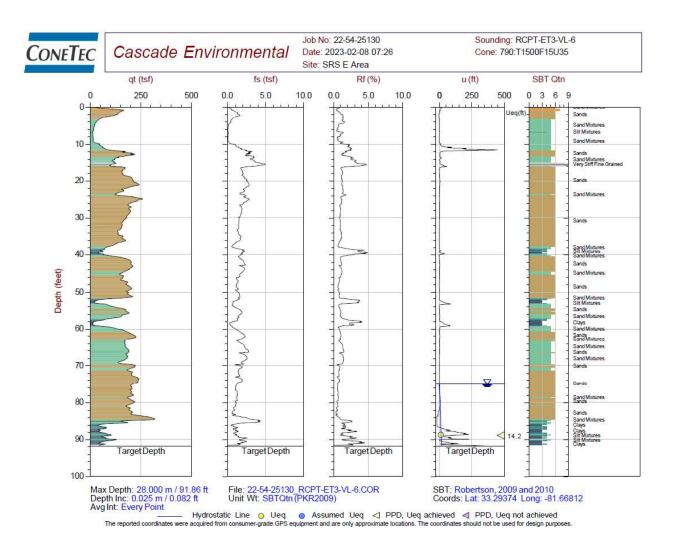
Figure 14. Silica Flour Placed Around Annulus of Lysimeter Ceramic Cup.

Table 1 Construction Details for FY23 Lysimeter Stations.

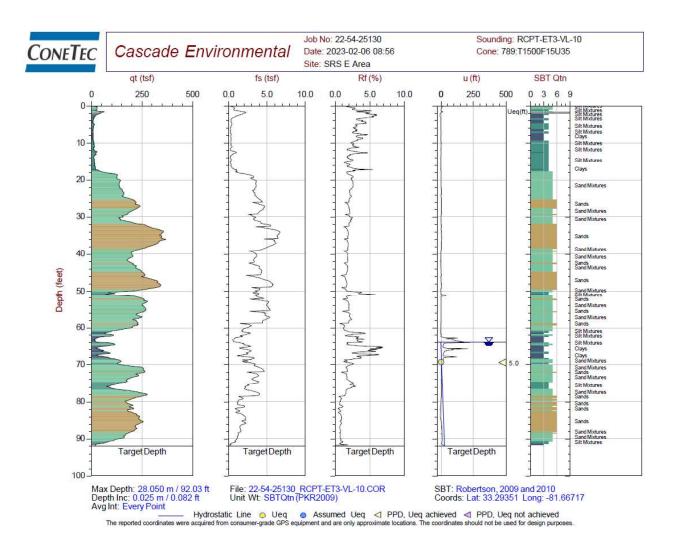
Station Name ET3-VL-6 (238) ET3-VI6 (219)					rysimeter	Lysmicier	HOHAL	ACHOIL
Station Name ET3-VL-6 (238) ET3-VL-6 (219)	Date	North	East	Elevation	Elevation	Depth	Level	Level
ET3-VL-6 (238) ET3-VL-6 (219)	Installed	(ft)	(ft)	(ft msl)	(ft msl)	(ft bgs)	Lysimeter	(pCi/ml)
ET3-VL-6 (219)	2023	78685.32	57503.89	276.22	238	38	No	
(2023	78685.32	57503.89	276.22	219	57	Yes	43.7
ET3-VL-7 (240)	2023	78613.77	57465.83	278.08	240	38	No	
ET3-VL-7 (220)	2023	78613.77	57465.83	278.08	220	58	Yes	43.7
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ET3-VL-10 (222)	2023	78448.06	57671.99	279.77	222	58	Yes	43.7
ET3-VL-11 (241)	2023	78401.64	57760.57	280.46	241	39	No	
ET3-VL-11 (221)	2023	78401.64	57760.57	280.46	221	59	Yes	43.7
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ET3-VL-12 (223)	2023	78407.90	57860.51	279.72	223	57	Yes	43.7
ET3-VL-13 (232)	2023	78482.50	57922.75	276.92	232	45	No	
ET3-VL-13 (218)	2023	78482.50	57922.75	276.92	218	59	Yes	43.7
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ST8-VL-7 (220)	2023	78413.31	58073.94	276.07	220	56	Yes	46.9
ST9-VL-4 (238)	2023	78377.51	58142.24	276.49	238	38	No	
ST9-VL-4 (216)	2023	78377.51	58142.24	276.49	216	09	Yes	46.9
ST9-VL-5 (237)	2023	78313.77	58261.45	276.12	237	39	No	
ST9-VL-5 (220)	2023	78313.77	58261.45	276.12	220	56	Yes	46.9

	Revision (
Appendix A. CPT Logs and Field Report	rts for FY23 ET3, ST8, and ST9 Lysimeter Installations

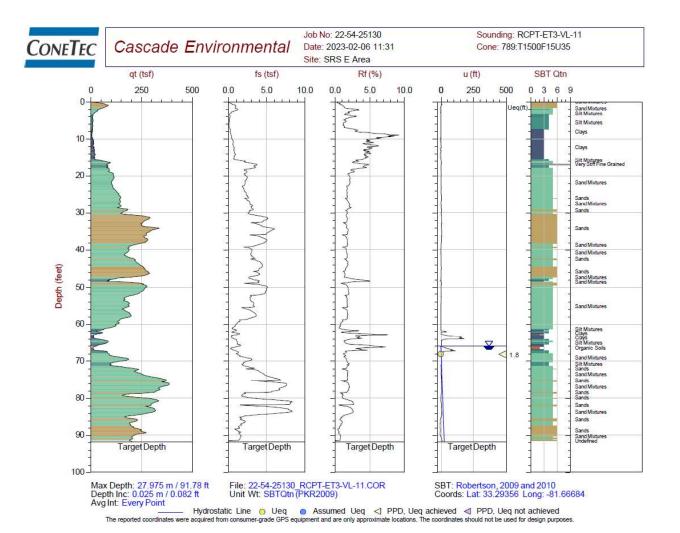
SRNL-STI-2023-00086



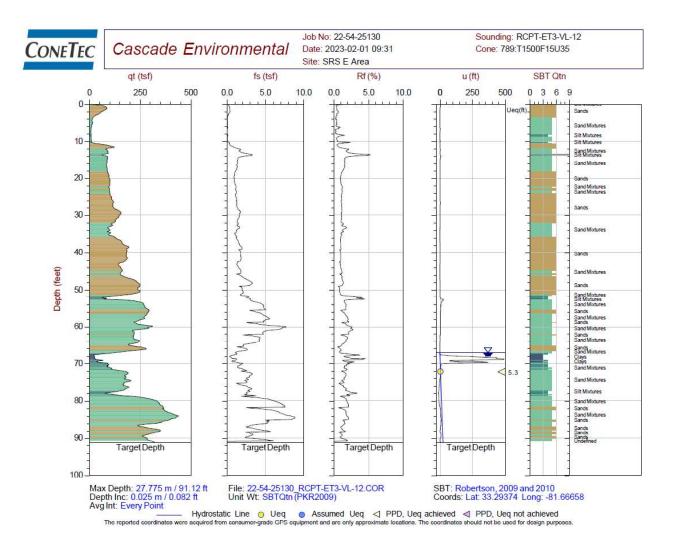
Cone Penetrometer Field Report							Test	Test Hole Number (AAA,NNN,AA)			
		Cor	ne Pen	etrome	ter Fleia	кероп		ET3	VL	6	
					(General					
Project Name											
E-Area Lysimeter In						14aaaaaaaa					
Project Manager (last Dixon, K.		nitial)			C)	Department Environmental Sciences	and Dosimetery	Si			
Type of Cone Penetro RCPT Resist Cone		n Test			County Aiken	Location Description North West edge of clear	ed area				
SRS North Grid Coord 78685.32	linate	SRS Ea 57503	ast Grid Coordii .89	nate	Ground Elevation 276.43	n Latitude (degrees, minutes, 33° / 17' / 37.06"	seconds)	Longitude (de -81° / 40' / 5		ites, seconds)	
		200000000000000000000000000000000000000	A102/2007/		Testing	and Sampling		4 27 3 3 4 2 2 2 2 2	20000		
Test Start Date 02/08/2023		nplete Date /08/2023	Total Penetr 90ft bls	ation Depth		Interpreted Water Table Lev 71ft bls	el	Ground Wate		Soil Samples?	
Cone Penetrometer Dissipation	Test Type	Depth 76ft bls and	to Sample 88ft bls	Cone Pene	etrometer Test Type	e Depth to Sample	Cone Pene	etrometer Test Typ	е	Depth to Sam	
Cone Penetrometer Cone Tech	ompany	No.		Cone Operat		Oversight Company Cascade Drilling	***	Oversigh Wilcox,		e, first initial)	
						Logging					
Log Type						Logging					
Log Type											
Sleeve (psi)		(psi)	Ratio (%	6)	Pressure (psi)						
Other Logs (list)											
					Aba	andonment					
Date Abandoned 02/08/2023		of Abandonme mie Pipe		-Grouting Metho		heoretical Grout Volume 0,4 gal				Actual Grout Vo 15 gal	
Report Prepared by Evan Koelker					100					Date Report Pro 03/03/20	



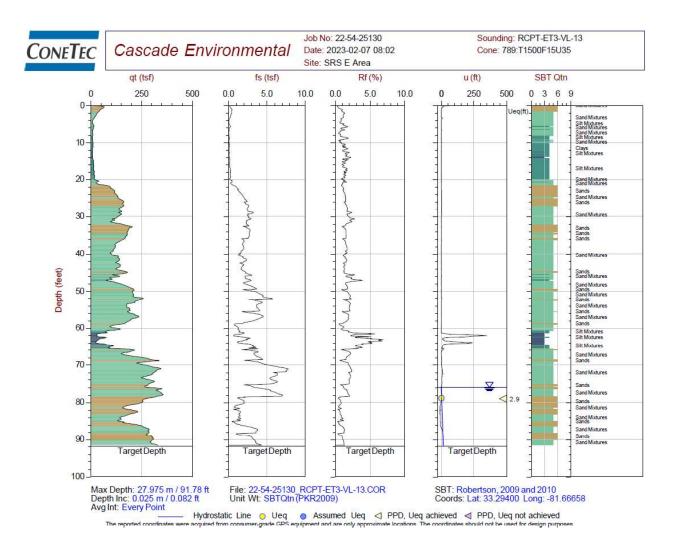
Cone Penetrometer Field Report								Test Hole Number (AAA,NNN,AA)			
Cone Penetrometer Fleid Report									VL	10	
					C	General		- Landan	- Li	1	
Project Name E-Area Lysimeter In	stall 1-2/20	023									
Project Manager (last Dixon, K.	name, first in	32/3/10/1				Department Environmental Sciences	and Dosimetery				
Type of Cone Penetro RCPT Resist Cone	Penetration				County Aiken	Location Description South Edge of cleared an					
SRS North Grid Coord 78448.06	inate	SRS E 57671	ast Grid Coordi .99	nate	Ground Elevation 280.01	Latitude (degrees, minutes, : 33°/17'/36.15"	seconds)	Longitude (de -81°/40'/2.3		utes, seconds	.)
					Testing	and Sampling					
Test Start Date 02/06/2023		nplete Date /06/2023	Total Penetr 90ft	ration Depth		Interpreted Water Table Leve 64ft bls	el	Ground Wate	er Samples? No	Soil Sample O Yes	s? No
Cone Penetrometer	Test Type	Depth	to Sample	Cone Pene	trometer Test Type	Depth to Sample	Cone Penetro	ometer Test Typ	oe .	Depth to Sa	ımple
Dissipation		69ft bls									_
Cone Penetrometer Co	ompany			Cone Operat Josh Hauck		Oversight Company Cascade Drilling		Oversig Wilcox		e, first initial)	
					L	ogging					
.og Type											
Sleeve (psi)	⊠ Tip	(psi)	Ratio (%	6) 🖂	Pressure (psi)						
Other Logs (list)											
					Aba	ndonment					
Date Abandoned		of Abandonme mie Pipe		-Grouting Metho		heoretical Grout Volume 0,58 gal				Actual Grout 45 gal	
Report Prepared by Evan Koelker										Date Report 02/06/	



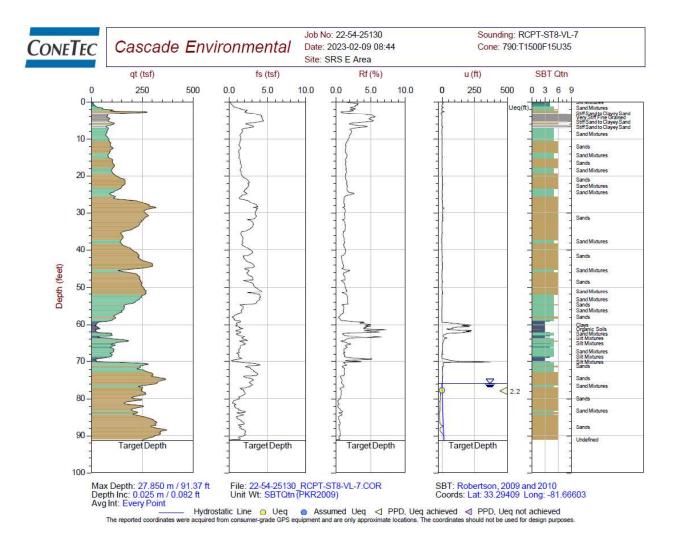
Cone Penetrometer Field Report								Test Hole Number (AAA,NNN,AA)			
		Cor	ie Pen	etrome	ier Fleid	Report		ET3	VL	11	
						General					
Project Name											
E-Area Lysimeter In	stall 1-2/20	23									
Project Manager (last i Dixon, K.		nitial)				Department Environmental Sciences	and Dosimetery				
Type of Cone Penetron RCPT Resist Cone		n Test			County Aiken	Location Description East edge of cleared area	а				
SRS North Grid Coord 78401.64	inate	SRS Ea 57760	ast Grid Coordir .57	nate	Ground Elevation 280.62	n Latitude (degrees, minutes, : 33°/17'/36.30"	seconds)	Longitude (de -81°/40'/1.20		ites, seconds)	
					Testing	and Sampling					
Test Start Date 02/06/2023		plete Date /07/2023	Total Penetr 90ft bls	ation Depth		Interpreted Water Table Leve 66ft bls	el	Ground Wate		Soil Samples O Yes	
Cone Penetrometer	Test Type	Depth	to Sample	Cone Pene	trometer Test Typ	e Depth to Sample	Cone Penetro	meter Test Typ	ie	Depth to Sar	nple
Dissipation	7, 3, 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4,	68ft bls	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			6	3				
											_
Cone Penetrometer Co Cone Tech	ompany	(5)		Cone Operate Josh Hauck		Oversight Company Cascade Drilling	67	Oversigi Wilcox.		e, first initial)	
						Logging					
Log Type											
Sleeve (psi)	∑ Tip	(psi)	Ratio (%	b) 🖂	Pressure (psi)						
Other Logs (list)											
					Ab	andonment					
Date Abandoned 02/07/2023		of Abandonme mie Pipe		-Grouting Metho		Theoretical Grout Volume 10,6 gal				Actual Grout \ 15 gal	/olum
Report Prepared by Evan Koelker	•									Date Report P 02/07/2	



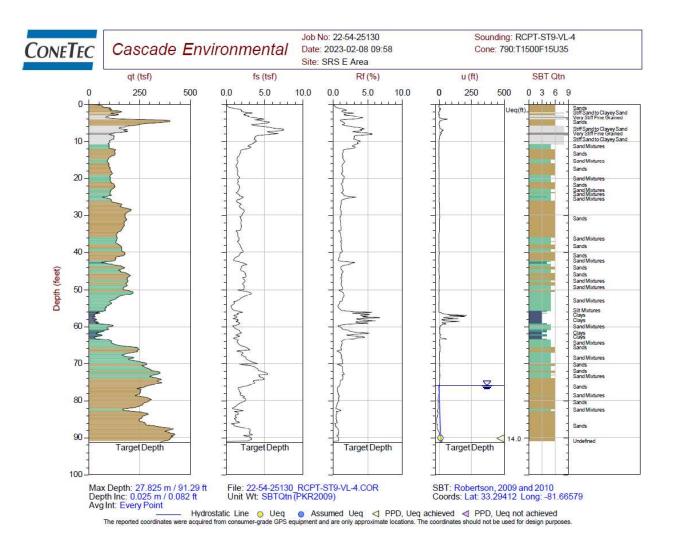
Page 1 of 1		0	D	_1				Test Hole Number (AAA,NNN,AA		
		Cor	ne Pen	etrome	ter Field F	кероп		ET3	VL	12
					Ge	noral		1-12	1	1.00
Project Name					10000					
E-Área Lysimeter In	stall 1-2/20	23								
Project Manager (last r Dixon, K.	name, first ir	nitial)				Department Environmental Sciences a	and Dosimetery			
Type of Cone Penetron RCPT Resist Cone I		n Test			County Aiken	Location Description ET3 - East edge of of clea	red area,			
SRS North Grid Coord 78407.9	inate	SRS E 57860	ast Grid Coordii .51	nate	Ground Elevation 279.86	Latitude (degrees, minutes, s '33° / 17' / 36.94"	econds)	Longitude (de -81° / 40' / 0		ites, seconds)
		***			Testing a	nd Sampling		*		
Test Start Date 02/01/2023		nplete Date /01/2023	Total Penetr 90 ft bls	ation Depth		Interpreted Water Table Leve 66 ft bis	ı	Ground Water O Yes O		Soil Samples? Yes No
Cone Penetrometer	Test Type	Depth	to Sample	Cone Pene	etrometer Test Type	Depth to Sample	Cone Penet	rometer Test Type	В	Depth to Sample
Dissipation		72.2 ft bls					12		0	
		S C					2	W.	8	
Cone Penetrometer Co Conetech	ompany			Cone Operat Josh Hauck		Oversight Company Cascade Drilling		Oversigh Wilcox,		e, first initial)
					Lo	gging				
Log Type					20	99"'9				
Log . Jpc										
Sleeve (psi)	⊠ Tip	(psi)	Ratio (%	b) 🖂	Pressure (psi)					
Other Logs (list)										
		Softer of			Abane	donment				
Date Abandoned 02/02/2023		of Abandonme mie Pipe		-Grouting Metho		eoretical Grout Volume 32				Actual Grout Volum 25
Report Prepared by Evan Koelker	he.				54				6	Date Report Prepar 02/02/2023



OSR 30-13 (Rev. 07-30-2019 Page 1 of 1).	0	o Don	_4,_,,_,	or Field	Donort		Test	Hole Numb	er (AAA,N	(AA, NNi
		Cor	ie Pen	etromet	er Field	кероп		ET3	VL		13
					1	General		- Alexander			
Project Name											
E-Area Lysimeter In						200					
Project Manager (last Dixon, K.		nitial)				Department Environmental Sciences	and Dosimetery	83			
Type of Cone Penetro RCPT Resist Cone		n Test			County Aiken	Location Description South East edge of clea	red area				
SRS North Grid Coord 78482.5	linate	SRS Ea 57922.	st Grid Coordi 75	nate	Ground Elevation 277.37	Datitude (degrees, minutes 33° / 17' / 37.90"	seconds)	Longitude (de -81° / 40' / 0		ites, secoi	nds)
		***			Testing	g and Sampling		*			
Test Start Date 02/07/2023		nplete Date /07/2023	Total Penet	ration Depth		Interpreted Water Table Le 76ft bls	vel	Ground Wate		Soil Sam	
Cone Penetrometer	Test Type	Depth	to Sample	Cone Pene	trometer Test Typ	Depth to Sample	Cone Pen	etrometer Test Typ	е	Depth to	Sample
Dissipation		79ft bls					8		- 10		
Cone Penetrometer Cone Tech	ompany			Cone Operato		Oversight Company Cascade Drilling		Oversigl Wilcox,	nt (last name	e, first initia	al)
						Logging					
Log Type											
Sleeve (psi)	□ Tip	(psi)	Ratio (%	6)	Pressure (psi)	□ Resistivity					
Other Logs (list)											
					Ab	andonment					
Date Abandoned 02/07/2023		of Abandonme mie Pipe		I-Grouting Metho		Theoretical Grout Volume 10,5 gal				Actual Gro 15 gal	out Volume
Report Prepared by Evan Koelker	to to					}					ort Prepar 03/2023



OSR 30-13 (Rev. 07-30-2019) Page 1 of 1		0	D		املح: ۵ ما	Damant		Test	Hole Numb	er (AAA,NNN,A
		Col	ne Pene	etrome	ter Field	кероп		ST8	VL	7
						General				L.
Project Name										
E-Area Lysimeter Ins						1 End (100 (100 (100 (100 (100 (100 (100 (10				
Project Manager (last r Dixon, K.	name, first ir	nitial)				Department Environmental Sciences	and Dosimetery			
Type of Cone Penetror RCPT Resist Cone F		T			County Aiken	Location Description	_			
SRS North Grid Coordi			ast Grid Coordin	ate	Ground Elevatio	East edge of cleared area n Latitude (degrees, minutes,		Longitude (de	arees mini	utes, seconds)
78413.31	ilato	58073		dio .	276.26	33° / 17' / 38.24"	seconas,	-81° / 39' / 5		ates, sessinas,
					Testing	and Sampling				
Test Start Date 02/09/2023		plete Date /09/2023	Total Penetra 91.9ft bls	tion Depth		Interpreted Water Table Lev 76ft bls	el	Ground Wate		Soil Samples? O Yes N
Cone Penetrometer	Test Type	Depth	to Sample	Cone Pene	trometer Test Typ	e Depth to Sample	Cone Penetro	meter Test Typ	e	Depth to Samp
Dissipation		78ft bls				7	1			
Cone Penetrometer Co	mpany	3.4		Cone Operati	or	Oversight Company		Oversigh	nt (last name	e, first initial)
Cone Tech				Josh Hauck		Cascade Drilling		Wilcox,	D.	
						Again a				
T					(1)	Logging				
Log Type										
Sleeve (psi)	□ Tip	(psi)	Ratio (%) 🖂	Pressure (psi)	□ Resistivity				
Other Logs (list)										
					Aba	andonment				
Date Abandoned 02/09/2023		of Abandonme mie Pipe		Grouting Metho		heoretical Grout Volume 0,5 gal				Actual Grout Vo 20 gal
Report Prepared by Evan Koelker					100	A 100 A 100 A				Date Report Pre 03/03/20



Page 1 of 1		0	D	_4	tana Etalal I	D4		Tes	t Hole Numbe	er (AAA,NNN,AA
Cone Penetrometer Field Report							ST9	VL	4	
					G	eneral		- Incide	1/2	
Project Name						V				
E-Area Lysimeter In:	stall 1-2/20	23								
Project Manager (last r	name, first ir	nitial)				Department		200		
Dixon, K.	28	600				Environmental Sciences	and Dosimeter	y		
ype of Cone Penetror					County	Location Description				
RCPT Resist Cone I					Aiken	North East portion of clea				
RS North Grid Coord	inate		ast Grid Coordin	nate	Ground Elevation		seconds)	Longitude (de		tes, seconds)
8377.51		58142	.24		276.67	33°/ 17' / 38.35"		-81° / 39' / 5	07.41"	
					Testing a	and Sampling				
est Start Date		nplete Date	Total Penetr	ation Depth		Interpreted Water Table Leve	el			Soil Samples?
02/08/2023	02.	/08/2023	90ft bls	§:		76ft bls		○ Yes	No	O Yes ⊚ N
Cone Penetrometer	Test Type	Depth	to Sample	Cone Pene	etrometer Test Type	Depth to Sample	Cone Per	netrometer Test Typ	oe	Depth to Samp
issipation		70ft bls					1		- 1	
issipation		T CIT DIG		- 1		4	34		-	
				355			**		-	
o						N 00 00 00 00 00 00 00 00 00 00 00 00 00	1	4000	-00000 A	- 100 A To Alexandra - 100 A
one Penetrometer Co one Tech	ompany			Cone Operat Josh Hauck		Oversight Company Cascade Drilling		Oversig Wilcox	ht (last name	, first initial)
					L	ogging				
og Type										
Sleeve (psi)		(psi)	Ratio (%	(a)	Pressure (psi)					
Other Logs (list)										
		2011	110			ndonment				
ate Abandoned		of Abandonme mie Pipe		-Grouting Metho		neoretical Grout Volume),5				Actual Grout Vo 15 gal
Report Prepared by Evan Koelker		<u> </u>		<u> </u>				<u> </u>		Date Report Pre 03/03/20

	SRNL-STI-2023-00086 Revision 0
	Revision 0
Appendix B. Field Geologic Logs for FY23 ET3, ST8, and ST9 I	ysimeter Installations

Project			100000			Proc.	Ref. 3Q1-9004, 9008 Date		
E-Area Ly Well Numb	/simeter Installa er	ations 2-3/2		ocation	Drilling Subcontract	or	02/21/2023		
ET3-VL-6 Logs Prepa			E	E-Area	Cascade Drilling Driller				
Evan Koe	lker				Branden Griffis				
Company SRNL		· ·	2	Drilling Method Rotosonic					
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Descrip	ption		illing Is/Remarks		
	0				X				
				0' - 10'					
	1			Med. stiff, moist, 5YR5/6 yellow-red, sandy SILT					
	2	4			A				
	3				*				
		i i			×		8		
1	4		50		X				
							- 3		
	5	SM							
	6						9		
	0				*		-		
	7				Ĭ		- 1		
							1		
	8						- 3		
	9			•	x				
	0 10								
	5,13			10' - 12'			- 17		
	.1			Firm, dry, 10YR4/6 red, sandy SIL	T; trace c. sand, trace				
				subangular to rounded gravel up to	o ~3" diam. (fill)				
	2								
2	3		100						
	4		100						
	5			12' - 27'					
		ML		Firm, dry, 5YR 6/8 red-yellow, non					
	6			some f. sand, occasional white clay	y parting at 17'				
	7				×				
	-				*		-		
	8				×		8		
					The state of the s				
	. 9						- 8		
	0.00								
	0 20	2							

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	1 2 3	ML			
3	45_		90		
	8				
	8	SP		27 - 30' Loose, dry, 7.5YR7/8 yellow red with 7.5YR8/1 white color layering ~1/16in in thicknesses, poorly graded f. SAND; trace m. sand	
	0 30	ML	100	30' - 32' Firm, dry 2.5YR6/8 light red, nonplastic SILT; some f. sand, with 31' - 32' section very dry and powderlike	
4	3			32' - 37' Low dense, dry to moist, 10R4/6 red, silty f. SAND; occasional white clay parting	
	5	SM			
	7	CW		37' - 39' Loose, moist, 5YR6/8 red-yellow, well graded f. SAND;	
	9	CL		Loose, moist, 6YR0/8 red-yellow, well graded f. SAND; some silt, trace c. sand 38' - 40'	
	0	400		Soft, moist, 5YR6/6 red-yellow, silty plastic CLAY	

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	040		1	A	
	1			40' - 45'	
	1			Loose, dry, 5YR5/3 red-brown, sandy nonplastic SILT;	
				Y.	
	2	SM			
	3				
	4		auris		
5	100		100		
	5	-			
				45' - 49'	
	6			Loose, dry to moist, well graded, f. SAND;	
				trace m. sand, trace silt	
	7	SW			
	8				
	.9				
	1			49' - 50'	
	0 50	ML		Firm/Friable, dry, 7.5YR red-yellow, nonplastic SILT;	
]		some f. sand	
	1			50" - 51"	
				Loose, v. dry, 5YR 6/1 gray, nonplastic SILT; powderlike	
	2	-			
		SM		51' - 54'	
	3		ausis	Loose, moist, 10YR 6/8 brown-yellow, silty well sorted	
			100	f. SAND; trace m. sand	
	4				
		1			
	5				
				54" - 58"	
	6	SW		Loose, moist, 7.5YR8/8 red-yellow, well graded m-f;	
	<u> </u>			SAND; trace silt	
	7			-becoming 10R4/8 red at 57'	
	8				
*******	9	0.79	commons		
		CL		1	
	0 60	1		Ů,	

Field Geologic Log (Continued)

	T P	2		Proc. Ref. 3Q1-9004, 90	
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	060	ľ	1 1		*
				58' - 63'	
	1	ş		Soft, moist to wet, 10YR7/8 yellow, silty/sandy	
		CL		plastic CLAY; trace m. sand	
	2			-becoming 10R3/6 dark red at 59' wiht purple mottling	×
	3				
	4	8		83' - 70'	
ą.			100	Loost, wet, 10YR7/8 yellow, well graded SAND;	*
	5	3		trace m. sand	
	1 77	8			1
	6				
	7	8			
	"-	8			†
	8				*
		8			4
	9	ž.			+
	-	š.			4
	0.70	TotalDepth			
	0/0	Тогагоерия			×
	1				-
		ă.			1
	2	8			+
	-	i.			4
					4
	3				×
	2	3			1
	4				
	12-1				
	5				3
		ş			*
	.6	į.			
		į.			×
	7	e.			
	-	is:			
	8	8			
	9	2			
	0		1		

Project E-Area Ly	simeter Installa	tions 2-3/2	023				tef. 3Q1-9004, 9006 Date 02/21/2023
Well Numb ET3-VL-7	er	200000000000000000000000000000000000000	L	ocation E-Area	Drilling Subcontracto Cascade Drilling	or	100000000000000000000000000000000000000
Logs Prepa Evan Koe	red By Iker		- 89		Driller Branden Griffis Drilling Method		
Company SRNL							
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Descriptio	n		ling s/Remarks
	0			0" - 8"			
	0.0	26		Med stiff, moist, 2.5YR 4/8 red, sandy	low-plastic SILT;		
	1			trace m. sand, trace gravel at 8ft			
				ET EST SPECIFIED TO PRODUCE STANDARD SPECIFIC CONTRACTOR SERVICE STANDARD PRODUCE STANDARD STANDARD STANDARD S	Ĭ.		
	2	80					
	(a)						
	3	8			2		
	4	SM			-		-
1	4	SM .	100				
	5		100				
	7	8					
	6	8					
	7				Ĭ		
	8				ž.		
		ş.	-0.000000000000000000000000000000000000				
200000000000000000000000000000000000000	9	8		-	×		
	0 10	ši .			×		
	0 10	30		8' - 20'			-
	1 1	ii.		Firm, moist 5YR6/8 red-yellow, silty to	w-plastic CLAY:		
	" -	84		occasional white clay (kaolin) parting	-		
	2			- color changing to 10R 4/8 red at 10'			
				at 19'	×		
	3				Ŷ		- 1
		CL	mars.		ž		
2	4	8	100		×		
	<u> </u>	E .			×		
	5	ši .			*		
	6	ž.					
	0	8			*		
	7	8			7	-	-
					×		
	8	3			×		
		6			Ÿ		
	9				X		
		ş			×		
	0 20						

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
Number	O 20	Lithology	Recovery	Sample Description	Comments/Remarks
	U20	;;;:1:::::::::::::::::::::::::::::::::			
	1			1	
				20' - 26'	
	2			Loose, moist, 10R6/8 light red, silty well graded m-f SAND	
	2			Essert, marst, terrare ngm rea, 2my men grades m reams	
	3	sw			
N .	 		100		
	4				
				*	
	5			*	
	-			*	
	6			3	
				,	
	7			,	
	8			26' to 34'	
				Loose, moist, 7.5YR6/8 red-yellow, poorly graded	
	9			f. SAND	
		SP			
	0 30	8			
	_				
	1			*	
	2			+	
				4	
	3			4	
	-		90	*	
	4			1	
		3-1		3	
	5			34' - 37'	
		SM		Loose, dry, 10R4/8 red, silty, poorly graded f, SAND	
	6	0.1 X.C.C.			
	100				
	7			37' - 38'	
		SM		Firm/Friable, dry, 10R7/4 pale red and 10YR8/4 yellow	
	8			color parting/seams, sandy SILT;	
		SM		occasional low cementation	
	9			× ×	
				38' - 39'	
	0 40	CL	1	Loose, moist, 10R4/8 red, silty m-f SAND	

Field Geologic Log (Continued)

	Ÿ.	ř -		1	Proc. Ref. 3Q1-9004, 9006
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 40		1 1		1
				39' - 43'	
	1	£		Fimr, dry, 10R4/Bred with brown mottling, silty CLAY;	
		CL		trace f. sand	
	2				*
	3				+
5	4		100	43' - 47'	
	100			M. stiff to hard (Friable), dry, 7.5YR8/8 and 10R4/8 red	
	5			layers, sandy SILT	1
	6	ML			
					Î
	7			47' - 48'	i e
				Loose, v. dry, 7.5YR 7/1 gray, sandy SILT; powder-like	
	8				
				47' - 52'	
200000000000000000000000000000000000000	. 9			M. stiff, moist, 2.5YR5/8 red, sandy SILT;	
		ML		trace c. subangular sand	
	0 50			n, 1,	
					1
	1 1				*
	2	xxxNRxxx			+
		xxxNRxxx			52' - 55' sample not recovered
	3	xxxNRxxx			oz oo sampe no recovere
6			70		*
	4	xxxNRxxx			*
		xxxNRxxx			
	5	xxxNRxxx			
				55' - 58'	
	6	S		Loose, moist, 10YR 8/8 yellow, m-f SAND;	
		SW		trace c. sand	+
	7			- becoming 2.5YR4/8 red at 57"	+
	8				1
					1
	. 9				
		CL			*
	0 60				1

Field Geologic Log (Continued)

	Ľ.	2 3	- 4	Proc. Ref. 3Q1-9004, 9		
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks	
	0 60	X 3		×		
				58' - 67"		
	1			Soft, moist, 10R 3/6 dark red, sandy low-plastic CLAY;		
				- increasing sand % to depth.		
	2	CL				
		005				
	3					
				Ĭ.		
	4					
			80			
	5			×		
				8		
	6			X		
		ą		×		
	7					
				67' - 70'		
	8			Loose, moist to wet, 10R4/6 red, well graded m-f SAND;		
		SW		trace silt		
	9					
	0 70					
				×		
	1	s		*		
	2					
	3					
	0.					
	4					
	150					
	5			X		
		ş				
	6	ş		×		
		į.				
	7	i i				
		8		-		
	8					
	9	2				
	12					
	0	1	1	l Y		

Project E-Area Ly	simeter Installa	itions 2-3/2	2023			Proc. Ref. 3Q1-9004, 900 Date 02/22/2023	
Well Numb ET3-VL-1	0			Location E-Area	Drilling Subcontractor Cascade Drilling		
Logs Prepa Evan Koe	ared By Iker				Driller Branden Griffis		
Company SRNL		e s		9	Drilling Method Rotosonic		
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Descrip	otion	Drilling Comments/Remarks	
	1 2			0' - 18' Soft, moist, 10R 5/8 red, sandy low	-plastic CLAY		
1		CL	60		, , , , , , , , , , , , , , , , , , ,		
	7 8						
	0 10						
	2						
2	45	CL	100				
	6 7	6 8 8					
	8 9			18' - 22' Soft majet 7 EVDRIQ and vallous a	andy SILT		
	1	SM		Soft, moist, 7.5YR6/8 red-yellow, s. gradual increasing sand % to depth			

Field Geologic Log (Continued)

	Ť	<u> </u>	2	The state of the s	Proc. Ref. 3Q1-9004, 90
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0				
	1	SM			
	2				
	3				
	4		100	22' - 29' Loose, dry, 7.5YR6/8 red-yellow, silty well graded	
		92500		f. SAND	
	5	SW		1	
	6				
	7				
	8				
	. 9				
	0 30				
		SM		29' - 32'	
	1			Firm/Friable, dry, 10R5/6 red, sandy SILT;	
	2			trace c. sand	
		1		32' - 34'	
	3		500	Dense, dry, 10YR 8/8 yellow, silty f. SAND	
Ř.	4	SM	100	color change to 10R 5/8 red at 34' - 36'	
	5	-			
	6				
				36' - 39'	
	7	sw		Loose, moist, 5YR6/8 yellow-red, m-f well graded SAND; some silt	
	8				
			J		
		2000			
	0 40	SM			

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	040	×			
	1			39' - 46'	
	1			Firm, dry, 5YR5/6 yellow-red, sandy non-plastic SILT	
	2				4
5		SM	80		
	3				
	4				
	10	-			46' - 49' sample dropped from rods,
	5				and second run from 46' to 49' added
					to recover that interval.
	6			46' - 50'	
	7	1		Dry, loose, 7.5YR5/8 pale brown, well-graded m-f SAND	
В		1	100	some silt, trace c. sand	
2	8	sw			
	. 9				
	0 50	CL		50' - 51'	
	1			Stiff, dry, 5YR5/4 red-brown, sandy low plastic CLAY	
				EAN EEU	
	2	-		51' - 55' Loose, moist, 5YR6/8 red-yellow, well graded m-f SAND;	*
	3	sw			A
7	"-	SW	100	some silt, trace c. sand and small pebbles; occasional low cementation	
(0)	4		100	low cementation:	Ž.
	5				
				55' - 58'	
	6	1		Loose, moist, 7.5YR 7/8 red-yellow poorly graded	
	1.50	SP		f. SAND; some silt	*
	7				
	8	-			
				58' - 63'	
	. 9			Soft, moist to wet, 7.5YR7/8 red-yellow with 10YR5/8red	
		SM		mottling, sandy nonplastic SILT; occasional white clay	4
	0 60	7.10		parting	

Field Geologic Log (Continued)

44		2 2	9	Proc. Ref. 3Q1-9004, 900		
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks	
	0 60	×	1 6		×	
					3	
	1	SM				
	2				×	
	3			63' - 65'		
				Firm to hard, dry, 7.5YR6/6 brown, sandy SILT		
	4		Suite:	211 XG12		
8	100		100			
	5	<u> </u>				
	223			700,000,000		
	6			65' - 70'	3	
		Ş.,,		Soft, wet, 5YR4/6 yellow-red, sandy CLAY		
	7	sc				
	8					
	<u> </u>					
	.9				4	
	0.70				×	
	0 70	TotalDepth	100000000000000000000000000000000000000			
	1				×	
	2	8				
	-	8			A	
	3	8				
	J -					
	4	i i			+	
		ė.			3	
	5					
	6	8				
	£0.	8				
	7					
	8					
	8					
	9				×	
					×	
	0				0	

Field Geologic Log

Proc. Ref. 3Q1-9004, 9006 Project Date 02/23/2023 E-Area Lysimeter Installations 2-3/2023 Well Number ET3-VL-11 Drilling Subcontractor Cascade Drilling Location E-Area Logs Prepared By Evan Koelker/Terry Killeen Branden Griffis Company SRNL/SRNS Drilling Method Rotosonic Depth Below Drilling Comments/Remarks Run Ground Percent Lithology Number Surface (Feet) Recovery Sample Description Soft, moist, 2.5YR 5/8 red, sandy CLAY 80 CL 0 10 100 Stiff, moist, 5YR 7/8 red-yellow, sandy low plastic SILT; sparse white mottling color SM 0 20

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 20		-		
]			
	1				
		<u> </u>			
	2	-			
3	3	SM	100		-
3	4	Sivi	100		
		Ť			
	5				
]			
	6				
		5		26' - 29'	
	7			Loose, dry, 10YR 8/8 yellow, f-grain SAND;	
	8	sw		well graded with trace m-sand	
	8				-
	9				
	0 30				
				26' - 34'	
	1			M-stiff, dry, 10YR 7/8 yellow, sandy SILT;	
		SM		some low cementation	
	2	·			
	_	8			1
,	3	:	100		
4	4		100		+
		grad discharacter for General Province of Land The			
	5				
]			
	6			34' - 39'	
		sw		Loose, dry, 7.5YR 6/8 red-yellow, m-f grain SAND;	
	7	-		trace silt	
	8				
	°	ž.			+
	9			39' - 40': 10R 5/6 Reddish Brown Sandy-Silty-Clay,	+
	X-5.1	ML		~ 10% fine to med. grained sand, ~ 20-30% silt;	
	0 40			Dry & partially consolidated.	

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
TTGITIEG!	040	Littlology	recovery	campio Bosa paon	Commentar Coments
	1	Š.		40' - 41.5': 10R 5/6 Reddish Brown Clayey-Silty-Sand.	
	1			40 - 41.8. Tork did redddidi Erown Gibycy-Gilly-Garid.	
	` 			41.5' - 42.5': 2.5YR 4/4 Lt Brown Clayey-Silty-Sand;	
	2			Very fine to med. grained sand.	
	<u> </u>	SM		42.5' - 46.0': 10R 5/6 Reddish Brown Clayey-Silty-Sand	
	3	,=:::			
		X.			
5	4		100		
	5				
	6				
	7			46' - 49': 10YR 6/8 Yellow Brown Sand, fine to coarse	
		SP		grain sand; 20-25% silt & day.	
	8				
	9				
	0 50				
				49' - 54': 10YR 8/6 Yellow Clayey-Silty-Sand;	
	1			Very fine to med. grain sand; grades to Clayey-Sandy-Silt	
		sc		towards 54'.	
	2	ž			
	3		8		
6			100		
	4			54' - 54.5': 10YR 5/4 Brown Sandy-Clayey-Silt,	
		SM		30-40% Vry fine to med. grain sand, more clay at 44.5'.	
	5				
	6			EAS' EOU 10VB 9/9 Light Volland Clauser City Sand	
	, p			54.5' - 59': 10YR 8/8 Light Yellow Clayey-Silty-Sand, 20-25% fines (silt & clay); Vry fine to med. grain sand;	
	7	sc		white clayey-sand lenses 58' to 59'.	
	<i>'</i> -	00		write days, said lenses so to sa.	
	8				
	<u> </u>	*			
	9				
	100/2				
	0 60	SM			

Field Geologic Log (Continued)

		ř	ř .	ř	1105. 1151. 30 1-3004, 3000
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 60				
	1 100				
				59' - 65.5': Lt Yellow Brown Silty-Sand, Very fine to med.	
	1			grain sand, 30-4-% silt.	
				Service and an extensive services and the services	
	<u> </u>				
	2	SM			
		2			
	3	į.			
7	4		100		
l°		+			
	5			65.5' - 66.5': 10YR 8/4 Lt Brown Clayey-Sandy-Silt;	
		sM		Very fine to fine grained sand (30-40%).	
	_	1		sory mile to mile gramos same (so voya).	
	6				
				66.5 - 68': 10YR 7/6 Lt Yellow Brown Clay (Tan Clay?)	
	7	CL		grades to dark brown (10YR 3/6) sandy-silty-clay near 68'	
	_			thin (2") black (10YR 2/1) sandy-clay layer at 68', fine	
	_				
	8			to very coarse grained sand.	
				68' - 69': 10YR 6/8 Yelowish Brown Silty-Clayey-Sand,	
	9	sc		very fine to fine grained sand (50-60%).	
		Properties:		very line to line grained sand (50-00 %).	
		TotalDepth			
	0 70				
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	9	1			
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	0				

Project E-Area Ly	simeter Installa	itions 2-3/2	2023			Proc. Ref. 3Q1-9004, 9006 Date 02/14/2023	
Well Numb ET3-VL-1	2			ocation E-Area	Drilling Subcontractor Cascade Drilling		
Logs Prepa Evan Koe	ared By Iker			Driller Branden Griffis			
Company SRNL			v		Drilling Method Rotosonic		
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Descripti	on	Drilling Comments/Remarks	
1	1 2 3 4 5 6 6 7	sw	60	0" - 9" Loose, dry, 5YR5/8 orange, silty f. S	AND		
	. 9						
	123			9" - 35" Firm, dry, 10YR8/8 yellow-red, sand white clay parting at 23" - 35"	y SILT; occasional		
2	4 5 6	SM	100				
	. 9						
	0 20						

Field Geologic Log (Continued)

	ř –	<u> </u>	1		Proc. Ref. 3Q1-9004, 9006
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 20	×	6		×
	1	SM			
					*
	2				*
	3				*
		1			
3	4		100		
					X
	5				
	6				9
	7				
		SM			
	8				
	. 9				4
	0 30	-			×
	0 30				*
	1				
	200				
	2				
8	3		80		*
4	4		80		1
					3
	5				
					*
	6			35' - 40'	×
				Med. dense, dry, 2.5YR4/8 red, silty f. SAND	×
	7	SW			-
	8	1			4
					1
	9]			
					*
	0 40				

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks	
vurnoer	040	Littlology	Recovery	40' - 41'	Comments/Nemarks	
	040	ML		Loose, dry, 10YR7/6 yellow-red, SILT; some f, sand		
	1	IMIL.		-dry and powderlike		
	' -			ary and powdernike		
	2			41' - 48'		
	3			Loose, moist, 7.5YR7/8 yellow-red, well graded m-f SAND		
		sw		trace silt		
	4		90	race su		
	5			1		
	6					
	7					
				46' - 55'		
	8			Stiff, dry, 7.5YR6/8 red-yellow, sandy SILT		
				- becoming 10YR8/8 brown-yellow at 49' with silt %		
	9				increasing to depth	
	0 50					
		SM		×		
	1			4		
	2					
	3					
5			60	X		
	4			*		
	5					
				55' - 59'		
	6			Loose, moist, 10R5/8 red, well graded m-f SAND;		
	7	sw		trace silt, trace subangular c. sand		
		-				
	8					
	. 9			59' - 59.5'		
				Soft, moist, 10R8/1 white, plstic CLAY varved with		
	0 60			soft, moist, 5YR6/8 red-yellow, nonplastic SILT		

Field Geologic Log (Continued)

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	060			59.5' - 63'	CONTRACTOR OF THE
				Firm/ dry, 10YR6/8 brown-yellow, sandy SILT;	
	1			-becoming 10YR5/6red at 62'	
		SM			
	2			*	
		8		7	
	3				
7	4	İ	100	63' - 71'	
			62.5	Loose, moist, 5YR6/8 red-yellow, well graded f. SAND;	
	5			some silt, trace c, sand	
				-becoming wet at 68'	
	6				
				1	
	7	sw		*	
				*	
	8			A	
				3	
	9				
	0 70				
	**				
	1			71' - 72'	
		CL		Soft, moist, 7.5YR6/8 red-yellow, sandy plastic CLAY;	
8	2		100	trace c. sand, occasional white clay parting	
000	233		100.00		
	3	1		72' - 75'	
	97.			Soft, wet, 10R5/8 red, sandy nonplastic SILT	
	4				
	910				
	5 75	TotalDepth			
		S 75		1	
	6			*	
				*	
	7			A	
				1	
	8				
	277				
	9				
		1			
	0			*	

Project						Proc. F	Ref. 3Q1-9004, 9006 Date
E-Area Ly	simeter Installa	ations 2-3/2					02/15/2023
Well Numb ET3-VL-1	3			ocation E-Area	Drilling Subcontractor Cascade Drilling		
Logs Prepa Evan Koe	ared By		86		Driller Branden Griffis		
Company SRNL	14	10 0	94- 94		Drilling Method Rotosonic		
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Descrip	otion	Dri	lling s/Remarks
Homber	0	Linelogy	recovery	ouniple besting	20011	Commen	aryemen.a
	1						
				0' - 22'			
	2			Soft, moist,10YR6/8 light red, sand	ly nonplastic SILT		
	3						
1	4	SM	100				
211	5						
	6						
	7						
	8						
	9						
	0 10						
	1		80			ē.	
	2						
	3				ž		
2	4						
-	5				*		
	6	SM					
	7						
	8				*		
	9						
	0 20						

Field Geologic Log (Continued)

	ř –	<u> </u>	2	i i	Proc. Ref. 3Q1-9004, 900
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 20				
	1	SM			
		ş			
	2				
	3			22' - 31'	
	_			Loose, dry, 10YR7/8 yellow, well graded f. SAND;	
	4			some silt, occasional white clay parting increasing in	
20.			5205	frequency to 31' maximum	
3	5		100		
	6				
	-	SW		1	
	7			1	
				*	
	8				
				<u> </u>	
	.9			4	
	0 30				
	0 30	8	***************************************		
	1	-			
				31' - 39.5'	
	2			Loose, moist, 10R5/8 red, well graded m-f SAND;	
				some silt, trace c. sand and increasing in grain size	
	3			to depth	
				- lenticular white clay parting at 39' - 39.5'	
	4	3		The state of the s	
4			80	3	
170	5	sw	3.5		
		C 22.0			
	6				
	F-0				
	7				
	8				
	9			*	
	0 40	SM		1	

Field Geologic Log (Continued)

3	ž –	<u> </u>	Ş 2		Proc. Ref. 3Q1-9004, 900
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
-	040				
				39.5' - 45'	
	1			Loose, moist, 7.5YR7/8 red-yellow, silty m-f SAND	*
	2	SM			*
	3				
	4				
5	5		90	45' - 46'	*
		ML		Hard, dry, 2.5YR 8/1 white, sandy nonplastic SILT	
	6				
	7				
	8			46' = 60'	
	188			Loose, moist, 7.5YR7/8 red-yellow, m-f SAND	
	.9				
	0 50				
	1				
	2				50' - 60' sample dropped from rods
					during extraction. Sample recovered
	3				in 2nd run, and appeared consistent
	4				with 39.5' - 45' interval.
8	*		80		
*.	5				
	6				
	7				
					1
	8				
	9				
	0 60				1

Field Geologic Log (Continued)

				1	
Run Number	Depth Below Ground Surface (Feet)			Sample Description	Drilling Comments/Remarks
(valide)	060	Listiniogy	Recovery	Sample Description	Commentaryenana
	000	() II		60' - 62'	
				-0/H2/05-4	
	1	CL		Soft, moist, 2.5YR6/8 light red, plastic CLAY;	
	-			some m-f sand, trace c. sand and rounded gravel up to	
	2			1/4" in diameter	
	3			62' - 65'	
		SM		Loose, moist, 7.5YR6/8 red-yellow, silty m-f SAND	
	4			10	
			80		
	5			65'	
	=			Small lens (1/2") of black staining, no odor	
	6				
		1		65' - 70'	
	7	sw		Loose, wet, 7.5YR6/3 light brown, well graded m-f SAND;	
		200000		trace c. sand	
	8	1		2000 pp. 100 000:	
		1			
	9			Y .	
				7	
	0 70	Total depth			
				*	
	1				
		1			
	2				
	3			7	
				×	
	4			*	
				¥	
	5				
	8.7	1			
	6				
	100	1			
	7				
	3	1		*	
	8	1		1	
		1		7	
	9			*	
				1	
	1	4	1		

Project E-Area Ly	simeter Installa	itions 2-3/2	1023			Proc. Ref. 3Q1-9004, 90 Date 03/02/2023
Well Numb ST8-VL-7	er		L	Drilling Subcontractor Cascade Drilling		
Logs Prepa Evan Koe			32	Driller Branden Griffis		
Company SRNL		(C)	4 21		Drilling Method Rotosonic	
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Descripti	on	Drilling Comments/Remarks
	0			0' - 9'		The state of the s
				Firm, moist, 2.5YR 5/8 red, sandy pla	estic CLAY	
	1	ē:		trace gravel (Fill)		
	2	ē:			*	
		8				
	3) ()				
1	I .H	sc	100			
	4	50	100		X	
	5				į.	
		i S				
	6	ś.			×	
	7	ē:			*	
		8			Â	
	8					
	9	S.			x	
	8		0000000000		X	
	0 10					
	1	8:			4	
	2				×	
		8		9" - 20"	2	
	3			Soft, moist, 7.5 6/8 red-yellow, sandy		
		CH	100	Trace med-sand, white clay parting s	een at 7ft	
2	4	SM	100			
	5					
	6	6:				
	7	80			*	
					×	
	8				×	
					, and the second	
	9				- i	
	0 20	6/				

Field Geologic Log (Continued)

Run	Depth Below Ground	5000	Percent	21/22 7/27	Drilling
Number	Surface (Feet)	Lithology	Recovery	Sample Description	Comments/Remarks
	0			20' - 24'	
		5		Firm, dry, 2.5YR 5/8 red, sandy, non-plastic SILT	
	1	e.		~30% f. sand, trace gravel	
	2	5			
	3	St St			
18	4	SM	100		
		9		24' - 28'	
	5			Friable/firm, moist, 7.5YR 6/8 red-yellow, sandy, SILT;	
				some f. sand, trace cm. sand.	
	6			Some white mottling in color	
	7	Si Si			
	8				
				28' - 34'	
	. 9			Loose, moist, 10R 5/8 red, mf. well graded SAND;	
	0 30			trace silt, trace white plastic clay pockets 1/4-1/2 in diam.	
	000	8		7	
	1	SW			
	2				
	3				
ř.	"-	1	90	*	
	4			7	
	5			34' - 40'	
				Loose, moist, 7.5YR 6/6 red yellow, silty, m-f SAND;	
	6	SM		occasional white clay parting (~1/16in thickness seams)	
	7				
	8	8:			
***********	9				
	0 40			3	

Field Geologic Log (Continued)

Number Surface (Feet) Lithology Recovery 40" - 41" Firm/Friable, dry 10"YR 4/4 dk, yellow brown, SILT, trace f. sand 41" - 42" Loose, moist, 7.5"YR 6/8 red yellow, silty, SAND; some black staining, no odor 42" - 45" Firm/Friable, v. dry, 7.5"YR 7/2 pink gray, nonplastic SILT; -powderlike when broken apart 45" - 48" Loose, moist, 7.5"YR 7/8 redyellow, well graded m-f SAND; some (-20%) siltyfines 48" - 50" Soft, moist, 5"YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand 45" - 48" Firm/Friable, dry, 7.5"YR 7/8 strong brown, SILT some fine sand. 80 80 54" - 61" Loose, moist to wet, 2.5"YR 5/8 red layered with 7.5"YR 6/8 red yellow, m, to f. SAND, some silt, trace c. sand and gravel 40" - 40"	Run	Depth Below Ground		Percent		Drilling
SILT; trace f. sand 41' - 42' Loose, moist, 7.5YR 8/8 red layered with 7.5YR8/8 SM ML ML 100 42' - 45' Firm/Friable, v. dry, 7.5YR 7/2 pink gray, nonplastic SiLT; -powderlike when broken apart 45' - 48' Loose, moist, 7.5YR7/8 redyellow, well graded m-f SAND; some (~20%) silt/fines 8 48' - 50' Soft, moist, 5YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand 50' - 54' Firm/Friable, dry, 7.5YR5/8 strong brown, SiLT some fine sand. 80 54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel	Number	Surface (Feet)		Recovery		Comments/Remarks
41' - 42' Loose, moist, 7.5YR 6/8 red yellow, silty, SAND; some black staining, no odor 42' - 45' ML ML 100 45' - 48' Loose, moist, 7.5YR 7/2 pink gray, nonplastic SILT; -powderlike when broken apart SM SAND; some (-20%) silt/fines 48' - 50' Soft, moist, 5YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand ML 50' - 54' Firm/Friable, dy, 7.5YR5/8 strong brown, SILT some fine sand. 80 48' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel			ML.			
SM Some black staining, no odor 42'-46' Firm/Friable, v. dry, 7.5YR 7/2 pink gray, nonplastic SiLT; powderlike when broken apart 45'-48' Loose, moist, 7.5YR7/8 redyellow, well graded m-f SAND, some (~20%) silt/fines 48'-50' Soft, moist, 5YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand 50'-54' Firm/Friable, dry, 7.5YR5/8 strong brown, SILT some fine sand. 80 44'-61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel sand gravel sa						
42′ - 45′ 5			CH			
### 100 ###		2	SM.		some black staining, no odor	
SM					47' - 45'	
## 100 ## 100		3	İ			
5			ML			
8 SM Loose, moist, 7.5YR7/8 redyellow, well graded m-f SAND; some (~20%) sit/fines 8 Washed Sand Sand Sand Sand Sand Sand Sand San		4		100	in the state of th	
8 SM Loose, moist, 7.5YR7/8 redyellow, well graded m-f SAND; some (~20%) sit/fines 8 Washed Sand Sand Sand Sand Sand Sand Sand San						
Loose, moist, 7.5YR7/8 redyellow, well graded m-f		5			A	
SAND; some (~20%) silt/fines 48′ - 50′ Soft, moist, 5YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand 50′ - 54′ Firm/Friable, dry, 7.5YR5/8 strong brown, SILT some fine sand. 3 4 50 54′ - 61′ Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel						
### 1		6				
8			SM		SAND; some (~20%) silt/fines	
48' - 50' Soft, moist, 5YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand 50' - 54' Firm/Friable, dry, 7.5YR5/6 strong brown, SILT some fine sand. 80 54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel		7			<u> </u>	
48' - 50' Soft, moist, 5YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand 50' - 54' Firm/Friable, dry, 7.5YR5/6 strong brown, SILT some fine sand. 80 54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel					*	
Soft, moist, 5YR 3/1 dark gray, sandy, low-plastic CLAY m to f sand 50' - 54' Firm/Friable, dry, 7.5YR5/8 strong brown, SILT some fine sand. 80 54' - 81' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel		8				
m to f sand 50' - 54' Firm/Friable, dry, 7.5YR5/8 strong brown, SILT some fine sand. 80 4		_				
0 50 1 ML 50' - 54' Firm/Friable, dry, 7.5YR5/8 strong brown, SILT some fine sand. 80 4		9				
1 ML 50' - 54' Firm/Friable, dry, 7.5YR5/6 strong brown, SILT some fine sand. 3		0.50			m to risand	
Firm/Friable, dry, 7.5YR5/8 strong brown, SILT some fine sand. 80 4 5 54' - 81' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel		0 30				
Firm/Friable, dry, 7.5YR5/6 strong brown, SILT some fine sand. 80 4		1	MI		50' - 54'	
2 some fine sand. 80 54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel			- MIL			
3		2				
5 54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel						
5 6 54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel		3			1	
5 6 54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel				80	*	
54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel		4			1	
54' - 61' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel					9	
54' - 81' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel		5				
54' - 81' Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel					4	
SW Loose, moist to wet, 2.5YR 5/8 red layered with 7.5YR6/8 red yellow, m. to f. SAND, some silt, trace c. sand and gravel		6				
SW red yellow, m. to f. SAND, some silt, trace c. sand and gravel						
8 and gravel		7				
			SW			
		8	-		and gravel	
		_				
		9			1	
0 00		0.00				

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Field Geologic Log (Continued)

Degth Below Sample Description Drilling Comments/Remarks		-	2 3	2		Proc. Ref. 3Q1-9004, 90
1	Run Number	Surface (Feet)	Lithology		Sample Description	Drilling Comments/Remarks
Friable/Firm, dry, 5YR 4/3 red brown, SILT some trace f. sand -color 5YR 8/1 gray from 63'-84' 5		0	ľ		Ĭ	
Friable/Firm, dry, 5YR 4/3 red brown, SILT some trace f. sand -color 5YR 8/1 gray from 63'-84' 5						
Some trace f, Sand -color 6YR 6/1 gray from 63'-64' ML 6		1			100 0000	
ML			į.			
3		2				
4			ML		-color 5YR 6/1 gray from 63'-64'	
5 CL 84' - 70' Soft, moist to wet, 10R 4/8 red, sandy/silty, plastic CLAY 8		3				
5 CL 84' - 70' Soft, moist to wet, 10R 4/8 red, sandy/silty, plastic CLAY 8						
Soft, moist to wet, 10R 4/6 red, sandy/silty, plastic CLAY 8 9 TotalDepth 7 3 4 5 6 7 8 9 9 10R 4/6 red, sandy/silty, plastic CLAY		4				
Soft, moist to wet, 10R 4/6 red, sandy/silty, plastic CLAY 8 9 TotalDepth 7 3 4 5 6 7 8 9 9 10R 4/6 red, sandy/silty, plastic CLAY			20			
6		5	CL		Control of the contro	
7					Soft, moist to wet, 10R 4/6 red, sandy/silty, plastic CLAY	
8		6				
8						
9 TotalDepth 0 70 1		7				
9 TotalDepth 0 70 1					*	
0 70 1		8				
0 70 1		-				
1 2 3 4 5 5 6 6 7 7 8 8 9 9 1		9	TotalDepth		**************************************	
1 2 3 4 5 5 6 6 7 7 8 8 9 9 1		0.70				
2 3 4 5 5 6 6 7 7 8 8 9 9		0 70	8			
2 3 4 5 5 6 6 7 7 8 8 9 9						
3 4 5 6 7 8 8 9		2-			*	
3 4 5 6 7 8 8 9		-			*	
4 5 6 7 8 8 9 9 1					*	
4 5 6 7 8 8 9 9 1					*	
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Field Geologic Log

Project		-5 2.25	1000			Proc.	Ref. 3Q1-9004, 9000 Date
Well Numb ST9-VL-4		auons 2-3/2	L	ocation E-Area	Drilling Subcontrac Cascade Drilling	tor	02/28/2023
Logs Prepa Evan Koe	ared By		8		Driller Branden Griffis		
Company SRNL				Drilling Method Rotosonic			
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Desc	ription	Dr Commen	illing ts/Remarks
	0			0' - 17'			
				Firm, dry, 7.5YR 7/6 red-yellow,	sandy SILT;	× .	
	1	ML		trace m. sand			
	2	1					
	8						
	3						
1	4	1	90			4	
	5						
	6						
	10						
	7						
	8						
	9	ML					
	0 10	-				×	
	3,15	1					
	.1						
	2						
		i i					
	3						
2			100				
	4	-					
	5					×	
	6	-					
	7	ML					
	120			17' - 20'	V 10/04-0-15		
	8			Fribale, dry, 7.5YR8/6 red-yellow	, nonplastic SILT		
	. 9			occasional white clay parting			
		1					
	0 20						

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Field Geologic Log (Continued)

	<u> </u>	-	¥ 2	· · · · · · · · · · · · · · · · · · ·	Proc. Ref. 3Q1-9004, 90
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 20	-		1	
	9			20' - 27'	
	1			Med. dense, moist, 7.5YR6/8 red-yellow, silty f, well	
		9		graded SAND; trace m. sand	
	2				
	3	SM			-
NO.		-	00		
ië.	4	-	80		:
	5				
	-				
	6				
		1			
	7	1			
			ŀ		
	8				
		1			
	.9			27' - 39'	
				Loose, dry, 10R 5/8 red, m-f well graded SAND;	
	0 30			some silt, becoming 5YR5/8 yellow-red at 35ft	
		1.			
	1				
	2	SW			
	-	-			
	3	-			
	4		60		
	-		00		
	5				
		1			
	6	1			
	100	1			
	7	1			
	8				
	8				
	9				
				A	
	0 40				

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Field Geologic Log (Continued)

	X.	<u> </u>	2	<u> </u>	Proc. Ref. 3Q1-9004, 9008
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	040	× ·	1	39' - 47'	
				Friable, dry, 5YR5/8 yellow-red with gray parting, sandy	
	1			nonplastic SILT; trace m. sand	
	2				
		ML			
	3				
-50	4		8		
5	183		80		
	5			1	
	6				
	7			*	
				*	
	8	£		47' - 50ft	
235500000000000000000000000000000000000		SW		Loose, moist, 7.5YR6/8 red-yellow, well graded	
	.9			m-f SAND; occasional white plastic clay seams	
	0.50				
	0 50				
	- 4				
				50' - 56'	
	2			Soft/loose, dry, 5YR5-3 red-brown, sandy SILT	
		1		Sololouse, dry, 5110-5 red-brown, sailuy SiE1	
	3	ML		*	
	3	IMIL.		*	
6	4		70	*	
(A)				1	
	5				
	6				
	1 10			56' - 59'	
	7	1		Loose, moist, 7.5YR 6/8 red-yellow, f. well graded SAND;	
		sw		trace silt, with occasional white clay parting	
	8	1		27.2	
				7	
	. 9	ļ			
		CL		59' - 59.5'	
	0 60			Soft, moist, 7.5YR7/2 pink-gray, sandy CLAY	

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Field Geologic Log (Continued)

Run Number S	Depth Below Ground		1		
	Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
- 1	0 60			59.5' - 61'	
		SW		Loose, moist, 5YR5/8 yellow-red, m-f well graded SAND;	
	1			trace c. sand, trace silt	
	2	5		61' - 70'	
	92			Soft, moist, 7.5YR 6/8 red-yellow, sandy lowplastic CLAY	
	3	80			
	1	8		*	<u>;</u>
	4	8		*	
9			90	*	
	5	8		*	T T
	200	CL			
	6	Ü.			
	-	6			
	7	9			
	4-	8		-	
		š		*	
	8	80			r
		8			
	.9	80			
	-	lettera in			
*********	0 70	TotalDepth	**********		
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	-	8			
	2	8			
		82			
	3				
		5			
	4	5		1	<u> </u>
	5				
		8			
	6				
	7				
	8	24			
		N.		1	
	9				
		3			
	0			1	

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Field Geologic Log

Project E-Area Ly	simeter Installa	itions 2-3/2	023		<u> </u>		ef. 3Q1-9004, 900 Date 03/01/2023
Well Number ST9-VL-5	er		L	ocation E-Area	Drilling Subcontracto Cascade Drilling	г	1-0010000000000000000000000000000000000
Logs Prepa Evan Koel			25				
Company SRNL		60 10	g = 50		Drilling Method Rotosonic		
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Descripti		Dril	ling s/Remarks
ryomber	0	Liniology	recovery	0' - 3'	-	Comments	or yeman no
		er E		Firm, moist, 2.5YR 5/8 red, low-plast	c CLAY		
	1			trace f. sand.	W		
		CL		1000-00-00-00-00-00-00-00-00-00-00-00-00			
	2	84					
	3				× ×		
				3' - 10'	×		
1	4		100	Soft/Loose, moist to wet, 5YR 6/8 red	-yellow, sandy SILT		
					- 1		
	5	ŝ					
	6	Si .			*		
	10 -	ML			*		
	7				*		
	8	8			- 4		
DOMESTIC STREET	9	ş.	200000000000000000000000000000000000000		*		
	1 1	8			Ť		
	0 10				1		
	1						
	2	8					
	3				3		
					3		
2	4	j S	100	10' - 24'	×		
		ši .		Soft, moist, 7.5YR 6/8 red yellow and	479-504 Local States (State Office State Off		
	5	ML		stratum, sandy SILT; with occasiona	I white clay parting.		
	6	ML			*		
		8			*		
	7	8					
	Tel	8: 84					
	8				1		
	9				-		
	0 20	57 			- 1		

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Field Geologic Log (Continued)

	ř – –	Ť ·	1	7	Proc. Ret. 3Q1-9004, 900
Run Number	Depth Below Ground Surface (Feet) Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 20)	1	À	
	61	4			
	1				
	2	ML		× ×	
	-	IVIL		*	
	3	1		1	
		1			
3	4		100		
				X	
	5	-		24" - 30"	
		-		Loose, dry, 7.5YR 6/8 red yellow with 10R 4/8 red	
	6	-		layering, well graded m-f SAND; some silt	
	7	sw		Ì	
		2000			
	8				
200000000000000000000000000000000000000	. 9		************	•	
	-				
	0 30	1		30'- 32'	
	1	SM		Loose, dry, 5YR 6/3 light red-brown, silty f. SAND;	
		Jam .		~40% silt, very dry/powder-like	
	2			Total State of Conference and Confer	
		1			
	3				
1332			18050	× × × × × × × × × × × × × × × × × × ×	
4	4	1200320	90	34" - 37"	
	5	SM/ML		Friable, dry to moist, 7.5YR 6/6 red-yellow, silty	
	9	-		f. SAND with parting of firm, dry, 7.5YR7/1 light gray, SILT	
	6	1		Ì	
	100				
	7	-			
	2				
	8	1		37' - 40'	
		sw		Loose moist, 7.5YR 6/8 red-yellow, m-f well graded SAND	
	9	-		some silt, trace c. sand	
	0.40				
	0 40				

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Field Geologic Log (Continued)

	Depth Below	Ì			Proc. Ref. 3Q1-9004, 9000
Run Number	Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0 40			40' - 42'	
				Firm/Friable, dry, 5YR 6/8 red-yellow, nonplastic SILT;	
	1	ML		trace f. sand	
	2				
	22			42' - 44'	
	3	SM		Friable, dry, 5YR6/3 light red-brown, sandy SILT;	
	4	xxxNRxxx	8		
5		xxxNRxxx	80		44' to 45' interval not recovered
	5	xxxNRxxx		44" - 52"	
				Loose, moist, 7.5 6/8 red-yellow, silty well-graded SAND	
	6			trace c. sand with 1ft lens of soft, 10R 3/6 red, sandy	
				plastic CLAY	
	7				
				-	-
	8	SW		*	
2000000000	. 9				
	0 50				
	1				
	2				
				52' - 54'	
	3	ML.		Friable, dry, 5YR5/6 yellow-red, sandy nonplastic SILT	
6			90	trace m. sand	
	4]		54' - 54.5'	
				Loose, v. dry, 5YR 6/1 gray, nonplastic SILT (powder like)	
	5			54.5' - 56'	
		SW		Loose, moist to wet, 7.5YR 5/8 strong brown, m-f well	
	6			graded SAND; trace silt	
	7			56" - 59"	
		CL		Soft, wet, 7.5YR 4/6 strong brown, sandy plastic CLAY;	
	8				
	9		ļ		
	0 60			, and the second	

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Field Geologic Log (Continued)

Run	Depth Below Ground	50397	Percent		Drilling Comments/Remarks
lumber	Surface (Feet)	Lithology	Recovery	Sample Description	Comments/Remarks
	0 60				
				220 (220)	
	1	ÿ.		59' - 69'	
		ş		Loose, moist to wet, 5YR5/8 yellow red, clayey m-f well	
	2	į.		graded SAND	
	3	8		*	
	°	8		*	
	4	sc		9	
			70	×	
	5	2	70		
		8			
	8				
	3				
	7	8			
		S			
	8	E .		8	
	3-	80		*	
	9 69	TotalDepth			
		8 75			
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	4			×	
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				*	
	9	24			
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Appendix C. Soil Boring Reports for FY23 ET3, ST8, and ST9 Lysimeter Installations

Boring Number (AAA,NNN,AA) Soil Boring Installation Report GENERAL INFORMATION E-Area LLWF ET3, ST8 & ST9 Lysimeters Project Manager Ken Dixon SRNS, Solid Waste Programs Location Description Boring Purpose County Install Lysimeters at ET3 for vadose zone sampling. SRS North Grid Coordinate | SRS East Grid Coordinate Aiken, SC Latitude (degrees E-Area at SRS Longitude (degrees, minutes, seconds) (NAD 27) Ground Elevation 33° / 17' / 37.06" -81° / 40' / 5.61" 78685 32 57503.89 276.43 ft-msl DRILLING AND SAMPLING INFORMATION Total Drilled Depth Static Water Level Drilling Start Date Drilling Method Drilling Completion Date 75 ft-bgs 2/21/2023 70 ft-bgs 2/16/2023 RotoSonic Drilling and Sampling Comments (Include drilling muds used, source of water, lost circulation Sample Type Sampling Interval Sample Type Sampling Interval RadCon Composite 0 - 70 ft-bgs 1) Borehole drilled dry to 70 ft-bgs, with 4" diameter continuous coring and 6" diameter over-ride casing. 2) Bentonite pellets backfill to elev. 219.43 ft-msl for lysimeter ET3-VL-6-219. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to cover Sinca industry instance under hysmreac examic up and adount not over top of ceramic cup, then silica sand installed to top of the lysimeter. 3) Bentonite pellets installed from top of sand to elevation 238.43 ft-ms for lysimeter ETa-VL-6-238. Silica flour (-3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top of the lysimeter. the lysimeter. 4) Bentonite pellets installed from top of sand to 2.5 ft-bgs. 5) Surface completion is 5-ft PVC protective casing (6-in diam.) driven 2-ft into ground, and 1 bag (60lb) Sakrete to cement in place at ground surface. 6) Two lysimeters (Solimoisture Corp., model 1920F1, 1.5" diameter) are installed in the borehole, which are connected to 1" risers with an PVC adapter. Lysimeter 1/4" vaccum/pressure air tubing and 1/4" water discharge tubing runs from lysimeter through 1" PVC riser pipe to surface for sampling. Drilling Company Driller (Last Name, First Initial) Oversight Company Oversight (Last Name, First Initial) Cascade Drilling Co Hall, James Jr. SRNS Killeen, Terry Disposition of San Composite samples collected and analyzed by SRNS Radiological Controls (RadCon). All samples below detection. Drill cuttings disposed on unit. ABANDONMENT NA NA APPROVALS Abandonment Verified By Date Boring Installation Report Prepared By NA Terry Killeen 3/15/2023

Boring Number (AAA,NNN,AA) Soil Boring Installation Report GENERAL INFORMATION E-Area LLWF ET3, ST8 & ST9 Lysimeters Project Manager Ken Dixon SRNS, Solid Waste Programs Location Description Boring Purpose County Install Lysimeters at ET3 for vadose zone sampling. SRS North Grid Coordinate | SRS East Grid Coordinate Aiken, SC Latitude (degrees E-Area at SRS Longitude (degrees, minutes, seconds) (NAD 27) Ground Elevation 33° / 17' / 36.26" -81° / 40' / 5.47" 78613 77 57465.83 278.48 ft-msl DRILLING AND SAMPLING INFORMATION Total Drilled Depth Static Water Level Drilling Start Date Drilling Method Drilling Completion Date 77 ft-bgs 2/22/2023 70 ft-bgs 2/21/2023 RotoSonic Drilling and Sampling Comments (Include drilling muds used, source of water, lost circulation Sample Type Sampling Interval Sample Type Sampling Interval RadCon Composite 0 - 70 ft-bgs 1) Borehole drilled dry to 70 ft-bgs, with 4" diameter continuous coring and 6" diameter over-ride casing. 2) Bentonite pellets backfill to elev. 220.48 ft-msl for lysimeter ET3-VL-7-220. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to cover Sinca indu (*3 instance under lysimete eleminic up and adount no lover top of ceramic cup, then silica sand installed to top of the lysimeter. 3) Bentonite pellets installed from top of sand to elevation 240.48 ft-ms for lysimeter ET3-VL-7-240. Silica flour (*3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top of the lysimeter. the lysimeter. 4) Bentonite pellets installed from top of sand to 2.5 ft-bgs. 5) Surface completion is 5-ft PVC protective casing (6-in diam.) driven 2-ft into ground, and 1 bag (60lb) Sakrete to cement in place at ground surface. 6) Two lysimeters (Solimoisture Corp., model 1920F1, 1.5" diameter) are installed in the borehole, which are connected to 1" risers with an PVC adapter. Lysimeter 1/4" vaccum/pressure air tubing and 1/4" water discharge tubing runs from lysimeter through 1" PVC riser pipe to surface for sampling. Drilling Company Driller (Last Name, First Initial) Oversight Company Oversight (Last Name, First Initial) Cascade Drilling Co Hall, James Jr. SRNS Killeen, Terry Disposition of San Composite samples collected and analyzed by SRNS Radiological Controls (RadCon). All samples below detection. Drill cuttings disposed on unit. ABANDONMENT NA NA APPROVALS Abandonment Verified By Date Boring Installation Report Prepared By NA Terry Killeen 3/15/2023

					140	В	oring Number (AA)	A,NNN,AA)
	Soil E	Borin	ig Instal	lation Repo	ort	ET3	VL	10
VALUE AND AND A				GENERAL INFO	RMATION			
Project Name								
E-Area LLWF ET3, ST8 &	ST9 Lysimeters							
Project Manager					Department		_	
Ken Dixon					SRNS, Solid Waste Programs			
Boring Purpose			County		Location Description			
Install Lysimeters at ET3 f	for vadose zone samp	ling.	Aiken, SC		E-Area at SRS			
SRS North Grid Coordinate	SRS East Grid Coord	linate	Latitude (degree	es, minutes, seconds) (NAD 27)	Longitude (degrees, minutes, seconds) (N.	AD 27) Ground E	evation	
78448.06	57671.99		33°/17'/36.1	5"	-81°/40'/2.36"	280.01 ft	-msl	
				DRILLING AND SAN	IPLING INFORMATION			
Total Drilled Depth	Static Water Level		Drilling Sta	art Date	Drilling Completion Date	Drilling Me	ethod	
70 ft-bgs	65 ft-bgs		553000000000000000000000000000000000000	2/22/2023	2/23/2023	RotoSon	c	
			- JA		Drilling and Sampling Comments (Inclu	ude drilling muds us	ed, source of wate	er, lost circulation
Sample Type	Sampling Interval	S	ample Type	Sampling Interval	zones, etc.)			
RadCon Composite	0 - 70 ft-bgs				1) Borehole drilled dry to 70 ft-by diameter over-ride casing. 2) Bentonite pellets backfill to el Silica flour (~3 lbs) installed und top of ceramic cup, then silica s: 3) Bentonite pellets installed froi lysimeter ET3-VL-10-242. Silica cup and around it to cover top o the lysimeter. 4) Bentonite pellets installed froi 5) Surface completion is 5-ft PV ground, and 1 bag (60lb) Sakret 6) Two lysimeters (Sollmoisture installed in the borehole, which Lysimeter 1/4" vaccum/pressure from lysimeter frough 1" PVC r	elevation 222 ft-ms ler lysimeter cera and installed to te m top of sand to a a flour (~3 lbs) ins of ceramic cup, the m top of sand to 2 C protective casis te to cement in pl Corp., model 192 are connected to e air tubing and 1/2	if for lysimeter E1 mic cup and arou pp of the lysimete elevation 242 ft-ri talled under lysii en silica sand ins 2.5 ft-bgs. ng (6-in diam.) di ace at ground su 2004 ft-1, 5" diame 1* ri sers with an 4* water dischar	T3-VL-10-222. und it to cover er. nsl for meter ceramic stalled to top of riven 2-ft into inface. eter) are PVC adapter.
Drilling Company		Driller (L	ast Name, First I	nitial)	Oversight Company	Oversig	ht (Last Name, Fire	st Initial)
Cascade Drilling Co		Hall, Ja	imes, Jr		SRNS	Killeen	Terry	2000
Disposition of Samples								
Composite samples collec	cted and analyzed by	SRNS R	adiological Cont		mples below detection. Drill cuttings	disposed on unit		
Make at all the sections of				ABANDON			_	
Method of Abandonment				Materials Used in Al	pandonment			
NA				NA				
11		ID-to		APPRO		la.	_	
Abandonment Verified By		Date	200	G. Z. (1) (1) (2) (3) (3)	allation Report Prepared By	Date		12-2-1
NΔ		1	NΔ	Terry Kille	en	1	3/15/20	123

			790 NO 10	an income and	130	В	oring Number (AA	A,NNN,AA)	
	Soil E	Borin	g Instal	lation Repo	ort	0.00-0000. 1	200	Esca.	
		- 23				ET3	VL	11	
244 244				GENERAL INFO	RMATION				
Project Name									
E-Area LLWF ET3, ST8 &	ST9 Lysimeters				A Proposition of Association (Association)				
Project Manager					Department				
Ken Dixon					SRNS, Solid Waste Programs				
Boring Purpose			County		Location Description				
Install Lysimeters at ET3 for	or vadose zone samp	ling.	Aiken, SC		E-Area at SRS				
SRS North Grid Coordinate	id Coordinate SRS East Grid Coordinate Latitud		Latitude (degree	es, minutes, seconds) (NAD 27)	Longitude (degrees, minutes, seconds) (NAD 27)	Ground E	levation		
78401.64	57760.57		33°/17'/36.3	0"	-81°/40'/1.20"	280.62 ft	-msl		
	1500 (100 (100 (100 (100 (100 (100 (100		48	DRILLING AND SAM	IPLING INFORMATION			-	
Total Drilled Depth	Static Water Level		Drilling Sta	art Date	Drilling Completion Date	Drilling Me	ethod		
70 ft-bgs	66 ft-bgs			2/23/2023	2/27/2023	RotoSon	ic		
Sample Type	Sampling Interval	Sa	ample Type	Sampling Interval	Drilling and Sampling Comments (Include drilli zones, etc.)	npling Comments (Include drilling muds used, source of water, lost circular			
RadCon Composite	0 - 70 ft-bgs	Driller II.	net Namo First	DENO.	1) Borehole drilled dry to 70 ft-bgs, with 4" diameter continuous corin diameter over-ride casing. 2) Bentonite pellets backfill to elev. 221.6 ft-msl for lysimeter ET3-VL. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around top of ceramic cup, then silica sand installed to top of the lysimeter. 3) Bentonite pellets installed from top of sand to elevation 241.6 ft-ms lysimeter ET3-VL-11-242. Silica flour (~3 lbs) installed under lysimeter cup and around it to cover top of ceramic cup, then silica sand install the lysimeter. 4) Bentonite pellets installed from top of sand to 2.5 ft-bgs. 5) Surface completion is 5-ft PVC protective casing (6-in diam.) drive ground, and 1 bag (60lb) Sakrete to cement in place at ground surface for Two lysimeters (Soilmoisture Corp., model 1920F1, 1.5" diameter) installed in the borehole, which are connected to 1" risers with an PV Lysimeter 114" vaccum/pressure air tubing and 114" water discharge if from lysimeter through 1" PVC riser pipe to surface for sampling.				
Drilling Company		N. 13 . 15	ast Name, First I	nitial)	Oversight Company	2.00	ht (Last Name, Fir	rst Initial)	
Cascade Drilling Co		Hall, Jar	nes Jr.		SRNS	Killeen	, Terry		
Disposition of Samples									
Composite samples collect	ted and analyzed by	SRNS Ra	diological Con		imples below detection. Drill cuttings dispos	sed on unit	B		
			-	ABANDO	MENT				
Method of Abandonment				Materials Used in A	bandonment				
NA				NA					
				APPRO	VALS				
Abandonment Verified By		Date		Boring Inst	allation Report Prepared By	Date	_		
NA			NA	Terry Kille	en		3/15/20	023	

Boring Number (AAA,NNN,AA) Soil Boring Installation Report ЕТ3 12 GENERAL INFORMATION Project Name E-Area LLWF ET3, ST8 & ST9 Lysimeters Ken Dixon Boring Purpose SRNS, Solid Waste Programs Location Description Aiken, SC Latitude (dec Install Lysimeters at ET3 for vadose zone sampling. SRS North Grid Coordinate | SRS East Grid Coordinate E-Area at SRS Longitude (degre seconds) (NAD 27) Ground Elevation 78407.90 57860.51 '33° / 17' / 36.94" -81° / 40' / 0.29" 279.86 ft-msl DRILLING AND SAMPLING INFORMATION Total Drilled Depth Static Water Level Drilling Start Date 2/14/2023 75 ft-bgs 67 ft-bgs 2/15/2023 RotoSonic Drilling and Sampling Comments (Include drilling muds used, source of water, lost circulation zones, etc.) Sampling Interval Sample Type Sampling Interval Sample Type RadCon Composite 0 - 75 ft-bgs 1) Borehole drilled dry to 75 ft-bgs, with 4" diameter continuous coring and 6" diameter over-ride casing. 2) Bentonite pellets backfill to elev. 222.86 ft-msl for lysimeter ET3-VL-12-223. Silica flour (-3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top of the lysimeter. 3) Bentonite pellets installed from top of sand to elevation 234.86 ft-msl for lysimeter ET3-VL-12-235. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top of cup and around it to cover top or ceramic cup, uren sinca sand installed to top or the lysimeter. 4) Bentonite pellets installed from top of sand to 2.5 ft-bgs. 5) Surface completion is 5-ft PVC protective casing (6-in diam.) driven 2-ft into ground, and 1 bg (60lb) Sakrete to cement in place at ground surface. 6) Two lysimeters (Sollmoisture Corp., model 1920F1, 1.5" diameter) are installed in the borehole, which are connected to 1" risers with an PVC adapter. Lysimeter 1/4" vaccum/pressure air tubing and 1/4" water discharge tubing runs from lysimeter through 1" PVC riser pipe to surface for sampling. Drilling Company Driller (Last Name, First Initial) Oversight (Last Name, First Initial) Oversight Company Cascade Drilling Co Disposition of Samples SRNS Killeen, Terry Composite samples collected and analyzed by SRNS Radiological Controls (RadCon). All samples below detection. Drill cuttings disposed on unit. ABANDONMENT Method of Abandonment Materials Used in Abandonn APPROVALS Abandonment Verified By Date Boring Installation Report Prepared By Date NA Terry Killeen 3/15/2023

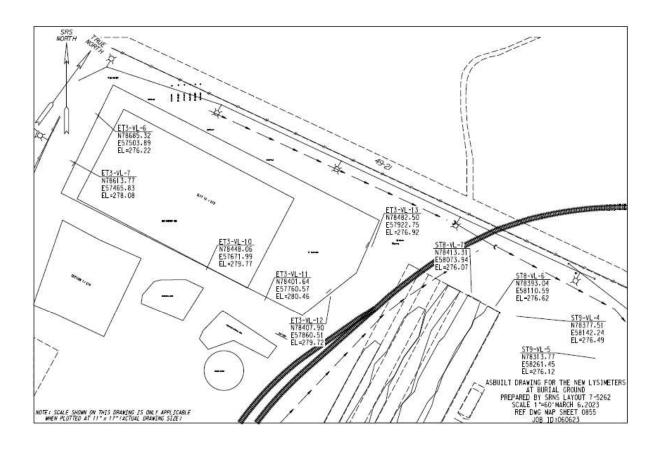
Boring Number (AAA,NNN,AA) Soil Boring Installation Report ЕТ3 13 GENERAL INFORMATION Project Name E-Area LLWF ET3, ST8 & ST9 Lysimeters Ken Dixon Boring Purpose SRNS, Solid Waste Programs Location Description Aiken, SC Latitude (dec Install Lysimeters at ET3 for vadose zone sampling. SRS North Grid Coordinate | SRS East Grid Coordinate E-Area at SRS SRS East Grid Coordina Longitude (degre seconds) (NAD 27) Ground Elevation 78482.50 57922.75 33° / 17' / 37.90" -81° / 40' / 0.22" 277.37 ft-msl DRILLING AND SAMPLING INFORMATION Total Drilled Depth Static Water Level Drilling Start Date 70 ft-bgs 76 ft-bgs 2/15/2023 2/16/2023 RotoSonic Drilling and Sampling Comments (Include drilling muds used, source of water, lost circulation zones, etc.) Sampling Interval Sampling Interval Sample Type Sample Type RadCon Composite 0 - 70 ft-bgs 1) Borehole drilled dry to 70 ft-bgs, with 4" diameter continuous coring and 6" diameter over-ride casing. 2) Bentonite pellets backfill to elev. 218.37 ft-msl for lysimeter ET3-VL-13-218. Silica flour (-3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top of the lysimeter. 3) Bentonite pellets installed from top of sand to elevation 232.37 ft-msl for lysimeter ET3-VL-13-232. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top of cup and around it to cover top or ceramic cup, uren sinca sand installed to top or the lysimeter. 4) Bentonite pellets installed from top of sand to 2.5 ft-bgs. 5) Surface completion is 5-ft PVC protective casing (6-in diam.) driven 2-ft into ground, and 1 bg (60lb) Sakrete to cement in place at ground surface. 6) Two lysimeters (Sollmoisture Corp., model 1920F1, 1.5" diameter) are installed in the borehole, which are connected to 1" risers with an PVC adapter. Lysimeter 1/4" vaccum/pressure air tubing and 1/4" water discharge tubing runs from lysimeter through 1" PVC riser pipe to surface for sampling. Drilling Company Driller (Last Name, First Initial) Oversight (Last Name, First Initial) Oversight Company SRNS Cascade Drilling Co Disposition of Samples Killeen, Terry Composite samples collected and analyzed by SRNS Radiological Controls (RadCon). All samples below detection. Drill cuttings disposed on unit. ABANDONMENT Method of Abandonment Materials Used in Abandonn APPROVALS Abandonment Verified By Date Boring Installation Report Prepared By Date NA Terry Killeen 3/15/2023

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	Soil	3orin@	g Instal	lation Repo	ort	20000000	1000	A1000 I
		300				ST8	VL	7
Project Name				GENERAL INFO	RMATION		_	
to a Superior of the contract of the contract of								
E-Area LLWF ET3, ST8 &	ST9 Lysimeters				Teach and the second		_	
Project Manager					Department			
Ken Dixon					SRNS, Solid Waste Programs			
Boring Purpose			County		Location Description			
Install Lysimeters at ST8 f			Aiken, SC		E-Area at SRS			
SRS North Grid Coordinate	SRS East Grid Coon	dinate		es, minutes, seconds) (NAD 27)	Longitude (degrees, minutes, seconds) (NAD			
78413.31	31 58073.94		33° / 17' / 38		-81° / 39' / 58.31"	276.26 ft	-msl	
					IPLING INFORMATION		_	
Total Drilled Depth	Static Water Level		Drilling Sta		Drilling Completion Date	Drilling M		
70 ft-bgs	76 ft-bgs	40		3/2/2023	3/2/2023	RotoSon		
Sample Type	Sampling Interval	Sai	mple Type	Sampling Interval	Drilling and Sampling Comments (Include zones, etc.)	e drilling muds us	sed, source of wate	er, lost circulation
RadCon Composite	0 - 70 ft-bgs				1) Borehole drilled dry to 70 ft-bgs diameter over-ride casing. 2) Bentonite pellets backfill to elev Silica flour (~3 lbs) installed under top of ceramic cup, then silica san 3) Bentonite pellets installed from lysimeter ST8-VL-7-237. Silica floc cup and around it to cover top of coup and around it to cover top of coup the lysimeter. 4) Bentonite pellets installed from 5) Surface completion is 5-ft PVC ground, and 1 bag (60lb) Sakrete. 6) Two lysimeters (Soilmoisture Coinstalled in the borehole, which are Lysimeter 1/4" vaccum/pressure a from lysimeter through 1" PVC rise	. 220.26 ft-msi lysimeter cera d installed to to top of sand to ur (~3 lbs) inst eramic cup, the top of sand to protective casi to cement in pl orp., model 19; e connected to ir tubing and 1. er pipe to surfa	for lysimeter ST: mic cup and aroup of the lysimete elevation 237.26 alled under lysimen elistic sand ins 2.5 ft-bgs. ng (6-in diam.) di ace at ground su 20F1, 1.5" diame 1* risers with an 44" water dischar ce for sampling.	8-VL-7-220. und it to cover er. ft.msl for leter ceramic stalled to top of rriven 2-ft into urface. leter) are PVC adapter. rge tubing runs
Drilling Company		Driller (La	ist Name, First I	Initial)	Oversight Company	Oversig	ht (Last Name, Fin	st Initial)
Cascade Drilling Co		Hall, Jan	nes Jr.		SRNS	Killeen	, Terry	1111
Disposition of Samples								
Composite samples collec	cted and analyzed by	SRNS Rac	diological Con		mples below detection. Drill cuttings d	isposed on unit	t.	
				ABANDON				
Method of Abandonment				Materials Used in Al	bandonment			
NA				NA				
				APPRO	VALS			
Abandonment Verified By		Date		Boring Inst	allation Report Prepared By	Date	_	
NA			NA	Terry Kille	en		3/15/20	123

					W.	В	oring Number (A	AA,NNN,AA)	
	Soil	Borin	g Instal	lation Repo	ort	ST9	VL	4	
				GENERAL INFO	RMATION		- b		
Project Name							_		
E-Area LLWF ET3, ST8	& ST9 Lysimeters								
Project Manager					Department		_		
Ken Dixon					SRNS, Solid Waste Programs				
Boring Purpose			County		Location Description				
Install Lysimeters at ST9 for vadose zone sampling. Aiken, SC					E-Area at SRS				
SRS North Grid Coordinate			Latitude (degrees, minutes, seconds) (NAD 27)		Longitude (degrees, minutes, seconds) (NAD 27)	Ground Elevation			
8377.51 58142.24			33°/ 17' / 38.35"		-81° / 39' / 57.41"	276.67ft-msl			
	22			DRILLING AND SAN	IPLING INFORMATION				
Total Drilled Depth	Static Water Level		Drilling Sta		Drilling Completion Date	Drilling Method			
70 ft-bgs	ft-bgs 76 ft-bgs		2/27/2023		2/28/2023	RotoSonic			
3		1			Drilling and Sampling Comments (Include dri	llina muds us	ed, source of wa	ter. lost circulation	
Sample Type	Sample Type Sampling Interval		Sample Type Sampling Interval						
RadCon Composite	0 - 70 ft-bgs				1) Borehole drilled dry to 70 ft-bgs, with 4" diameter continuous coring and 6" diameter over-ride casing. 2) Bentonite pellets backfill to elev. 216.67 ft-msl for lysimeter ST9-VL-11-217. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to cove top of ceramic cup, then silica sand installed to top of the lysimeter. 3) Bentonite pellets installed from top of sand to elevation 238.67 ft-msl for lysimeter ST9-VL-11-239. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top the lysimeter. 4) Bentonite pellets installed from top of sand to 2.5 ft-bgs. 5) Surface completion is 5-ft PVC protective casing (6-in diam.) driven 2-ft into ground, and 1 bag (60lb) Sakrete to cement in place at ground surface. 6) Two lysimeters (Solimoisture Corp., model 1920F1, 1.5" diameter) are installed in the borehole, which are connected to 1" risers with an PVC adaptet Lysimeter 1/4" vaccum/pressure air tubing and 1/4" water discharge tubing run from lysimeter through 1" PVC riser pipe to surface for sampling.				
Drilling Company Driller (Last Name, First In				nitial)	Oversight Company	200	ht (Last Name, F	irst Initial)	
Cascade Drilling Co Hall, Jame			imes Jr.		SRNS	Killeen	Terry	1000	
Disposition of Samples									
Composite samples colle	ected and analyzed by	SRNS Ra	adiological Con		imples below detection. Drill cuttings dispo	osed on unit			
Mathed of Abandans				ABANDON			_		
Method of Abandonment				Materials Used in Al	pandonment				
NA				NA			_		
		IDete		APPRO		In-t	_		
Abandonment Verified By Date			986	C. Z. W. C.	allation Report Prepared By	Date			
NA		NA Terry Killee			en	1	3/15/2	ID23	

			200			В	oring Number (AA	(A,NNN,AA)	
	Soil	Borin	g Instal	lation Repo	ort	ST9	VL	5	
				GENERAL INFO	RMATION	013			
Project Name				OLIVERAL IVI O	TURN TON				
E-Area LLWF ET3, ST8 &	ST9 Lysimeters								
Project Manager	e to Ljoiniototo				Department		_		
Ken Dixon					SRNS, Solid Waste Programs				
Boring Purpose			County		Location Description				
Install Lysimeters at ST9 for vadose zone sampling. Aiken, SC					E-Area at SRS				
SRS North Grid Coordinate			Latitude (degree	es, minutes, seconds) (NAD 27)	Longitude (degrees, minutes, seconds) (NAD 27)) Ground Elevation			
78313.77	8313.77 58261.45		33°/ 17' / 38	55"	-81° / 39' / 55.83"	276.48 ft-msi			
, , , , , , , , , , , , , , , , , , , ,	00201110		00 / 11 / 00	The state of the s	MPLING INFORMATION	2.0.101			
Total Drilled Depth	Static Water Level		Drilling Sta	art Date	Drilling Completion Date Drilling Method				
70 ft-bgs	76 ft-bgs			3/1/2023	3/1/2023	RotoSonic			
9-		T			Drilling and Sampling Comments (Include drilli		_	er. lost circulation	
Sample Type	Sampling Interval	Sa	ample Type	Sampling Interval	zones, etc.)				
RadCon Composite	0 - 70 ft-bgs				1) Borehole drilled dry to 70 ft-bgs, with	4" diame	ter continuous o	oring and 6"	
		-			diameter over-ride casing.				
	3			1	 Bentonite pellets backfill to elev. 220.48 ft-msl for lysimeter ST9-VL-5-22 Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to co 				
		top of ceramic cup, then silica sand installed to top of the lysimeter.							
	3					3) Bentonite pellets installed from top of sand to elevation 237.48 ft-msl for lysimeter ST9-VL-5-237. Silica flour (~3 lbs) installed under lysimeter ceramic cup and around it to cover top of ceramic cup, then silica sand installed to top of the lysimeter.			
	1			1					
	4				4) Bentonite pellets installed from top of sand to 2.5 ft-bgs. 5) Surface completion is 5-ft PVC protective casing (6-in diam.) driven 2-ft into ground, and 1 bag (60lb) Sakrete to cement in place at ground surface.				
3	*								
	1			4	6) Two lysimeters (Soilmoisture Corp., model 1920F1, 1.5" diameter) are installed in the borehole, which are connected to 1" risers with an PVC adapter. Lysimeter 1/4" vaccum/pressure air tubing and 1/4" water discharge tubing runs				
	1								
		ł		1	from lysimeter through 1" PVC riser pip	e to surfa	ce for sampling.		
Drilling Company		Driller (L:	ast Name, First I	nitial)	Oversight Company	Oversio	ht (Last Name, Fi	rst Initial)	
Cascade Drilling Co Hall, James Jr.			· main	SRNS	Killeen, Terry				
Disposition of Samples		rian, oa	11103 01.		Olito	Milceri	City		
	ted and analyzed by	SRNS Ra	idiological Conf	trols (RadCon). All sa	amples below detection. Drill cuttings dispos	ed on unit			
	Lington by	20 110		ABANDO			-		
Method of Abandonment				Materials Used in A	bandonment				
NA				NA	ROSS STREET STREET STREET				
				APPRO	VALS		_		
Abandonment Verified By		Date			allation Report Prepared By	Date	_		
NA NA		NA Terry Killee				3/15/2023			

Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	SRNL-STI-2023-0008 Revision
Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	
Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	
Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	
Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	
Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	
Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	
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Appendix D. Final Layout for FY23 ET3, ST8, and ST9 Lysimeter Installations	
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