Contract No:

This document was prepared in conjunction with work accomplished under Contract No. DE-AC09-08SR22470 with the U.S. Department of Energy (DOE) Office of Environmental Management (EM).

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Installation of Lysimeters Near Engineered Trench 3

K. L. Dixon

W. D. Joyce

January 28, 2021

SRNL-STI-2020-00555, Revision 0

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Prepared for
U.S. Department of Energy

SRNL-STI-2020-00555
Revision 0

Keywords: *ELLWF, Lysimeter, Tritium, CPT*

Retention: *Permanent*

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REVIEWS AND APPROVALS

AUTHORS:

K. L. Dixon, SRNL Environmental Sciences and Dosimetry Date

W. D. Joyce, Geotechnical Engineering Date

TECHNICAL REVIEW:

S. A. Goodlove, SRNL Environmental Sciences and Dosimetry Date

APPROVAL:

D. G. Jackson, Manager Date
Manager, SRNL Environmental Sciences and Dosimetry

I. J. Stewart, Low Level Waste Engineering Date

V. Rigsby, Program Manager - Radioactive Waste Management Date

K. C. Crawford, Manager Date
Solid Waste Programs Manager

ACKNOWLEDGEMENTS

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

EXECUTIVE SUMMARY

Three new lysimeter stations were installed on the north rim of Engineered Trench 3 (Figure ES-1) at the E-Area Low Level Waste Facility (ELLWF). These stations were designated as ET3-VL-3, ET3-VL-4, and ET3-VL-5. The stations were installed in a line with the two existing stations (ET3-VL-1 and ET3-VL-2) and spaced approximately 100 ft apart. Two lysimeters were installed at each station at the depths shown in Table ES-1. Lysimeter placement was based on borehole lithology and was comparable to the existing lysimeter stations. The deepest lysimeter at each of the three 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 December 2020 with each lysimeter producing 1000 ml of water for tritium analysis. All lysimeters were below the administrative limit for ET3 (43.7 pCi/ml) with all but ET3-VL-5 (222) at background levels. ET3-VL-5 (222) had a tritium concentration of 27.5 pCi/ml.

With the addition of the new lysimeters at ET3, the vadose zone monitoring system is now comprised of 309 active lysimeters at 102 lysimeter stations. There are 93 action-level lysimeters at 102 stations.

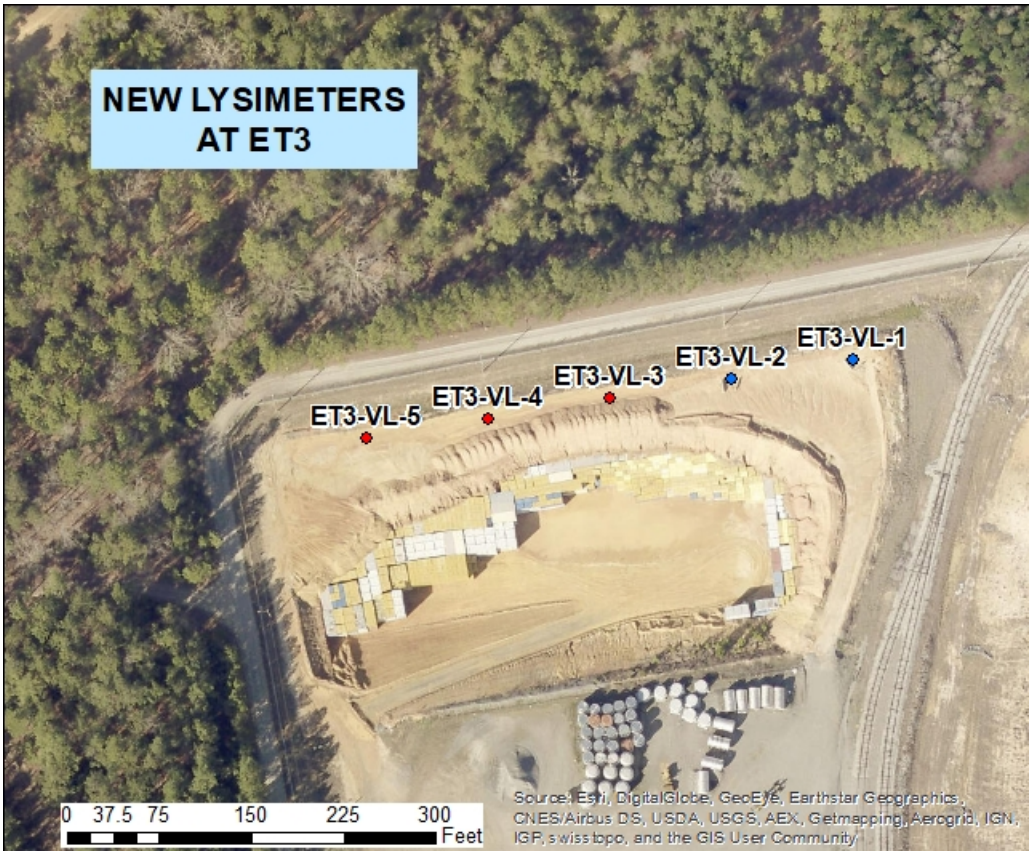

Figure ES-1. New Lysimeter Locations at ET3.

Table ES-1. Construction Details for New ET3 Lysimeters.

Station Name	SRS North (ft)	SRS East (ft)	Ground Elevation (ft msl)	Lysimeter Elevation (ft msl)	Lysimeter Depth (ft bgs)	Action Level (pCi/ml)	Tritium Concentration (pCi/ml)
ET3-VL-3 (236)	78614.41	57764.17	275.9	236	40	43.7	2.26
ET3-VL-3 (222)[1]	78614.41	57764.17	275.9	222	54	43.7	1.68
ET3-VL-4 (233)	78659.91	57674.15	275.2	233	42	43.7	0.95
ET3-VL-4 (224)[1]	78659.91	57674.15	275.2	224	51	43.7	1.67
ET3-VL-5 (236)	78705.96	57584.55	274.9	236	39	43.7	0.83
ET3-VL-5 (222)[1]	78705.96	57584.55	274.9	222	53	43.7	27.5

[1]Action-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 site 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

Engineered Trench 3 (ET3) is located in the northwest corner of ELLWF (Figure 1) and was placed in operation in 2013. As of November 2020, ET3 was 86% full. In 2016, two lysimeter stations were installed along the north perimeter of ET3 (Figure 2). These lysimeter stations were designated as ET3-VL-1 and ET3-VL-2. Each station consists of two lysimeters with the deepest lysimeter designated as the action-level lysimeter (Table 1).

The objective of this project was to install three additional vertical lysimeter stations along the north perimeter of ET3. The purpose of this report is to provide the construction details and layout for the new lysimeters and to present the tritium data from the initial sampling of the lysimeters.

2.0 Summary of Field Activities

Drilling and lysimeter installation occurred during October 2020. Drilling services were provided by Cascade Environmental, LLC. Technical oversight of the drilling activities was provided by SRNS Geotechnical Engineering personnel. Three new lysimeter stations were installed along the north perimeter of ET3. These lysimeter stations were installed in a line with the two existing lysimeter stations (ET3-VL-1 and ET3-VL-2) and were spaced approximately 100 ft apart. The new lysimeter stations were identified as ET3-VL-3, ET3-VL-4, and ET3-VL-5. Figure 2 provides the layout of the lysimeter stations at ET3. The new lysimeter stations, together with the existing stations, span the length of ET3 on the north side of the disposal trench.

2.1 Coring and Lithologic Logging

Vertical borings were completed at each lysimeter location using sonic drilling technology (Figure 3). 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 three boreholes were dry drilled meaning no drilling mud or water was used to advance the casing or to remove cuttings from the borehole. Each borehole was continuously cored from about 10 ft bgs through 90 ft bgs. The resulting core was visually described, and detailed logs were documented for each borehole (Appendix A).

Lithologic logs were developed for each borehole based on gamma-ray logs and CPT logs where available. Gamma-ray logging was performed on each borehole once the target depth was achieved. Gamma-ray logging measures the naturally occurring gamma radiation from sediments containing gamma emitting radionuclides. Generally, clays emit more gamma rays due to radioactive potassium, uranium, and thorium than do sands as these radionuclides are not as prevalent in sand. Therefore, gamma logs provide an indication of sand and silt/clay zones. The gamma log data collected from each borehole are presented in Figure 4.

Prior to the start of drilling, a CPT push for lithology was conducted at ET3-VL-3 to assist with the placement of lysimeters. Originally, it was planned to conduct a CPT push at all three lysimeter stations. However, excessive rainfall made ET3-VL-4 and ET3-VL-5 inaccessible to the CPT truck. The lithologic data obtained from the CPT push at ET3-VL-3 are plotted in Figure 5 and the vendor supplied log is presented in Appendix B.

2.2 Lysimeter Installation

The lysimeters installed at the new ET3 lysimeter stations were SoilMoisture® Equipment Corporation Model Number 1920F1 vacuum soil water samplers (Figure 6). 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 the 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 several hours to saturate the ceramic cup (Figure 7). 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 8 presents a schematic diagram of lysimeter completion for the ET3 lysimeter stations. Installation reports for the ET3 lysimeters are presented in Appendix C. At each lysimeter station, both the shallow and deep lysimeters were installed within the same borehole (Figure 8). Each borehole was drilled to a total depth of approximately 90 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 9). 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 8. 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 new ET3 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 lysimeter stations (ET3-VL-1 and ET3-VL-2) while honoring the local lithology observed in each new borehole. The existing lysimeter stations ET3-VL-1 and ET3-VL-2 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 was at 71 ft bgs surface at the time of installation.

The core description (Appendix A), gamma logs (Figure 4), and CPT logs (Figure 5) 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 ET3-VL-3, ET3-VL-4, and ET3-VL-5 is shown in Figure 4 and Figure 5. Construction details for the lysimeters are presented in Table 1.

For ET3-VL-3, lysimeters were installed at 40 ft bgs (236 ft msl) and 54 ft bgs (222 ft msl) as shown in Figure 4 and Figure 5. The shallow lysimeter was placed based on the gamma log and CPT logs because there was no recovery of core from the target interval. Good agreement is noted between the gamma log and the CPT logs for ET3-VL-3. The shallow lysimeter was placed at 40 ft bgs and located above a clay layer observed on both the gamma and CPT logs. Figure 10 shows the core from the interval where the lysimeter was placed. The deep lysimeter was placed at 54 ft bgs and located above a clay layer observed from 56 to 60 ft bgs (Figure 4 and Figure 5). This layer is noted in the core description at 57 ft bgs (Appendix A, Page A-4). Figure 11 shows the core from the interval where the deep lysimeter was placed.

For ET3-VL-4, lysimeters were installed at 42 ft bgs (233 ft msl) and 51 ft bgs (224 ft msl) as shown in Figure 4. For ET3-VL-4, the gamma log was generally consistent with the core description (Appendix A). The gamma log shows a clay layer from 37 to 39 ft bgs and this layer is noted in the core description (Appendix A, Page A-8). However, another clay layer was observed in the core description from 43 to 44.5 ft bgs with a sandy layer above (Appendix A, Page A-9). The shallow lysimeter at ET3-VL-4 was placed in this sandy zone above the clay layer located at about 43 ft bgs. Figure 12 shows the core from the interval where the lysimeter was placed.

The deep lysimeter at ET3-VL-4 was placed at 51 ft bgs based primarily on the core description (Appendix A, Page A-9). 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 A, Page A-9). Figure 13 shows the core from the interval where the deep lysimeter was placed.

For ET3-VL-5, lysimeters were installed at 39 ft bgs (236 ft msl) and 53 ft bgs (222 ft msl) as shown in Figure 4 and Figure 5. For ET3-VL-5, the gamma log was generally consistent with the core description (Appendix A). The gamma log shows a clay layer at about 35 ft bgs and this layer is noted in the core description between 35 and 37 ft bgs (Appendix A, Page A-13). Another clay layer is observed in both the gamma log and core description at 41 ft bgs. The shallow lysimeter at ET3-VL-5 was placed in the sandy zone between the clay layers observed in the logs. Figure 14 shows the core from the interval where the lysimeter was placed. The deep lysimeter at ET3-VL-5 was placed at 53 ft bgs above a clay layer observed in both the gamma log and the core description (Appendix A, Page A-14).

3.0 Analytical Results from Sampling of New ET3 Lysimeters

Two lysimeters were installed at each of the new ET3 lysimeter stations. Consistent with the existing lysimeters at ET3, the deep lysimeter at each station was designated as the action-level lysimeter (Table 1). The new action-level lysimeters at ET3 are ET3-VL-3 (222), ET3-VL-4 (224), and ET3-VL-5 (222).

In December 2020, each lysimeter was sampled and analyzed for tritium concentration. Results are provided in Table 2. All six lysimeters yielded 1000 ml of sample volume. Both the shallow and deep lysimeters at ET3-VL-3 and ET3-VL-4 were at or near background tritium concentration. For ET3-VL-5, the shallow lysimeter was also at background concentration. However, the deep lysimeter at ET3-VL-5 was at 27.5 pCi/ml. The analytical lab reported no issues with the analysis. However, for confirmation, the sample was analyzed again, and the result was verified. The action-level for ET3 is 43.7 pCi/ml. Therefore, ET3-VL-5 (222) will need to be closely monitored in the future.

4.0 Summary

Three new lysimeter stations were installed on the northern rim of Engineered Trench 3 at the E-Area Low Level Waste Facility (ELLWF). These stations were designated as ET3-VL-3, ET3-VL-4, and ET3-VL-5. The stations were installed in a line with the two existing stations (ET3-VL-1 and ET3-VL-2) and spaced approximately 100 ft apart. Two lysimeters were installed at each station. Lysimeter placement was based on borehole lithology and was comparable to the existing ET3 lysimeter stations. The deepest lysimeter at each of the three new lysimeter stations was designated as the action-level lysimeter.

Following installation, each lysimeter was purged and placed under vacuum for sampling. In December 2020, each lysimeter was sampled for tritium concentration. Each lysimeter yielded 1000 ml of water. All lysimeters were below the administrative limit for ET3 (43.7 pCi/ml) with all but ET3-VL-5 (222) at background levels. ET3-VL-5 (222) had a tritium concentration of 27.5 pCi/ml.

With the addition of the new lysimeters at ET3, the vadose zone monitoring system is now comprised of 309 active lysimeters at 102 lysimeter stations. There are 93 action-level lysimeters at 102 stations.

5.0 References

DOE, 1999. USDOE Order 435.1 Radioactive Waste Management Manual, U. S. Department of Energy, U.S. Department of Energy, Washington D.C., July 9, 1999.

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.

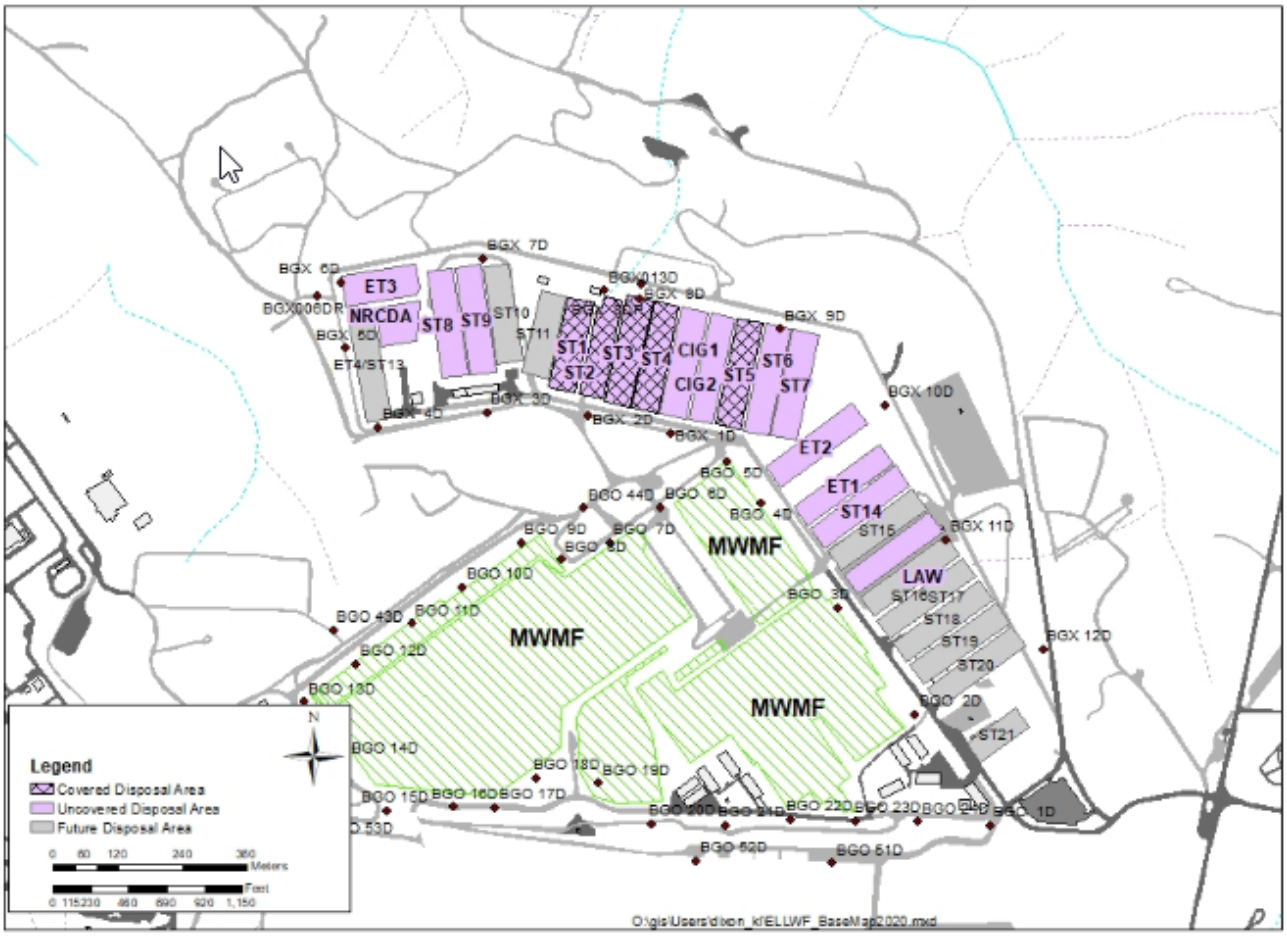


Figure 1. E-Area Low-Level Waste Facility.

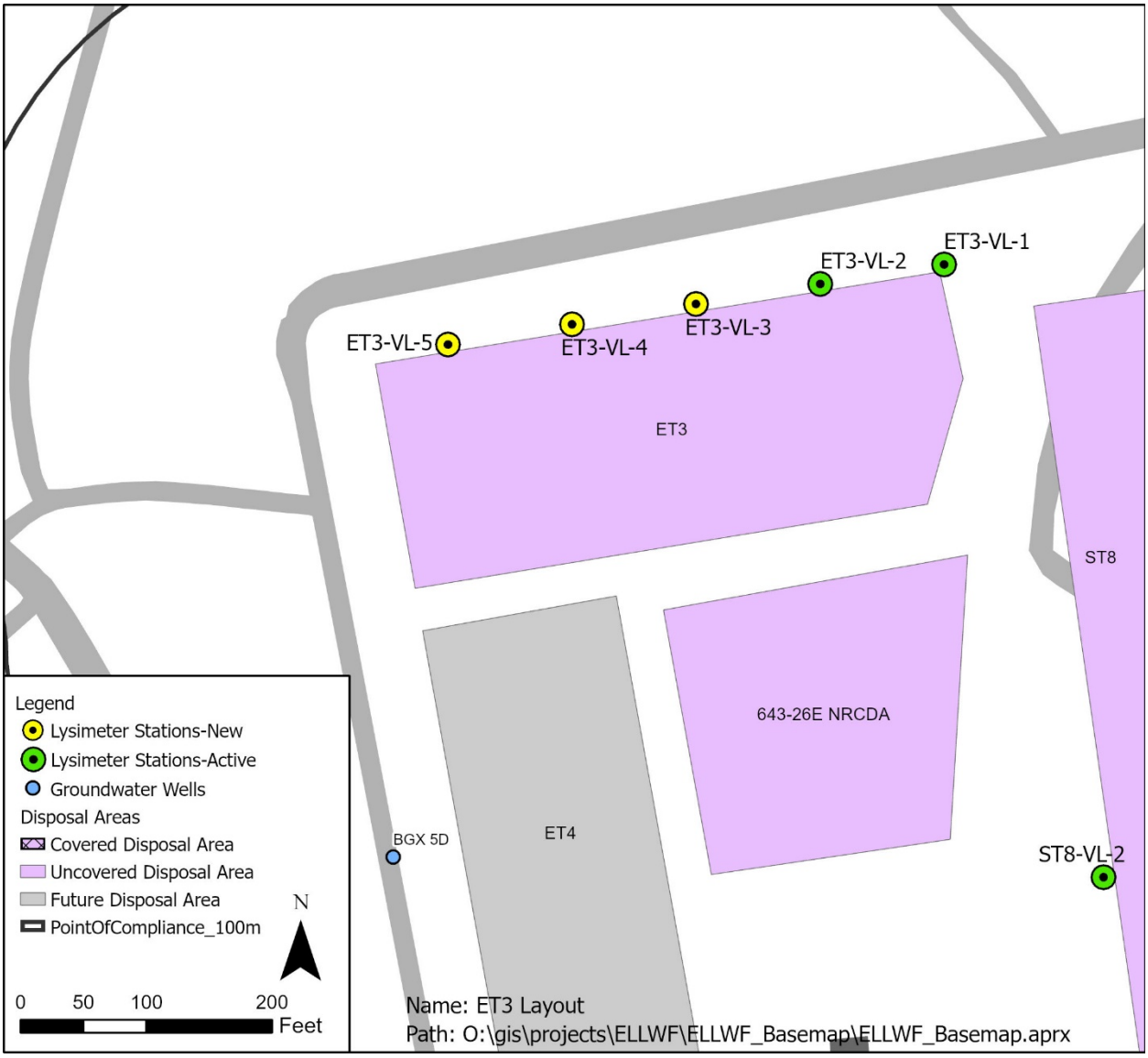


Figure 2. Layout of New Lysimeters at ET3.

Figure 3. Sonic Drill Rig Used to Install New Lysimeters at ET3.

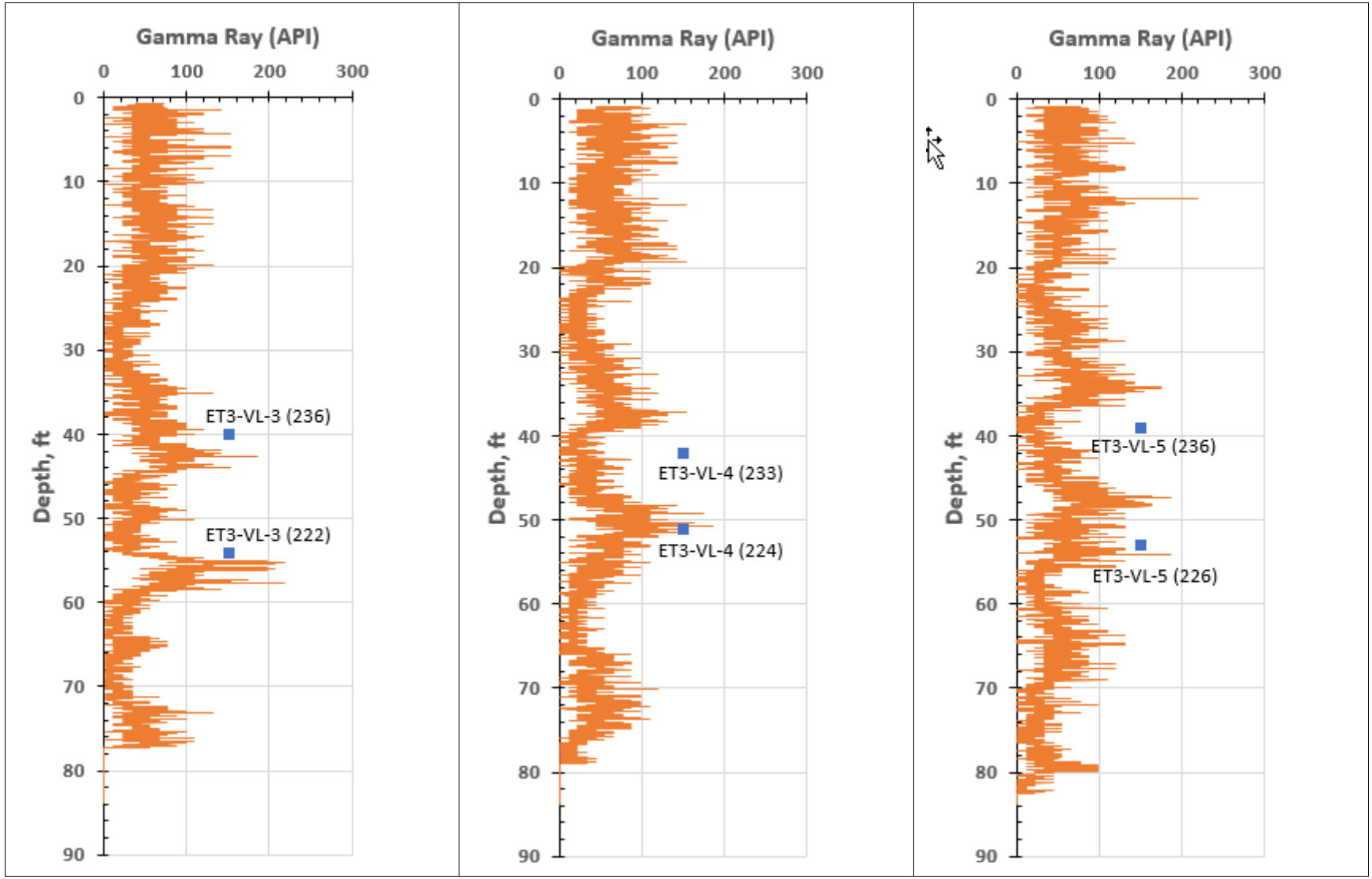


Figure 4. Gamma Ray Logs for ET3-VL-3, ET3-VL-4, and ET3-VL-5

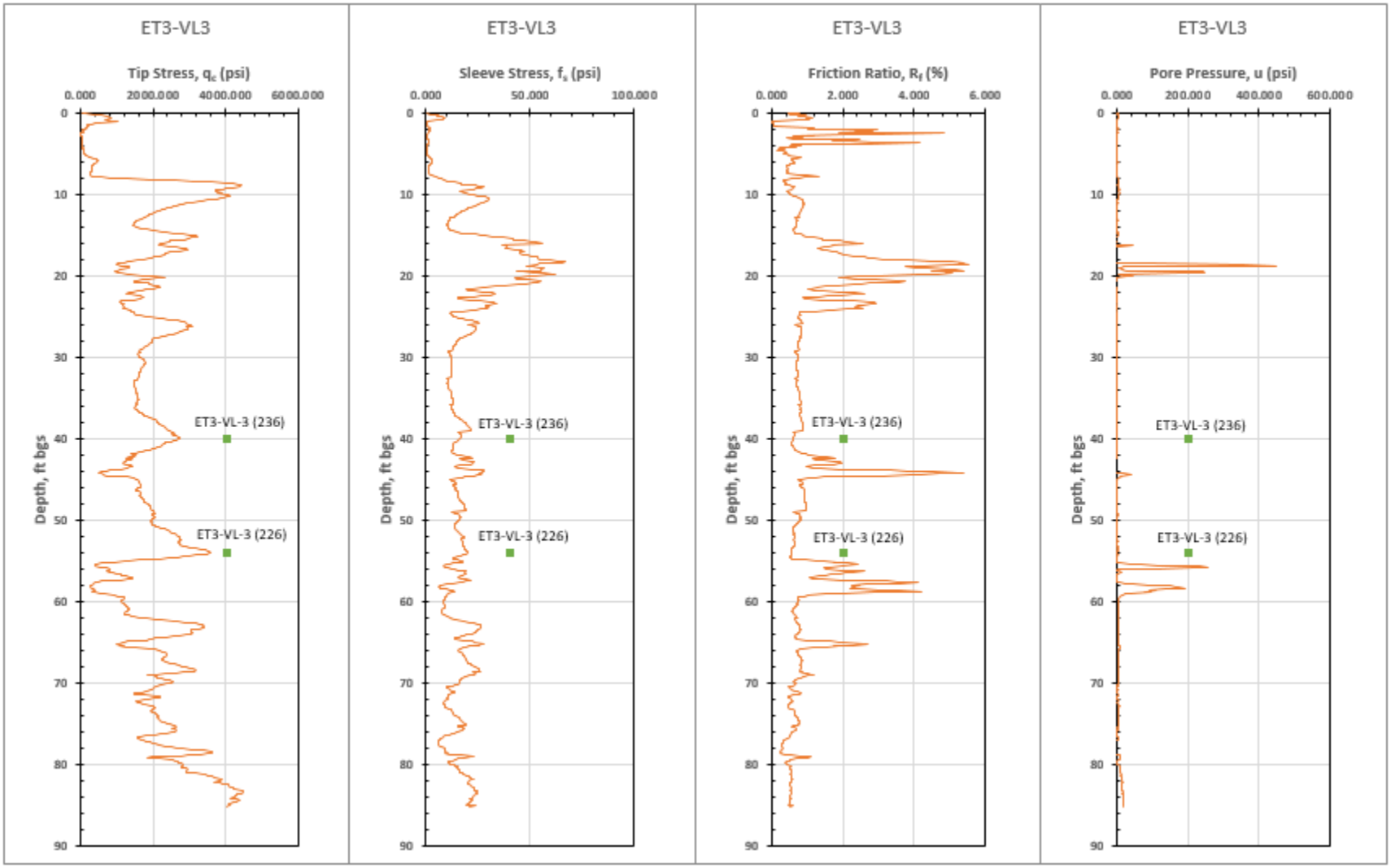


Figure 5. CPT Log for ET3-VL-3

Figure 6. Model 1920F1 (SoilMoisture® Equipment Corp) Suction Lysimeter

Figure 7. Lysimeters were Saturated with Water Prior To Installation.

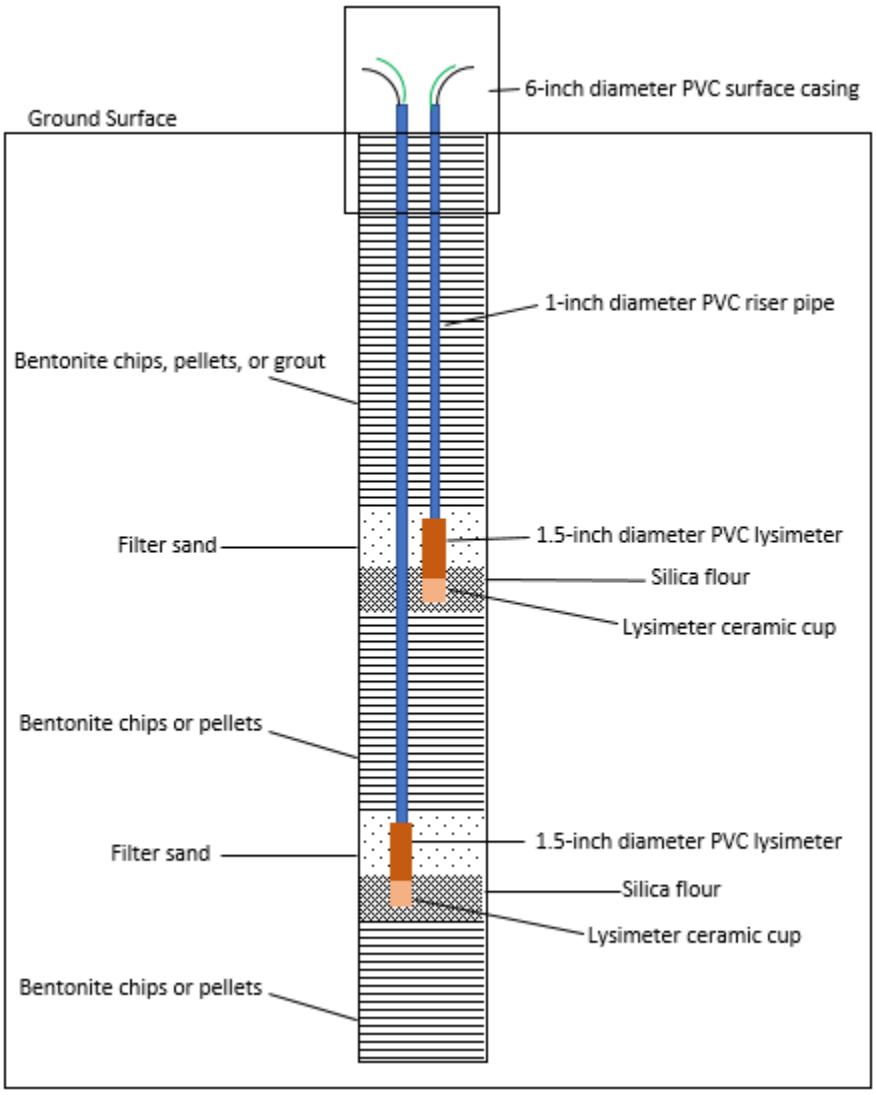


Figure 8. Generalized Schematic of Lysimeter Installation (not to scale).

Figure 9. Silica Flour Placed Around Annulus of Lysimeter Ceramic Cup.

Figure 10. Core Collected from ET3-VL-3 at a Depth of 40 ft. The Upper Lysimeter was Placed in this Interval [ET3-VL-3 (236)].

Figure 11. Core Collected from ET3-VL-3 at a Depth of 54 ft. The Action-Level Lysimeter was Placed in this Interval [ET3-VL-3 (222)].

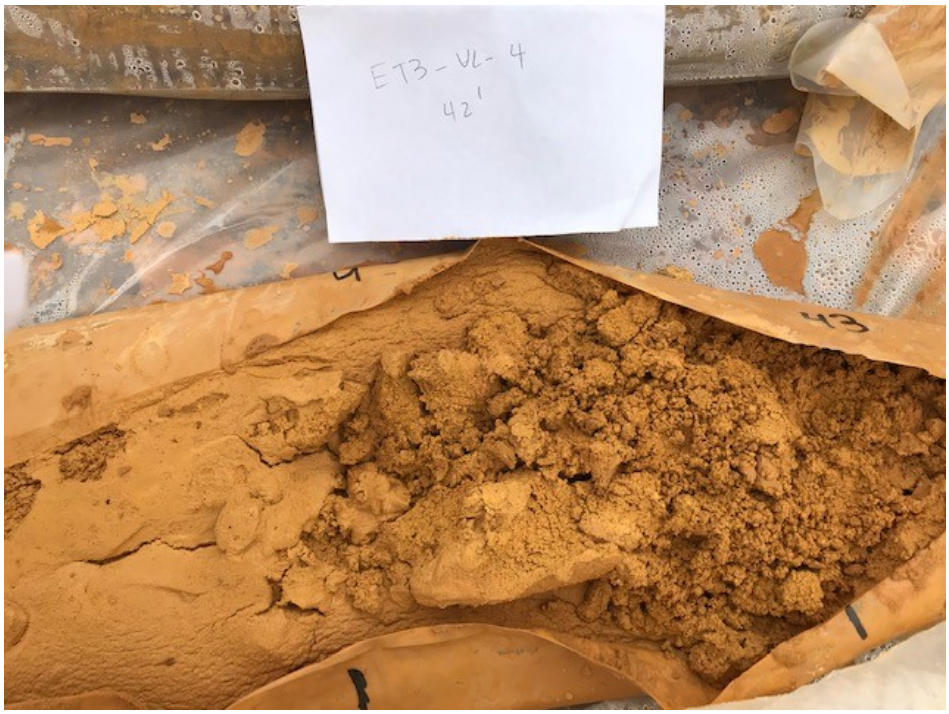


Figure 12. Core Collected from ET3-VL-4 at a Depth of 42 ft. The Upper Lysimeter was Placed in this Interval [ET3-VL-4 (233)].

Figure 13. Core Collected from ET3-VL-4 at a Depth of 51 ft. The Action-Level Lysimeter was Placed in this Interval [ET3-VL-4 (224)].

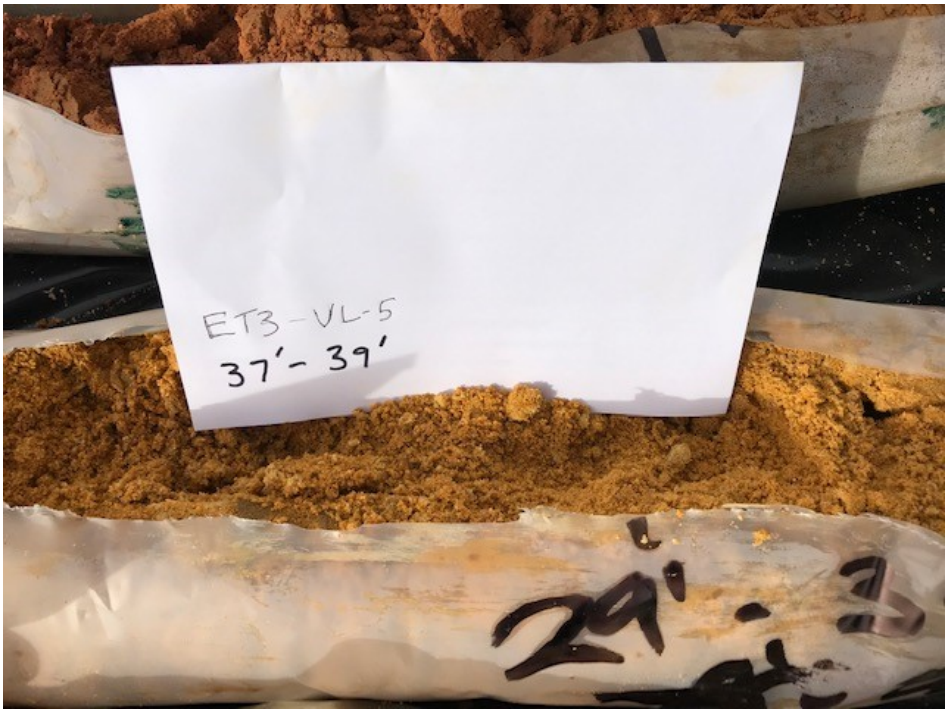


Figure 14. Core Collected from ET3-VL-5 at a Depth of 39 ft. The Upper Lysimeter was Placed in this Interval [ET3-VL-5 (236)].

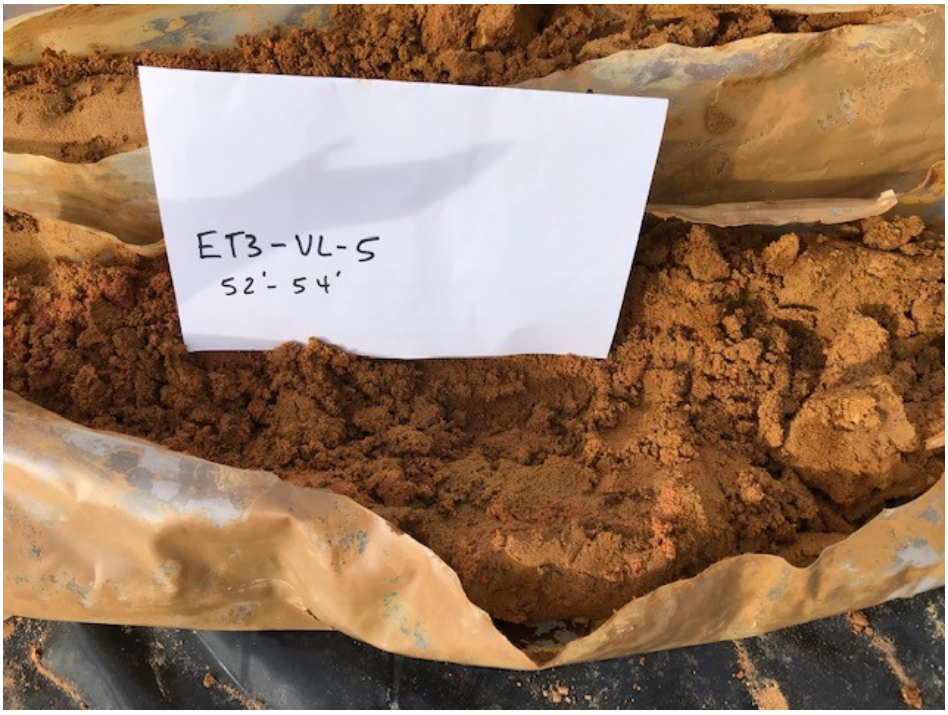


Figure 15. Core Collected from ET3-VL-5 at a Depth of 53 ft. The Action-Level Lysimeter was Placed in this Interval [ET3-VL-5 (222)].

Table 1 Construction Details for ET3 Lysimeter Locations.

Station Name	Date Installed	SRS North (ft)	SRS East (ft)	Ground Elevation (ft msl)	Lysimeter Elevation (ft msl)	Lysimeter Depth (ft bgs)	Action Level Lysimeter	Action Level (pCi/ml)
ET3-VL-1 (234)	2016	78525.21	57940.98	275.6	234	42	NO	-
ET3-VL-1 (221)	2016	78525.21	57940.98	275.6	221	55	YES	43.7
ET3-VL-2 (243)	2016	78570.92	57851.84	280.1	243	37.5	NO	-
ET3-VL-2 (226)	2016	78570.92	57851.84	280.1	226	54	YES	43.7
ET3-VL-3 (236)	2020	78614.41	57764.17	275.9	236	40	NO	-
ET3-VL-3 (222)	2020	78614.41	57764.17	275.9	222	54	YES	43.7
ET3-VL-4 (233)	2020	78659.91	57674.15	275.2	233	42	NO	-
ET3-VL-4 (224)	2020	78659.91	57674.15	275.2	224	51	YES	43.7
ET3-VL-5 (236)	2020	78705.96	57584.55	274.9	236	39	NO	-
ET3-VL-5 (222)	2020	78705.96	57584.55	274.9	222	53	YES	43.7

Table 2 Initial Tritium Concentrations Measured in New ET3 Lysimeters.

Lysimeter[1]	Action Level (pCi/mL tritium)	Sample Volume (ml)	December 2020 Concentration (pCi/ml)
ET3-VL-3 (236)	43.7	1000	2.26
ET3-VL-3 (222)	43.7	1000	1.68
ET3-VL-4 (233)	43.7	1000	0.95
ET3-VL-4 (224)	43.7	1000	1.67
ET3-VL-5 (236)	43.7	1000	0.83
ET3-VL-5 (222)	43.7	1000	27.5

Appendix A. Core Descriptions

GSS 39-27# (3-11-97)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-26-2020	Sheet: 1 of 5
Well Number: ET3-VL3	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0				Hand augered 6.0' No obstructions
	1				
	2				
	3			0.0'-6.0' Hand augered	
	4				
	5				
	6				
1	7				
	8		48	Sandy SILT (sand 10-15%) pale reddish brown (10R5/4) firm-hard, dry interval 8.4'-9.4'	
	9				
1	0			SAND (silt 5-10%) fn-vfn grn, with pockets of med grn, mod reddish brown (10R4/6)-pale yellowish brown (10YR6/2)-light brown (5YR5/6) with very pale orange (10YR8/2) multicolored, sand-sized, mostly well sorted, dry, interval 9.4'-14.8'	
	1				
	2				
	3				
	4				
1	5			Sandy SILT (sand 10-15% vfn grn) multicolored, mottled, firm-hard, dry interval 14.8'-16.0'	
	6				
	7		100	SAND (silt trace grading to 10-15%) fn-vfn grn, mod yellowish brown (10YR5/4) grading to mod reddish brown (10R4/6) with dark yellowish orange (10YR6/6) mottled, sand, well sorted, dry, interval 16.0 to 19.7'	
2	8				
	9				
	2 0			Sandy SILT with Kaolin (19.7'-23.0') interval	

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-26-2020	Sheet: 2 of 5
Well Number: ET3-VL3	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
2	20–25		100	Sandy SILT with Kaolin (from 19.7'-21.2') pale reddish brown (10R 5/4) - mod reddish orange (10R 6/6) with white (N9) firm-hard, dry, interval 19.7'-23.0' Very Silty SAND (silt 30-35%) vfg-fg gra, light brown (5YR 5/6) - pale reddish brown (10R 5/4), sand, well sorted, trace kaolin, interval 23.0'-26.0'	
3	26–31		64	Silty SAND interval 26.0'-26.5' Sandy SILT (sand 5-10% with sandier pockets) mod reddish brown (10R 4/6) with dark yellowish orange (10YR 6/6) grading to light brown (5YR 5/6) - pale reddish brown (10R 5/4), trace kaolin, interval 26.5'-31.0' Sandy SILT with Kaolin/Clay (clayier) light brown (5YR 5/6) with dark yellowish orange (10YR 6/6) and white (N9), firm-hard, dry, interval 31.0'-32.3'	
4	36–40		35	SAND (silt 5% grading to 10-15%) fg-vfg gra, light brown (5YR 5/6) grading to mod reddish brown (10R 4/6), sand, well sorted, moist, interval 36.0'-39.5' Recovered 2.0' on the next run (#5)	

OSR 30-27# (2-12-97)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-26-2020	Sheet: 3 of 5
Well Number: ET3-VL3	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotasonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
4	4 0		35	Recovered 2.0' on the next run (#5)	
	1				
	2				
	3				
	4				
	4 5			SAND (silt 10-15%, trace kaolin) fn-vfn gra, dark yellowish orange (10YR6/6) - light brown (5YR5/6) with pale reddish brown (10R5/4), sbrnd-sbang, mod sorted, moist interval 44.0-47.0'	
	6				
5	7		100	SAND (silt 5-10%) with siltier pockets) fn-vfn gra grading to some med gra, mod reddish brown (10R4/6) - light brown (5YR5/6) grading to dark yellowish orange (10YR6/6) sbrnd-sbang, well grading to mod sorted, trace kaolin, interval 47.0'-52.0'	
	8				
	9				
	5 0				
	1			Thin Clay at 50.5'	
	2			SAND (silt trace-5%) fn gra, pale yellowish orange (10YR8/6) - dark yellowish orange (10YR6/6), sbrnd, well sorted, trace kaolin, interval 52.0'-56.8'	
	3				
	4				
	5				
	6				
6	7		100	Interbedded CLAY and SAND (silt 20-25%, clay 5-10%) Clay 56.8'-57.2' Sand is fn-med gra with some crse gra, dark yellowish orange (10YR6/6) - grayish orange (10YR7/4) with white (N9) sbang - sbrnd, mod-poly sorted, thin kaolin stringers through out, interval 56.8'-62.7'	
	8				
	9				
	6 0				

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-26-2020	Sheet: 4 of 5
Well Number: ET3-VL3	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	60			Interbedded CLAY and SAND See A/A for description, interval 56.8'-62.7'	
6	61		100	SAND (silt 5%) fn-med grn dark yellowish orange (10YR6/6)-light brown (5YR5/6), sbang-sbrnd, mod sorted, trace kaolin stringer, trace mang. oxide, interval 62.7'-66.0'	
	62				
	63				
	64				
	65				
	66			SAND and CLAY Interval 66.0'-67.5'	
	67			SAND (silt trace-5%) fn-med with occ crse grn, light brown (5YR5/6) sbang-sbrnd, mod sorted, moist, interval 67.5'-69.0'	
	68			SAND (silt 5-10% clay kaolin stringers 5%) fn grn with occ. med grn, dark yellowish	
7	69		100	orange (10YR6/6)-light brown (5YR5/6), sbang-sbrnd, mod-well sorted, dry, interval 69.0'-72.2'	
	70				
	71			SAND (silt trace-5%) vfn-fn grn pale yellowish orange (10YR8/6) & dark yellowish orange (10YR6/6), sbrnd, well sorted, dry, interval 72.2'-76.8'	
	72				
	73				
	74				
	75				
	76			SAND (silt trace-5%) vfn-fn grn, dark yellowish orange (10YR6/6), sbrnd, well sorted, wet, interval 76.8'-76.8	
8	77		100	Silty SAND (silt 20-25% clay trace-5% as kaolin) vfn-fn grn, dark yellowish orange (10YR6/6)-grayish orange (10YR7/4) with white (N9) and med reddish orange (10R6/6), sbrnd, well sorted, moist interval 76.8'-81.0'	
	78				
	79				
	80				

GSR 58-STM (3-15-97)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-26-2020	Sheet: 5 of 5
Well Number: ET3-VL3	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
8	80			Silty SAND See A/A for description, interval 76.8'-81.0' med-olive gray @ 80.5'	
	81			SAND (silt trace-5%) fn-med grn, dark yellowish orange (10YR 6/6) grading to dark yellowish orange (10YR 6/4)-mod yellowish brown (10YR 5/4)-white (N9) sbrnd-sbang, mod sorted, wet-moist, interval 81.0'-90.0'	
8	85		100		
	90			Stiffer bottom @ 5	
9				Total Depth - 90.0'	

OSR 38-27W (3-12-91)g

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-21-2020	Sheet: 1 of 5
Well Number: ET3-VL4	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

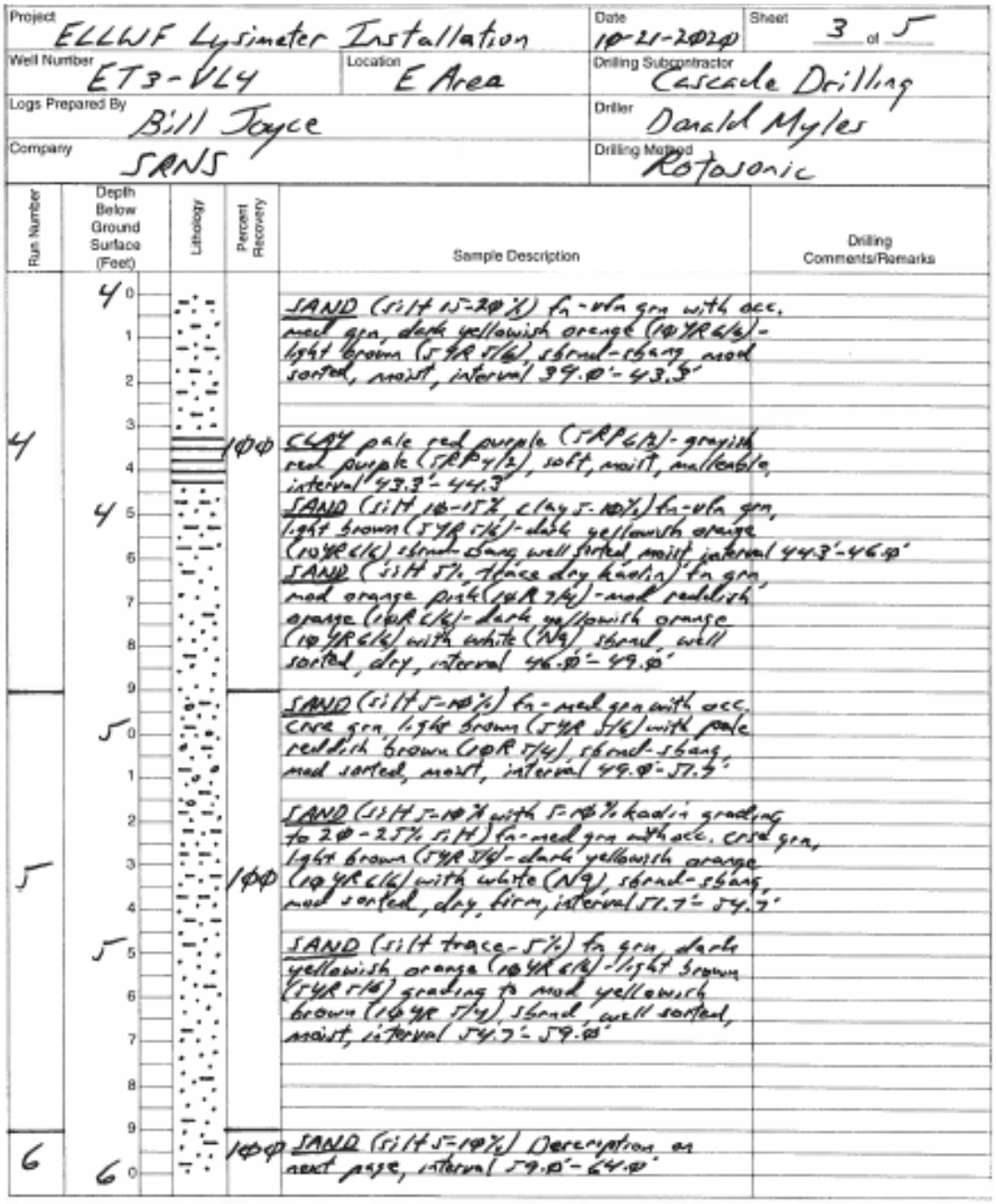
Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0				Hand augered 6.0'
	1				No obstructions
	2				
	3				
	4				
	5				
	6				
	7				
	8				
1	9		53	Sandy SILT (sand 15-20%) pale reddish brown (10R 5/4) - light brown (5YR 5/6) firm-hard, solid, dry, interval 9.0' - 13.0'	
	10				
	11				
	12				
	13				
	14			SAND (silt trace) vfn-fn grn, dark yellowish orange (10YR 6/6), sbrnd, well sorted, dry, interval 13.0' - 13.7'	
	15			Silty SAND (silt 30'-35%) vfn-fn grn, mod yellowish brown (10YR 5/4) - light brown (5YR 5/6) with mod reddish orange (10R 6/6) - mod red (5R 5/6), mottled, sbrnd, well sorted, dry, interval 13.7' - 18.4'	
	16				
	17				
	18				
	19			SAND (silt 5-10%) vfn grn, light brown (5YR 6/4), sbrnd, well sorted, dry, interval 18.4' - 19.0'	
2	20		100	SAND (silt 5-10%) fn - vfn grn, light brown (5YR 6/4) - grayish orange (10YR 7/4) with pale reddish brown (10R 5/4), sbrnd - sbang, well sorted, moist, interval 19.0' - 21.2'	

GSR 30-27# (3-11-97)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-21-2020	Sheet: 2 of 5
Well Number: ET3-VL4	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
2	20–29		100	SAND See A/A for description, interval 19.0'-21.2' Sandy SILT (sand 20-25%, kaolin stringers 5%) light brown (5YR 5/6)-grayish orange (10YR 7/4)-pale reddish brown (10R 5/4), firm-hard, dry, interval 21.2'-25.4' SAND (Silt 10-15% trace kaolin) fn gry, light brown (5YR 5/6) sbrnd, well sorted, dry, interval 25.4'-27.0' SAND (silt 5%) fn-med gry, dark yellowish orange (10YR 6/6)-mod reddish orange (10R 6/6) sbrnd-sbang, well sorted, dry, interval 27.0'-29.0'	
3	30–39		100	SAND (Silt 10-15%) fn gry with rare med gry, dark yellowish orange (10YR 6/6)-light brown (5YR 6/4) with pale reddish brown (10R 5/4), sbrnd-sbang, well sorted, moist, trace kaolin, interval 29.0'-32.0' SAND (Silt 10-15%, kaolin stringers throughout 5-10%) fn-med gry, dark yellowish orange (10YR 6/6)-light brown (5YR 5/6) with white (N9) sbrnd-sbang, mod sorted dry, consolidated, interval 32.0'-37.3' CLAY thin laminae with interbedded sand thin layered kaolin white (N9) and pale red purple (5RP 6/2), firm-hard, dry, interval 37.3'-39.0'	
4	40–		100	SAND (Silt 15-20%) Description on	



Project: ELLWF Lysimeter Installation
Date: 10-21-2020
Sheet: 3 of 5
Well Number: ET3-VL4
Location: E Area
Drilling Subcontractor: Cascade Drilling
Logs Prepared By: Bill Joyce
Driller: Donald Myles
Company: SRNS
Drilling Method: Rotasonic

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
4	40–49		100	SAND (silt 15-20%) fn-vfn grn with acc. med grn, dark yellowish orange (10YR 6/6)-light brown (5YR 5/6), sbrnd-sbang mod sorted, moist, interval 39.0'-43.3'	
4	43–44		100	CLAY pale red purple (5RP 6/2)-grayish red purple (5RP 4/2), soft, moist, malleable, interval 43.3'-44.3'	
4	44–49			SAND (silt 10-15% clay 5-10%) fn-vfn grn, light brown (5YR 5/6)-dark yellowish orange (10YR 6/6) sbrnd-sbang well sorted, moist interval 44.3'-46.0' SAND (silt 5%, trace dry kaolin) fn grn, med orange pink (10R 7/4)-med reddish orange (10R 6/6)-dark yellowish orange (10YR 6/6) with white (N9), sbrnd, well sorted, dry, interval 46.0'-49.0'	
5	50–59		100	SAND (silt 5-10%) fn-med grn with acc. crse grn, light brown (5YR 5/6) with pale reddish brown (10R 5/4), sbrnd-sbang mod sorted, moist, interval 49.0'-57.7' SAND (silt 5-10% with 5-10% kaolin grading to 20-25% silt) fn-med grn with acc. crse grn, light brown (5YR 5/6)-dark yellowish orange (10YR 6/6) with white (N9), sbrnd-sbang mod sorted, dry, firm, interval 57.7'-54.7' SAND (silt trace-5%) fn grn, dark yellowish orange (10YR 6/6)-light brown (5YR 5/6) grading to mod yellowish brown (10YR 5/4), sbrnd, well sorted, moist, interval 54.7'-59.0'	
6	60–		100	SAND (silt 5-10%) Description on next page, interval 59.0'-64.0'	

OSR 30-379 (2-12-97)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-21-2020	Sheet 4 of 5
Well Number: ET3-VL4	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
6	60–68.5		100	SAND (silt 5-10%) fn grn, light brown (5YR 5/6) with pale reddish brown (10R 5/4), sbrnd, well sorted, dry, interval 59.0'-64.0'	
				SAND (silt trace-5%, trace kaolin) fn-med grn, dark yellowish orange (10YR 6/6)-pale yellowish orange (10YR 8/6) sbrnd-sbang, mod sorted, dry, interval 64.0'-68.5'	
7	68.5–79		100	SAND (silt 10-15% trace kaolin) vfn grn, dark yellowish orange (10YR 6/6), sbrnd, well sorted, dry, interval 68.5'-69.0'	
				SAND (silt 5-10%) vfn-fn grn, dark yellowish orange (10YR 6/6)-pale yellowish orange (10YR 8/6) sbrnd, well sorted, slightly moist, interval 69.0'-71.7'	
				SAND As Above with kaolin stringers 5%, interval 71.7'-74.0'	
				SAND As Above, kaolin 5% with some med-crse grn, mod sorted, interval 74.0'-76.0'	
				SAND (silt trace-5%) med-fn grn with some crse grn, very pale orange (10YR 8/2)-grayish orange (10YR 7/4) with black (N1) (cobalt mang oxide), sbrnd-sbang, mod sorted, slightly moist-very wet from 77.0'-79.0' interval 76.0'-79.0'	
8	79–80		82	SAND (silt 5-10%) Description on next page, interval 79.0'-84.2'	

GSR 30-27# (2-12-91)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-21-2020	Sheet: 5 of 5
Well Number: ET3-VL4	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
8	80		82	SAND (silt 5-10%) fn gm with some med grn, dark yellowish orange (10YR 6/6) - pale yellowish brown (10YR 6/2), sbrnd-sbang, well sorted, wet, trace mang. oxide, interval 79.0'-84.2'	
	85			SAND (silt trace-5%) fn-med grn, very pale orange (10YR 8/2) - grayish orange (10YR 7/4), sbrnd, mod sorted, moist-wet, interval 84.2'-87.2'	
	90			Total Depth - 89.0'	

OSR 30-21e (2-12-97)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-20-2020	Sheet: 1 of 5
Well Number: ET3-VL5	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	0				Hand augered 6.0'
	1				No obstructions
	2				
	3			0.0'-6.0' Hand augered	
1	4		44		
	5			Silty SAND (silt 35-40%) vfg-fg grn, light brown (5YR 5/6)-pale reddish brown (10R 5/4), sbrnd, well sorted, dry interval 5.0'-10.3'	
	6				
	7				
	8				
	9				
	10			SAND (silt trace) vfg-fg grn, pale yellowish brown (10YR 6/2), sbrnd-sbang, well sorted, dry interval 10.3'-11.0'	
	1			Sandy SILT (trace vfg grn sand) light brown (5YR 5/6)-pale reddish brown (10R 5/4)	
	2			mottled, firm-hard, dry, interval 11.0'-15.7'	
2	3		66		
	4				
	15				
	6			Recovered 3.0' on the next run (dg)	
	7			Silty SAND (silt 35-40%) fg grn, light brown (5YR 5/6)-pale reddish brown (10R 5/4) with white (N9), mottled, sbrnd, well sorted, firm	
	8				
	9				
3	20		100	Sandy SILT As Above Interval 19.0'-21.0'	

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-20-2020	Sheet: 2 of 5
Well Number: ET3-VLS	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
3	20–40		100	Sandy SILT light brown (5YR 5/6)- pale reddish brown (10R 5/4), firm-hard, dry, interval 19.0'-21.0' Silty SAND (silt 35-40%) vfn-fn grn, light brown (5YR 5/6)-pale reddish brown (10R 5/4), sbrnd, well sorted, dry, interval 21.0'-23.2'	
3	40–60		100	SAND (silt 10-15%) fn grn, mod red (5R 5/4)-light brown (5YR 5/6), sbrnd-sbang, well sorted, moist, interval 23.2'-26.3' Silty SAND (silt 30-35%) vfn-fn grn, light brown (5YR 5/6)-pale red (10R 6/4)-pale red purple (5RP 6/4)-very pale orange (10YR 8/4), multicolored, sbrnd, well sorted interval 26.3'-29.0'	
4	00–20		100	Silty SAND As Above, interval 29.0'-32.0' Silty SAND (silt 20-25%) vfn-fn grn, light brown (5YR 5/6)- dark yellowish orange (10YR 6/6), sbrnd, well sorted, interval 32.0'-35.2'	
4	20–40		100	Interbedded CLAY and SAND Clay as kaolin stringer and dark yellowish orange (10YR 6/6) thin laminae with silty sand, interval 35.2'-36.7' SAND (silt 5% with Kaolin stringers) fn grn, dark yellowish orange (10YR 6/6)- light brown (5YR 5/6) sbrnd-sbang, well sorted, loose, interval 36.7'-39.9'	
5	40–00		100	SAND As Above, interval 39.8'-39.8'	

GSR 30-27H (3-12-97)

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-20-2020	Sheet: 3 of 5
Well Number: ET3-VL5	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
	40			Interbedded SAND with Kaolin stringers and thin laminae from, includes iron staining, interval 39.8'-41.5'	
	1			SAND (silt 15-20%) fn gra, light brown (5YR 5/4)-mod brown (5YR 4/4), sbrnd-sbang, well sorted, dry, interval 41.5'-44.7'	
5	2				
	3		100		
	4				
	45			SAND (silt 5-10%) fn gra with occ. med gra, pale reddish brown (10R 5/4)-mod red (5R 4/6), sbrnd-sbang, well sorted, moist, interval 44.7'-47.3'.	
	6				
	7			SAND (silt 5%) fn-med gra, occ. corse gra, light brown (5YR 5/6)-dark yellowish orange (10YR 6/6) with occ. pale red purple (5RP 6/2), sbrnd-sbang, mod sorted, moist interval 47.3'-49.0'	
	8				
	9				
	50			SAND (silt 5%) with occ. siltier sections) fn-med gra with corse gra-cobbles, pale reddish brown (10R 5/4)-dark yellowish orange (10YR 6/6) with pale red purple (5RP 6/2), sbrnd-sbang, poly sorted, interval 49.0'-52.0'	
	1				
	2				
	3			SAND (silt 5%) fn-med gra, mod reddish orange (10R 6/6) grading to light brown (5YR 5/6), sbrnd-sbang, mod sorted, interval 52.0'-54.0'	
6	4		100		
	55			Interbedded thin clay laminae / clayey sand with iron staining, interval 54.0'-56.2'	
	6				
	7			SAND (silt 5-10%) fn-vfn gra, light brown (5YR 5/6), sbrnd-sbang, well sorted, interval 56.2'-57.6'	
	8			CLAY grading sandier, light brown (5YR 6/4), solid, firm-hard, interval 57.6'-58.6'	
	9			Silty SAND interval 58.6'-59.2'	
7	60		100	CLAY with interbedded SAND mottled, firm-hard, interval 59.2'-61.2'	

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-20-2020	Sheet: 4 of 5
Well Number: ET3-VL5	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
7	60–64		100	CLAY with interbedded SAND, mottled, firm-hard, interval 59.2'-61.2' SAND (silty 15-20%, clay 15-20% as stringers throughout) fn-med gsn, light brown (5YR 7/6) - dark yellowish orange (10YR 6/6) sbrnd-sbang mod sorted, clay is soft, moist, malleable, interval 61.2'-64.5'	
6	64–67			SAND (silt 5%) fn-med gsn, light brown (5YR 5/6) - dark yellowish orange (10YR 6/6), sbrnd-sbang, mod sorted, dry, interval 64.5'-67.2'	
	67–69			SAND (silt trace-5%) vfn-fn gsn, grayish orange (10YR 7/4) - pale yellowish orange (10YR 8/6), sbrnd, well sorted, dry, beach sand, interval 67.2'-69.0'	
7	69–73		100	SAND (silt 5-10%) vfn-fn gsn grading to fn-med gsn, light brown (5YR 5/6) dark yellowish orange (10YR 6/6) sbrnd-sbang, well sorted grading to mod sorted, moist, trace manq. oxide, interval 69.0'-73.9'	
8	73–77		100	SAND (silt 5%) grading silt(y) med-fn gsn, pale yellowish brown (10YR 6/2) - grayish orange (10YR 7/4) with white (N9), sbrnd-sbang, mod sorted, moist, trace mang. oxide interval 73.9'-79.4'	
	77–79			Kaolinitic CLAY white (N9) - pale yellowish brown (10YR 6/2), stringers with mang oxide, solid firm-hard, interval 77.4'-78.7' Grades sandier 78.7'-79.9'	
9	79–80		100	SAND (silt trace-5%) fn-med gsn, mod yellowish brown (10YR 5/4) - light brown (7.5YR 5/6), sbrnd-sbang, mod sorted, moist, interval 79.9'-80.9'	

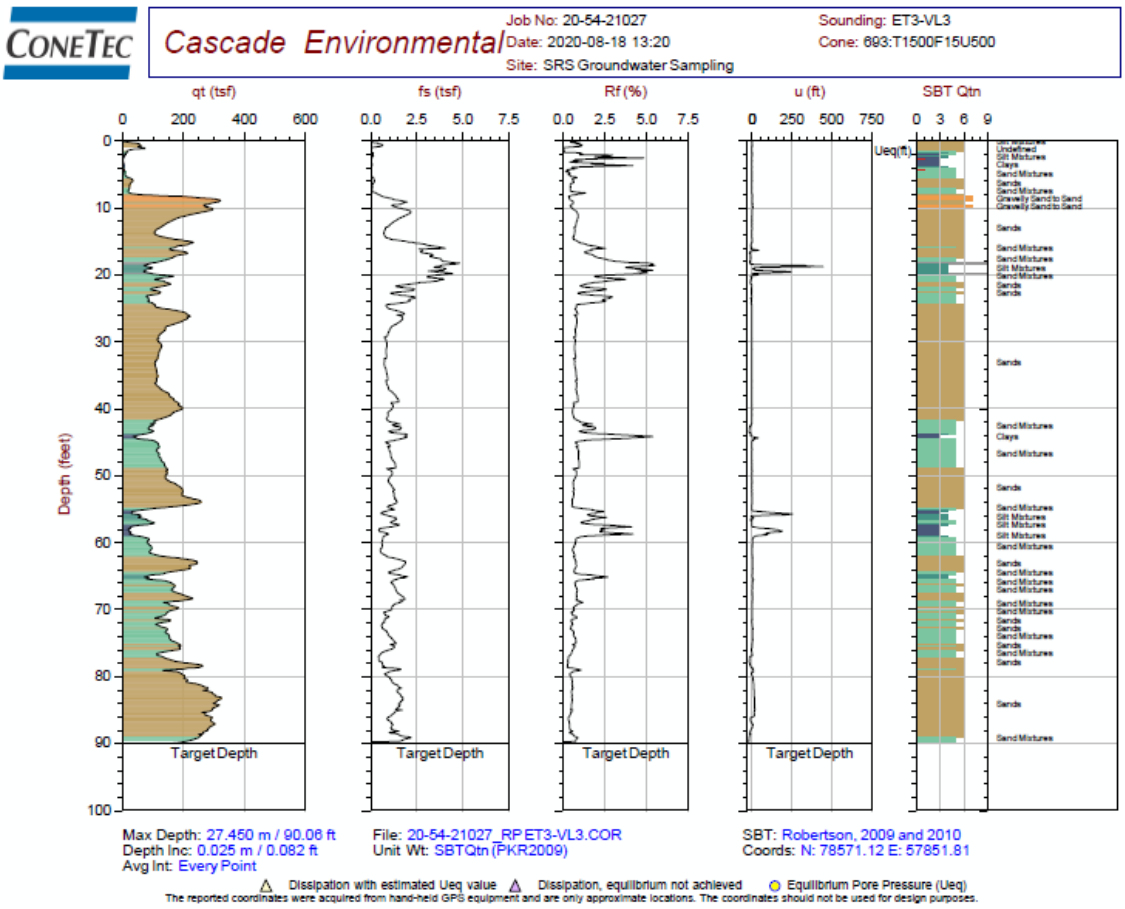
OSR 30-27# (3-11-97)g

Field Geologic Log

Project: ELLWF Lysimeter Installation		Date: 10-20-2020	Sheet: 5 of 5
Well Number: ET3-VL5	Location: E Area	Drilling Subcontractor: Cascade Drilling	
Logs Prepared By: Bill Joyce		Driller: Donald Myles	
Company: SRNS		Drilling Method: Rotosonic	

Run Number	Depth Below Ground Surface (Feet)	Lithology	Percent Recovery	Sample Description	Drilling Comments/Remarks
9	80–84		100	Interbedded CLAY (Kaolinitic) with Clayey SAND and Sandstone, very pale orange (10 YR 8/2) - white (N9) with yellowish gray (5 Y 8/1). CLAY very soft malleable, moist. SAND in sections 10-15% with fine shell fragments, includes many oxide stratifications, interval 88.0-88.0'. Reacts with HCl - ca/carbons	
	89–90			Silty SAND (silt 35-40%) fn grn, light greenish gray (5GY 8/1), slightly well sorted moist interval 88.0'-89.0'. Total Depth - 89.0'	

Appendix B. CPT Log and Field Report for ET3-VL-3


CONETEC
Cascade Environmental
Job No: 20-54-21027
Date: 2020-08-18 13:20
Site: SRS Groundwater Sampling
Sounding: ET3-VL3
Cone: 693:T1500F15U500
qt (tsf)
fs (tsf)
Rf (%)
u (ft)
SBT Qtn
Depth (feet)
Target Depth
Max Depth: 27.450 m / 90.06 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
File: 20-54-21027_RP ET3-VL3.COR
Unit Wt: SBTQtn (PKR2009)
SBT: Robertson, 2009 and 2010
Coords: N: 78571.12 E: 57851.81
Dissipation with estimated Ueq value
Dissipation, equilibrium not achieved
Equilibrium Pore Pressure (Ueq)
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Print Form | Save Form | E-mail Form

OSR 30-13 (Rev. 07-30-2019)
Page 1 of 1

Cone Penetrometer Field Report

Test Hole Number (AAA,NNN,AA)		
ET3	VL	3

General

Project Name				
Installation of Lysimeters Near ET3 (E Area)				
Project Manager (last name, first initial)			Department	
Dixon, K.			SRNL	
Type of Cone Penetrometer Test		County	Location Description	
CPTu		Aiken	E Area Solid Waste Management Facility	
SRS North Grid Coordinate	SRS East Grid Coordinate	Ground Elevation	Latitude (degrees, minutes, seconds)	Longitude (degrees, minutes, seconds)
78614.41	57764.17	275.88' msl	33°17'38.02"	-81°40'2.65"

Testing and Sampling

Test Start Date	Test Complete Date	Total Penetration Depth	Interpreted Water Table Level	Ground Water Samples?	Soil Samples?
8-18-2020	8-18-2020	90.06'	NA	○ Yes ◉ No	○ Yes ◉ No

Cone Penetrometer Test Type	Depth to Sample	Cone Penetrometer Test Type	Depth to Sample	Cone Penetrometer Test Type	Depth to Sample

Cone Penetrometer Company	Cone Operator	Oversight Company	Oversight (last name, first initial)
ConeTec, Inc.	Ramseyer, B.	SRNS	Joyce, B.

Drilling and Sampling Comments (e.g.,drilling muds used, source of water, lost circulation zones, etc.)

A Cone Penetrometer push was conducted to generate a log that was utilized to better target intervals for lysimeter placement.

Depth of the CPTu was 90.06'.

Logging

Log Type

☒ Sleeve (psi) ☒ Tip (psi) ☒ Ratio (%) ☒ Pressure (psi) ☐ Resistivity

Other Logs (list)

Abandonment

Date Abandoned	Method of Abandonment	Theoretical Grout Volume	Actual Grout Volume
9-15-2020	☒ Tremie Pipe ☐ CP Rod-Grouting Method	11 gallons	10 gallons

Report Prepared by	Date Report Prepared
Bill Joyce	1-14-2021

Appendix C. Installation Reports for New ET3 Lysimeters

Print Form | Save Form | E-mail Form

OSR 30-10 (Rev 6-14-2016)

Soil Boring Installation Report

Boring Number (AAA,NNN,AA)		
ET3	VL	3

GENERAL INFORMATION

Project Name				
Installation of Lysimeters Near ET3 (E Area)				
Project Manager			Department	
Ken Dixon			SRNL	
Boring Purpose		County	Location Description	
Environmental (Vadose Zone Sampling)		Aiken	E Area Solid Waste Management Facility	
SRS North Grid Coordinate	SRS East Grid Coordinate	Latitude (degrees, minutes, seconds) (NAD 27)	Longitude (degrees, minutes, seconds) (NAD 27)	Ground Elevation
78614.41	57764.17	33°17'38.02"	-81°40'2.65"	275.88' msl

DRILLING AND SAMPLING INFORMATION

Total Drilled Depth	Static Water Level	Drilling Start Date	Drilling Completion Date	Drilling Method
90.0'	NA	10-26-2020	10-26-2020	Rotosonic

Sample Type	Sampling Interval	Sample Type	Sampling Interval
NA	NA	NA	NA

Drilling and Sampling Comments (Include drilling muds used, source of water, lost circulation zones, etc.)

- 4" coring with 6" override casing to 90.0' total depth
- ran a Gamma Log through override casing at depth
- installed suction lysimeters at elevations 222' and 236'
- lysimeters set atop backplug bentonite layer
- annulus around lysimeter porous cups filled with silica flour, delivered from ground surface as slurry
- interval between lysimeters backfilled with filter pack sand and bentonite
- completed installation above upper lysimeter porous cup with filter pack sand, a bentonite layer, and AquaGuard high solids bentonite grout
- lysimeter tubing conveyed to surface via 1" Sch.40 PVC threaded riser pipe
- surface completion: 6" Sch.40 PVC Protective Casing (with Slip Cap) set in a concrete footer.

Drilling Company	Driller (Last Name, First Initial)	Oversight Company	Oversight (Last Name, First Initial)
Cascade Drilling	Myles, D.	SRNS	Joyce, B.

Disposition of Samples

Composite samples collected for Rad screen (all less than detectable). Cuttings/cores returned to ground.

ABANDONMENT

Method of Abandonment	Materials Used in Abandonment
NA	NA

APPROVALS

Abandonment Verified By	Date	Boring Installation Report Prepared By	Date
NA	NA	Bill Joyce	1-13-2021

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Soil Boring Installation Report

Boring Number (AAA,NNN,AA)		
ET3	VL	4

GENERAL INFORMATION

Project Name				
Installation of Lysimeters Near ET3 (E Area)				
Project Manager			Department	
Ken Dixon			SRNL	
Boring Purpose		County	Location Description	
Environmental (Vadose Zone Sampling)		Aiken	E Area Solid Waste Management Facility	
SRS North Grid Coordinate	SRS East Grid Coordinate	Latitude (degrees, minutes, seconds) (NAD 27)	Longitude (degrees, minutes, seconds) (NAD 27)	Ground Elevation
78659.91	57674.15	33°17'37.85"	-81°40'3.82"	275.20' msl

DRILLING AND SAMPLING INFORMATION

Total Drilled Depth	Static Water Level	Drilling Start Date	Drilling Completion Date	Drilling Method
89.0'	NA	10-21-2020	10-21-2020	Rotosonic

Sample Type	Sampling Interval	Sample Type	Sampling Interval
NA	NA	NA	NA

Drilling and Sampling Comments (Include drilling muds used, source of water, lost circulation zones, etc.)

- 4" coring with 6" override casing to 89.0' total depth
- ran a Gamma Log through override casing at depth
- installed suction lysimeters at elevations 224' and 233'
- lysimeters set atop backplug bentonite layer
- annulus around lysimeter porous cups filled with silica flour, delivered from ground surface as slurry
- interval between lysimeters backfilled with filter pack sand and bentonite
- completed installation above upper lysimeter porous cup with filter pack sand, a bentonite layer, and AquaGuard high solids bentonite grout
- lysimeter tubing conveyed to surface via 1" Sch.40 PVC threaded riser pipe
- surface completion: 6" Sch.40 PVC Protective Casing (with Slip Cap) set in a concrete footer.

Drilling Company	Driller (Last Name, First Initial)	Oversight Company	Oversight (Last Name, First Initial)
Cascade Drilling	Myles, D.	SRNS	Joyce, B.

Disposition of Samples

Composite samples collected for Rad screen (all less than detectable). Cuttings/cores returned to ground.

ABANDONMENT

Method of Abandonment	Materials Used in Abandonment
NA	NA

APPROVALS

Abandonment Verified By	Date	Boring Installation Report Prepared By	Date
NA	NA	Bill Joyce	1-13-2021

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OSR 30-10 (Rev 6-14-2016)

Soil Boring Installation Report

Boring Number (AAA,NNN,AA)		
ET3	VL	5

GENERAL INFORMATION

Project Name				
Installation of Lysimeters Near ET3 (E Area)				
Project Manager			Department	
Ken Dixon			SRNL	
Boring Purpose		County	Location Description	
Environmental (Vadose Zone Sampling)		Aiken	E Area Solid Waste Management Facility	
SRS North Grid Coordinate	SRS East Grid Coordinate	Latitude (degrees, minutes, seconds) (NAD 27)	Longitude (degrees, minutes, seconds) (NAD 27)	Ground Elevation
78705.96	57584.55	33°17'37.69"	-81°40'4.99"	274.90' msl

DRILLING AND SAMPLING INFORMATION

Total Drilled Depth	Static Water Level	Drilling Start Date	Drilling Completion Date	Drilling Method
89.0'	NA	10-20-2020	10-20-2020	Rotosonic

Sample Type	Sampling Interval	Sample Type	Sampling Interval
NA	NA	NA	NA

Drilling and Sampling Comments (Include drilling muds used, source of water, lost circulation zones, etc.)

- 4" coring with 6" override casing to 89.0' total depth
- ran a Gamma Log through override casing at depth
- installed suction lysimeters at elevations 222' and 236'
- lysimeters set atop backplug bentonite layer
- annulus around lysimeter porous cups filled with silica flour, delivered from ground surface as slurry
- interval between lysimeters backfilled with filter pack sand and bentonite
- completed installation above upper lysimeter porous cup with filter pack sand, a bentonite layer, and AquaGuard high solids bentonite grout
- lysimeter tubing conveyed to surface via 1" Sch.40 PVC threaded riser pipe
- surface completion: 6" Sch.40 PVC Protective Casing (with Slip Cap) set in a concrete footer.

Drilling Company	Driller (Last Name, First Initial)	Oversight Company	Oversight (Last Name, First Initial)
Cascade Drilling	Myles, D.	SRNS	Joyce, B.

Disposition of Samples

Composite samples collected for Rad screen (all less than detectable). Cuttings/cores returned to ground.

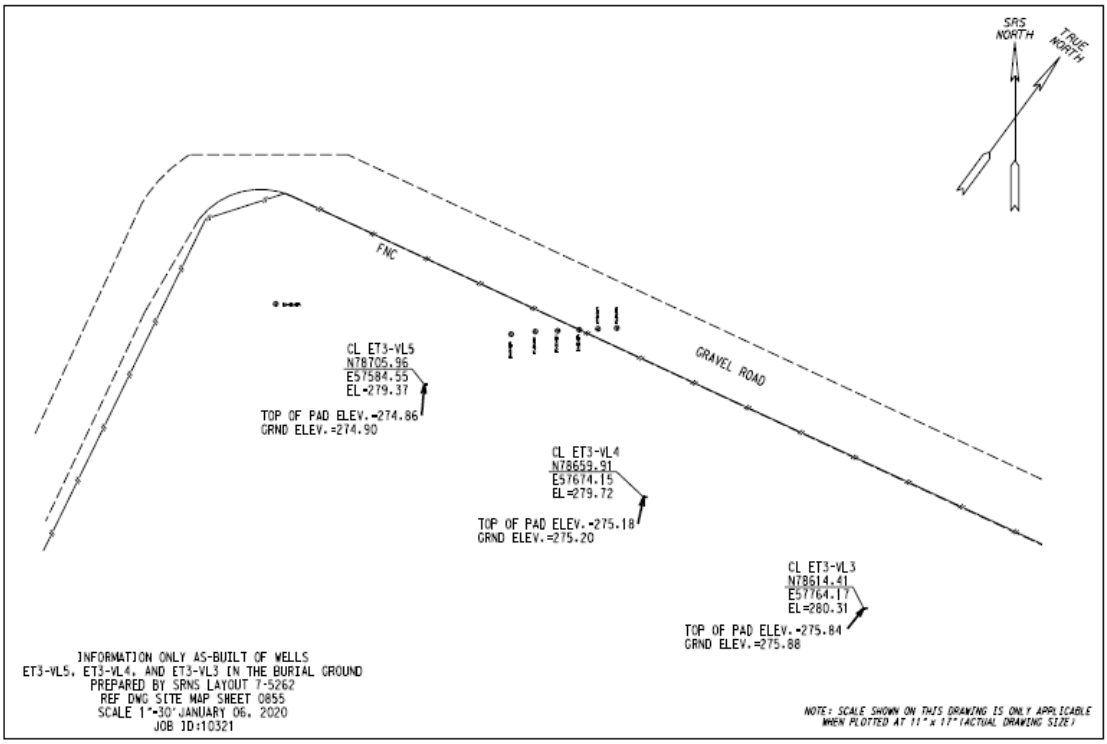
ABANDONMENT

Method of Abandonment	Materials Used in Abandonment
NA	NA

APPROVALS

Abandonment Verified By	Date	Boring Installation Report Prepared By	Date
NA	NA	Bill Joyce	1-13-2021

Appendix D. Final Layout for New ET3 Lysimeters


SRS NORTH
TRUE NORTH
FNC
GRAVEL ROAD
CL ET3-VL5
N78705.96
E57584.55
EL=279.37
TOP OF PAD ELEV.=274.86
GRND ELEV.=274.90
CL ET3-VL4
N78659.91
E57674.15
EL=279.72
TOP OF PAD ELEV.=275.18
GRND ELEV.=275.20
CL ET3-VL3
N78614.41
E57764.17
EL=280.31
TOP OF PAD ELEV.=275.84
GRND ELEV.=275.88
INFORMATION ONLY AS-BUILT OF WELLS
ET3-VL5, ET3-VL4, AND ET3-VL3 IN THE BURIAL GROUND
PREPARED BY SRNS LAYOUT 7-5262
REF DWG SITE MAP SHEET 0855
SCALE 1"=30' JANUARY 06, 2020
JOB ID:10321
NOTE: SCALE SHOWN ON THIS DRAWING IS ONLY APPLICABLE WHEN PLOTTED AT 11" x 17" (ACTUAL DRAWING SIZE)

Distribution:

virginia.rigsby@srs.gov
tom.butcher@srnl.doe.gov
brady.lee@srnl.doe.gov
sydney.goodlove@srnl.doe.gov
dennis.jackson@srnl.doe.gov
william.joyce@srs.gov
ira.stewart@srs.gov
jansen.simmons@srs.gov
kerri.crawford@srs.gov
verne.mooneyhan@srs.gov

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