EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
SCL000175	ND0072125	Savannah River Site	

Form 1 NPDES

EPA

U.S. Environmental Protection Agency
Application for NPDES Permit to Discharge Wastewater

GENERAL INFORMATION

SECTION 1. ACTIVITIES REQUIRING AN NPDES PERMIT (40 CFR 122.21(f) and (f)(1))

Activities Requiring an NPDES Permit

1.1 Applicants *Not Required* to Submit Form 1

1.1.1	Is the facility a new or existing **publicly owned treatment works**? If yes, STOP. Do NOT complete Form 1. Complete Form 2A. ☑ No	1.1.2	Is the facility a new or existing **treatment works treating domestic sewage**? If yes, STOP. Do NOT complete Form 1. Complete Form 2S. ☑ No

1.2 Applicants *Required* to Submit Form 1

1.2.1	Is the facility a **concentrated animal feeding operation** or a **concentrated aquatic animal production facility?** ☐ Yes ➔ Complete Form 1 ***and*** Form 2B. ☑ No	1.2.2	Is the facility an **existing** manufacturing, commercial, mining, or silvicultural **facility** that **is currently discharging process wastewater**? ☑ Yes ➔ Complete Form 1 ***and*** Form 2C. ☐ No
1.2.3	Is the facility a **new** manufacturing, commercial, mining, or silvicultural **facility** that has **not yet commenced to discharge**? ☐ Yes ➔ Complete Form 1 ***and*** Form 2D. ☑ No	1.2.4	Is the facility a **new or existing** manufacturing, commercial, mining, or silvicultural **facility** that **discharges only nonprocess wastewater**? ☐ Yes ➔ Complete Form 1 ***and*** Form 2E. ☑ No
1.2.5	Is the facility a **new or existing facility** whose discharge is composed entirely of **stormwater associated with industrial activity** or whose discharge is composed of **both stormwater and non-stormwater**? ☐ Yes ➔ Complete Form 1 ***and*** Form 2F unless exempted by 40 CFR 122.26(b)(14)(x) or (b)(15). ☑ No		

SECTION 2. NAME, MAILING ADDRESS, AND LOCATION (40 CFR 122.21(f)(2))

Name, Mailing Address, and Location

2.1 Facility Name

Savannah River Site

2.2 EPA Identification Number

SC0000175

2.3 Facility Contact

Name (first and last)	Title	Phone number
Robert Backer	NPDES Subject Matter Expert	803 507-0865

Email address
robert.backer@srs.gov

2.4 Facility Mailing Address

Street or P.O. box

City or town	State	ZIP code
Aiken	SC	29808

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
SCL000175	ND0072125	Savannah River Site	

Name, Mailing Address, and Location Continued

2.5 **Facility Location**

Street, route number, or other specific identifier
Savannah River Site

County name	County code (if known)	
Aiken, Barnwell		
City or town	**State**	**ZIP code**
Aiken	SC	29808

SECTION 3. SIC AND NAICS CODES (40 CFR 122.21(f)(3))

SIC and NAICS Codes

3.1	**SIC Code(s)**	**Description** (optional)
	2819	

3.2	**NAICS Code(s)**	**Description** (optional)
	325180	

SECTION 4. OPERATOR INFORMATION (40 CFR 122.21(f)(4))

Operator Information

4.1 **Name of Operator**

Savannah River Nuclear Solutions

4.2 Is the name you listed in Item 4.1 also the owner?

☐ Yes ☑ No

4.3 **Operator Status**

☐ Public—federal ☐ Public—state ☐ Other public (specify)_____

☑ Private ☐ Other (specify) _____

4.4 **Phone Number of Operator**

803 952-6719

Operator Information Continued

4.5 **Operator Address**

Street or P.O. Box
Savannah River Site

City or town	State	ZIP code
Aiken	SC	29808

Email address of operator
robert.backer@srs.gov

SECTION 5. INDIAN LAND (40 CFR 122.21(f)(5))

Indian Land

5.1 Is the facility located on Indian Land?

☐ Yes ☑ No

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
SCL000175	ND0072125	Savannah River Site	

SECTION 6. EXISTING ENVIRONMENTAL PERMITS (40 CFR 122.21(f)(6))

Existing Environmental Permits

6.1 **Existing Environmental Permits** (check all that apply and print or type the corresponding permit number for each)

☑ NPDES (discharges to surface water) SC0000175, SCR000000	☑ RCRA (hazardous wastes) SC1890008989	☑ UIC (underground injection of fluids) SCHE03020019
☑ PSD (air emissions) TV-0080-0041	☐ Nonattainment program (CAA)	☐ NESHAPs (CAA)
☐ Ocean dumping (MPRSA)	☐ Dredge or fill (CWA Section 404)	☑ Other (specify) SCG160000 Pesticide,

SECTION 7. MAP (40 CFR 122.21(f)(7))

Map

7.1 Have you attached a topographic map containing all required information to this application? (See instructions for specific requirements.)

☑ Yes ☐ No ☐ CAFO—Not Applicable (See requirements in Form 2B.)

SECTION 8. NATURE OF BUSINESS (40 CFR 122.21(f)(8))

Nature of Business

8.1 Describe the nature of your business.

USDOE Nuclear Facility

SECTION 9. COOLING WATER INTAKE STRUCTURES (40 CFR 122.21(f)(9))

Cooling Water Intake Structures

9.1 Does your facility use cooling water?

☑ Yes ☐ No ➔ SKIP to Item 10.1.

9.2 Identify the source of cooling water. (Note that facilities that use a cooling water intake structure as described at 40 CFR 125, Subparts I and J may have additional application requirements at 40 CFR 122.21(r). Consult with your NPDES permitting authority to determine what specific information needs to be submitted and when.)

Savannah River, Ground Water Wells

SECTION 10. VARIANCE REQUESTS (40 CFR 122.21(f)(10))

Variance Requests

10.1 Do you intend to request or renew one or more of the variances authorized at 40 CFR 122.21(m)? (Check all that apply. Consult with your NPDES permitting authority to determine what information needs to be submitted and when.)

- ☐ Fundamentally different factors (CWA Section 301(n))
- ☐ Water quality related effluent limitations (CWA Section 302(b)(2))
- ☐ Non-conventional pollutants (CWA Section 301(c) and (g))
- ☐ Thermal discharges (CWA Section 316(a))
- ☑ Not applicable

EPA Identification Number	NPDES Permit Number	Facility Name	Form Approved 03/05/19 OMB No. 2040-0004
SCL000175	ND0072125	Savannah River Site	

SECTION 11. CHECKLIST AND CERTIFICATION STATEMENT (40 CFR 122.22(a) and (d))

Checklist and Certification Statement

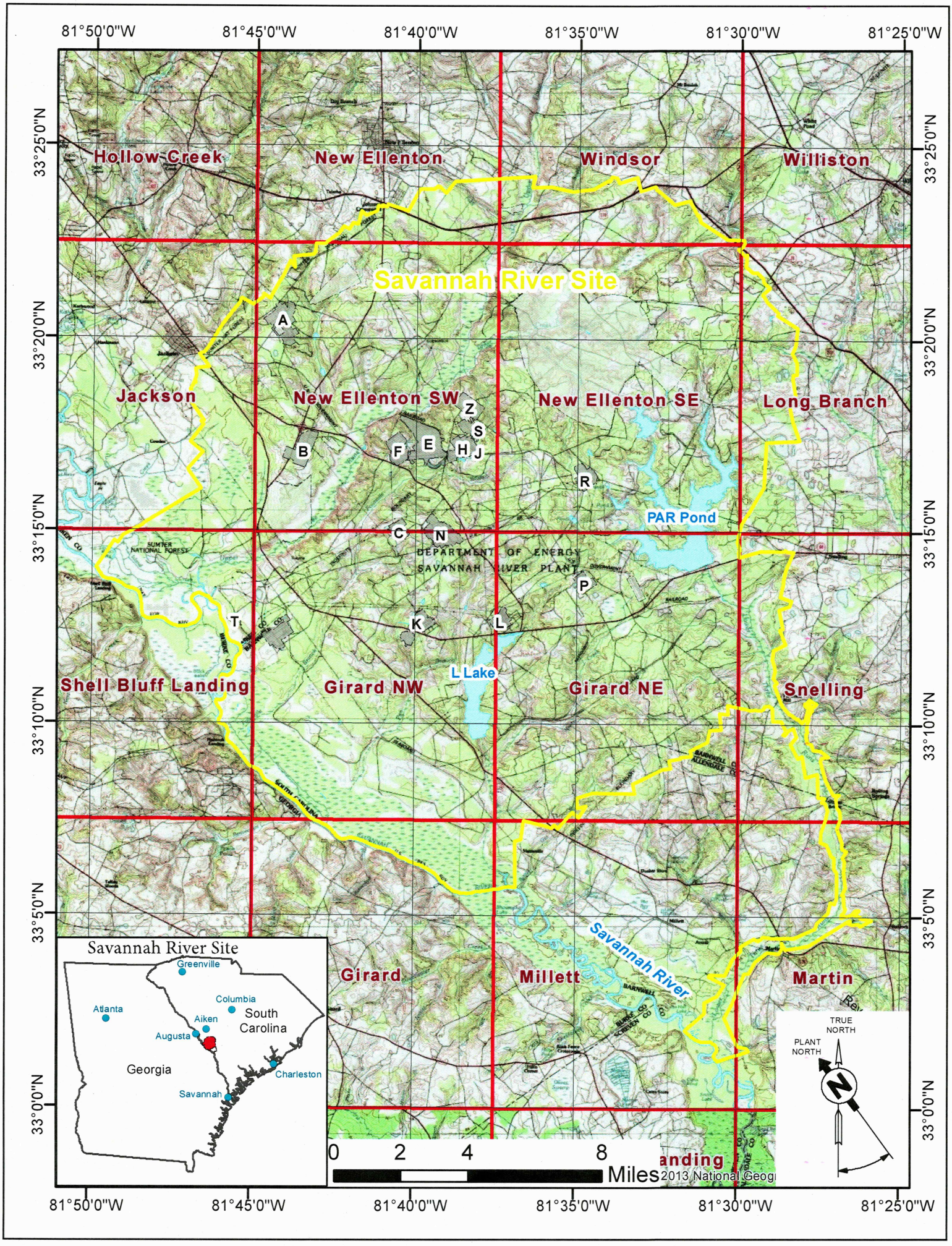
11.1 In Column 1 below, mark the sections of Form 1 that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing to alert the permitting authority. Note that not all applicants are required to provide attachments.

Column 1	Column 2
☑ Section 1: Activities Requiring an NPDES Permit	☐ w/ attachments
☑ Section 2: Name, Mailing Address, and Location	☐ w/ attachments
☑ Section 3: SIC Codes	☐ w/ attachments
☑ Section 4: Operator Information	☐ w/ attachments
☑ Section 5: Indian Land	☐ w/ attachments
☑ Section 6: Existing Environmental Permits	☐ w/ attachments
☑ Section 7: Map	☑ w/ topographic map ☐ w/ additional attachments
☑ Section 8: Nature of Business	☐ w/ attachments
☑ Section 9: Cooling Water Intake Structures	☐ w/ attachments
☑ Section 10: Variance Requests	☐ w/ attachments
☑ Section 11: Checklist and Certification Statement	☐ w/ attachments

11.2 **Certification Statement**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name (print or type first and last name)	Official title
Michael D. Budney	Savannah River Site Manager
Signature	**Date signed**
	5/26/2020


81°50'0"W
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81°35'0"W
81°30'0"W
81°25'0"W
33°25'0"N
33°20'0"N
33°15'0"N
33°10'0"N
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33°0'0"N
Hollow Creek
New Ellenton
Windsor
Williston
Savannah River Site
Jackson
New Ellenton SW
New Ellenton SE
Long Branch
A
B
C
E
F
H
J
K
L
N
P
R
S
T
Z
PAR Pond
L Lake
SUMTER NATIONAL FOREST
DEPARTMENT OF ENERGY
SAVANNAH RIVER PLANT
Shell Bluff Landing
Girard NW
Girard NE
Snelling
Girard
Millett
Martin
Savannah River
SOUTH CAROLINA
GEORGIA
BARNWELL CO
BURKE CO
Savannah River Site
Greenville
Columbia
Atlanta
Aiken
South Carolina
Augusta
Georgia
Charleston
Savannah
0 2 4 8
Miles
2013 National Geog
TRUE NORTH
PLANT NORTH
N

Savannah River
NUCLEAR SOLUTIONS
FLUOR • NEWPORT NEWS NUCLEAR • HONEYWELL

May 4, 2020

SRNS-J2200-2020-00079
RSM Track Number: 10854

NPDES/ND Permit Administration Section
Bureau of Water
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Dear Administrators:

SAVANNAH RIVER SITE (SRS), ND0072125 PERMIT RENEWAL 2020 APPLICATION FORM AND ATTACHMENTS

Please find the enclosed Sludge Land Disposal Permit ND0072125 renewal application, Sludge disposal supplement, and the Savannah River Site Annual Biosolids Report for 2019.

If you have any questions concerning the submittal, please contact Robert Backer at (803) 952-6719 or by email at Robert.backer@srs.gov.

Sincerely,

A. J. Meyer, Manager
Environmental Compliance

ajm/rmb

Enclosure:
Permit Renewal Application sent by registered mail (7017 2680 0000 6472 7151)

ec w/enclosure:
T. R. Fuss, Aiken Environmental Affairs Office
B.A. Green, ND Permitting, Columbia BOW

bec w/enclosure:
J. G. DeMass, DOE-SR, 730-B
G. S. Hoover, DOE-SR, 730-B
R. M. Backer, SRNS, 730-4B
C. L. Bergren, SRNS, 730-4B
T. P. Eddy, SRNS, 730-4B
R. F. Keenan, SRNS, 704-C
V. E. Millings, III, SRNS, 730-4B
W. S. Seigler, SRNS, 704-25G
D.M.Shepherd , SRNS, 707-C
T.O. Oliver, SRNS, 730-4B
M.E. Wright, SRNS, 703-47A
Records Administration

bcc w/enclosure:
NPDES Permit File, R.M. Backer, 730-4B

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF WATER
Application for a Land Disposal (No Discharge or ND) Permit
(Please Type or Print)

I. Project Name: Savannah River Site Biosolids Land Application Site

II. County: Aiken and Barnwell

III. Owners Name: United States Department of Energy (DOE)

Address: Savannah River Site

City, State, & Zip: Aiken, South Carolina, 29808

Area Code & Telephone #: (803) 952-6719

IV. Project Status: Proposed ( ) or if existing: Permit No.: ND00 72125
Expansion ( ) or
Renewal (X)

V. Project Description: Renewal of Land Application System Permit ND0072125. The Central Sanitary Wastewater Treatment Facility biologically treats sanitary and industrial wastewater producing air dried biosolids which are applied to Pine Tree (23) acreage for benefical reuse.

VI. Location of the Wastewater Treatment Plant and Land Disposal Site(s):

a) Location of the wastewater treatment plant (include a map):

Latitude: 33 degrees 15' 31" Longitude: -81 degrees 41' 35"

Location Description: The Central Sanitary Wastewater Treatment Facility is located on Burma Rd. 1.6 miles west from the intersection of C-Road and Burma Road.

b) Location and size (in acres) of the land disposal site(s):

Site 1 Size: 23 acres

Latitude: 33 degrees 50' 35" Longitude: -81degrees 42' 53.54"

Location Description (include a map): The application site is on 3 Road just east of Burma Road

Site 2 Size: _____ acres

Latitude: _____ Longitude: _____

Location Description (include a map): _____

VII. Description of Waste to be Land Applied: Air dried sludge (Biosolids) from sanitary wastewater of plant employees and industrial wastewater from various plants.

VIII. Volume or Quantity of Waste to be Land Applied:

Site 1: 28.4 dry metric tons Site 2: NA

IX. Frequency of Application:

Site 1: biennial Site 2: NA

X. Site Application Rate(s):

Site 1: <75 lbs PAN/acre/year Site 2: NA

XI. Ground Water Quality Monitoring: Proposed ( ) or Existing (X)
Number of Monitoring Wells (proposed or existing):

Site 1: 3 Site 2:

XII. Residual Solids: Complete the attached "Sludge Disposal Supplement."

XIII. Hazardous Substances: Does your discharge contain or is it possible for your discharge to contain one or more of the following substances added as a result of your operations, activities, or processes: ammonia, cyanide, aluminum, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc, phenols, oil and grease, chlorine (residual) or any other substance that could be considered hazardous? Yes or No (Yes)

If yes, please list substance, concentration, and source:

1. See Attachment - Section XIII. Hazardous Substances

2.

I certify that I am familiar with the information contained in this application and that to the best of my knowledge and belief such information is true, complete, and accurate.

Owner's Name Printed: MICHAEL D BUDNEY

Owner's Signature:

Title: Manager, Savannah River Operations Office **Date:** 4/7/2020

***** See attached instructions for completing this application. *****

For reapplication of an expiring ND permit, send the application package to the NPDES/ND Permit Administration Section at the following address:

Department of Health & Environmental Control
Bureau of Water
2600 Bull Street
Columbia, SC 29201

For preliminary engineering reports (PER) on a new WWTP, an expansion of an existing WWTP, or a commercial sludge or septage disposal site, send the application package with the PER to the appropriate Section Manager at the above address.

Attachment – Section XIII. Hazardous Substances

1. ammonia 39 mg/kg Source is applied sludge
2. cadmium 2.1 mg/kg Source is applied sludge
3. copper 1,800 mg/kg Source is applied sludge
4. lead 27 mg/kg Source is applied sludge
5. nickel 97 mg/kg Source is applied sludge
6. selenium 6.3 mg/kg Source is applied sludge
7. zinc 1,600 mg/kg Source is applied sludge

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health and Environmental Control

BUREAU OF WATER
SLUDGE DISPOSAL SUPPLEMENT FOR NPDES AND ND PERMIT APPLICATIONS

Facility Name: United States Department of Energy

Permit Number: SC00 00175 (leave blank for a new facility)

or ND00 72125

Please check your proposed or current sludge disposal procedure:

I. Existing Facilities:

___ Lagoon or other facility with no routine sludge disposal. Please attach a letter that addresses the approximate schedule for sludge removal and address the anticipated disposal method (note that the proposed sludge disposal method must be approved by the Department prior to initiation).

___ Sludge disposal at another wastewater treatment facility. Attached is a recent letter of acceptance dated_____. This letter must include the NPDES or ND number of the treatment facility accepting the sludge for disposal. If no previous SCDHEC approval has been granted on the disposal method, then please include a detailed report on the existing sludge disposal method. See the attached requirements for Sludge Disposal Report A. If a previous SCDHEC approval has been granted, then include a recent analysis that shows the non-hazardous nature of the sludge or a signed statement that the sludge characteristics have not changes since the last analysis.

___ Sludge disposal at a landfill. If the landfill is SWAIP (special waste) approved, an recent acceptance letter from the landfill is acceptable. If the landfill is not SWAIP approved, attached is SCDHEC Solid and Hazardous Waste approval dated _____, or other SCDHEC approval dated _____. If no previous approval has been granted on the disposal method, then please include a detailed report on the existing sludge disposal method. See the attached requirements for Sludge Disposal Report B.

X Sludge disposal by Beneficial Use of Sludge. Attached is SCDHEC approval letter or program approval dated 12/01/2010. If no previous approval has been granted on the disposal method, then please include a detailed report on the existing sludge disposal method. See the attached requirements for Sludge Disposal Report C.

II. Proposed Facilities:

___ Lagoon or other facility with no routine sludge disposal. Please attach a letter that addresses the approximate schedule for sludge removal and address the anticipated disposal method (note that the proposed sludge disposal method must be approved by the Department prior to initiation).

___ Sludge disposal at another wastewater treatment facility. Please include a detailed report on the proposed sludge disposal method. See the attached requirements for Sludge Disposal Report A.

___ Sludge disposal at a landfill. Please include a detailed report on the proposed sludge disposal method. See the attached requirements for Sludge Disposal Report B.

___ Sludge disposal by Beneficial Use. Please include a detailed report on the proposed sludge disposal method. See the attached requirements for Sludge Disposal Report C.

Send this form and the appropriate disposal report (if applicable) with your NPDES or ND permit application.

ALSO SEE ATTACHED INSTRUCTIONS

D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health
and Environmental Control

Land Application Permit

This Permit Certifies That

United States Department of Energy

has been granted permission to land apply sludge from a facility located at

Savannah River Site
Aiken, SC
Aiken and Barnwell Counties

to

One sludge land application site totaling approximately 23 acres

in accordance with limitations, monitoring requirements and other conditions set forth herein. This permit is issued in accordance with the provisions of the Pollution Control Act of South Carolina (S.C. Code Sections 48-1-10 *et seq.*, 1976) and Regulation 61-9.

Jeffrey P. deBessonet, P.E.

Jeffrey P. deBessonet, P.E., Director
Water Facilities Permitting Division

Issue Date: November 15, 2010

Effective Date: December 1, 2010

Modification Date: July 6, 2015

Expiration Date: September 30, 2020

Permit No.: **ND0072125**

SLUDGE DISPOSAL BY LAND APPLICATION OR OTHER BENEFICIAL USE:

REQUIREMENT FOR A SLUDGE REPORT C

1. Sludge Generator
    1. Name: US DOE
    2. Address: Savannah River Site, Aiken, SC, 29808
    3. Phone: 803 952-6719
    4. County: Aiken, Barnwell
    5. NPDES or ND Permit Number: ND0072125
    6. Plant capacity (MGD): 1.01 MGD
    7. Amount of sludge generated per year (dry weight tons): 14.2 dry weight tons per year
    8. Size, description, and location of sludge storage: approximately 168 cubic yards, storage shed, at the Central Sanitary Wastewater Treatment Facility.
    9. Amount of stockpiled sludge and sludge age: 168 cubic yards of sludge, one to two years
    10. The sanitary wastewater treatment package plants at SRS are extended aeration, activated sludge plants. Each package plant has an equalization basin, aeration basin, two clarifiers, a sludge holding tank, ultraviolet light disinfection channel, stilling basin, and outfall weir. The Centralized Sanitary Wastewater Treatment Facility (CSWTF) began operation in May 1995. This facility treats sanitary and industrial wastewater from nine production areas. The CSWTF consists of a bar screen, centrifugal grit removal system, equalization basin, three oxidation ditches with intra-channel clarifiers, an ultraviolet light disinfection system, a cascade aeration system, a gravity sludge thickener, and four sludge drying beds. Each package plant's sludge holding tank is sized to hold 10% of its treatment plant's daily capacity, which in addition to the gravity sludge thickener at the CSWTF provides approximately 59,900 gallons of liquid sludge storage volume. Diffused air is used for odor control and aerobic digestion in the sludge holding tanks and the gravity sludge thickener. Once the sludge holding tank at each package plant is full and sufficiently thickened, the sludge is removed via a pump truck and transferred to the gravity sludge thickener at the CSWTF. This sludge is thickened further and applied to drying beds for dewatering. Cationic polymer is added as a dewatering aid as the sludge is pumped from the thickener to the drying beds. Sludge dewaters and air dries on the drying beds for at least 90 days, and then is removed to a covered sludge storage area. Once every year or two, a manure spreader is used to haul the air-dried sludge from the CSWTF to the forested land application site where sludge is land applied in accordance with permit requirements. Approximately 40 cubic yards of sludge are currently stored on the drying beds or in the storage sheds at the CSWTF.
    11. Current method of sludge disposal: Land application to pine forest.
    12. Letter of acceptance: ND0072125
    13. Amount of sludge transported: 14.2 dry tons per year, 28.4 dry tons per application
    14. Estimated percent solids and total liquid volume: 59,900 gallons, 21.8% dry solids

2. Sludge Analysis Information
    1. TCLP toxicity test: see attached lab result
    2. Name of certified lab conducting analysis: Pace Analytical Services, LLC (formerly Shealy Environmental Services, Inc.) 106 Vantage Point Dr., West Columbia, SC 29172, (803) 791-9000, www.pacelabs.com
    3. Other compounds required by NPDES permit in effluent to treatment plant: not required.
    4. Method used to determine the reliability of sludge composition: Sample analysis performed by SC DHEC certified laboratory using DHEC required Standard Methods per Laboratory certification. Please see attached laboratory report.
    5. Total organic nitrogen: 64,961 mg/kg
    6. Total inorganic nitrogen: 2,439 mg/kg
    7. Ammonia nitrogen: 39 mg/kg
    8. pH: 5.80 (SU)
    9. Calcium Carbonate: NA
    10. Percent total solids: 21.8%
    11. Total arsenic: 0.0 mg/kg
    12. Total cadmium: 2.1 mg/kg
    13. Total copper: 1,800 mg/kg
    14. Total lead: 27 mg/kg
    15. Total mercury: 0.0 mg/kg
    16. Total molybdenum: 16 mg/kg
    17. Total nickel: 97 mg/kg
    18. Total selenium: 6.3 mg/kg
    19. Total zinc: 1,600 mg/kg

3. Application of Sludge
    1. Description of method of transportation to the proposed land site: a manure spreader is used to haul the air-dried sludge from the CSWTF to the forested land application site.
    2. Approximate time of year or schedule for the sludge application and how it relates to crop planting and/or harvesting: Sludge is land applied to pine tree forested lot, once every two years during the permit limit season of April through October. No harvesting will be conducted during lifetime of sludge application to specific area.
    3. Description of application method: Dried sludge is applied using a John Deere Model 874 fertilizer spreader, capacity 8.4 cubic yards.
    4. Name of contractor applying sludge: self
    5. Type of equipment used to spread the sludge: John Deere Model 874 fertilizer spreader.

4. Application Site Information
    1. General
        a. Name, address, and signature of landowner: United States Department of Energy, Savannah River Site, Aiken, SC 29808
        b. Name, address and party managing the site: Savannah River Nuclear Solutions, Savannah River Site, Aiken, SC 29808
        c. Approximate schedule for sludge application: Approximately every two years, Permit required March through October

d. Previous sludge application amounts covered under Permit #ND0072125: in 2017, 158.8 cubic yards (43.9 dry metric tons) of dried sludge was land applied.
e. Additional soil additives applied on site: NONE
f. Description of method to control access to the site: fence, Site police guarded gate, Site police patrol.
g. Method of odor control: the dewatered sludge was allowed to air dry on the drying beds for at least 90 days
h. Letter from each county stating that the proposed land application activity is consistent with the county solid waste management plan: NA

2. Site Description
   Scale Maps indicating:
   a. Site location
   b. Slope and drainage characteristics including the surrounding land
   c. Adjacent land usage and locations of inhabited dwellings: Forest, no dwellings
   d. All water supply wells within 1000 feet: None
   e. Adjacent surface water bodies: ¾ mile
   f. Sludge disposal boundaries
   g. Location of existing groundwater monitoring wells
   h. Private Roads, public roads, and rights-of-way.
   i. Certification of site suitability

3. Site Monitoring Plan Proposed method of site monitoring indicating:
   a. Groundwater monitoring well locations: southeast of land application site, see map
   b. Soil monitoring methods and locations. See map, 12-inch depth core sample from each of the 20 rows and a core sample adjacent to the rows outside of the application area. Composite the 10 front rows, composite the back 10 rows and composite the background from outside the application area, soil cores.
   c. Surface water sampling methods and locations: NA
   d. Proposed parameters and frequency of sampling groundwater, and soil: the soil is to be sampled before every sludge land application event (approx. every two years) for permit required Ammonia-Nitrogen (NH_3-N).
   e. Metals testing: NA for the application site
   f. Monitoring schedule to insure that soil pH will remain in agronomic ranges during land application: Once before each application.

4. Sludge Application Plan
   a. Typical crops to be grown and crop management plan: Pine trees, with land application.
   b. Sludge application rate: 1.7 dry tons per acre
   c. Total organic nitrogen: 64,961 mg/kg
   d. Total inorganic nitrogen: 2,439 mg/kg
   e. Ammonia nitrogen: 39 mg/kg
   f. pH: 5.80 su
   g. Calcium Carbonate Equivalency: NA
   h. Percent total solids: 21.8%
   i. Total arsenic: 0.0 mg/kg
   j. Total cadmium: 201 mg/kg

k. Total copper: 1,800 mg/kg
l. Total lead: 27 mg/kg
m. Total mercury: 0.0 mg/kg
n. Total molybdenum 16 mg/kg
o. Total nickel: 97 mg/kg
p. Total selenium 6.3 mg/kg
q. Total zinc 1,600 mg/kg
r. Formula and calculations used to determine plant available nitrogen and application rate: based on sludge analysis (0.5 k_{vol}(Vol. Factor Table) X 0.08 NH_3N lb/ton) + 4.4 NO_3-N lb/ton + 0.3 k_{min} (Min. Factor Table) X 130 TKN lb/ton – 0.08 NH_3- N lb/ton = 43.4 lb/ton PAN.
s. Estimated hydraulic loading rate: NA
t. Certification of crop management plan:

E. Distribution & Marketing or other Alternative Programs: NA

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF WATER

LOCATION SUPPLEMENT FOR ND AND NPDES PERMIT APPLICATIONS

FACILITY: Savannah River Site DATE: 04-06-2020

ITEM 1: Please give a short description of the plant location, if the address is not a specific location. Example: Plant is located at the interchange of Interstate 26 and U.S. Highway #1.

The Central Sanitary Wastewater Treatment Facility is located on Burma Rd., 1.6 miles west from the intersection of C-Road and Burma Road. The land application site is located on Road 3 just east of Burma Road.

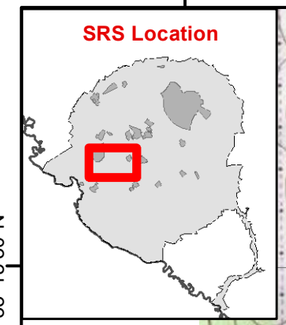
ITEM 2: Please give a description of the location of the discharge point into the receiving stream using some landmark as a reference point, i.e., bridge, stream, road junction, the plant itself, etc. Give the direction and the distance in feet from the reference point. Example: Discharge #001 is into Johnny Creek approximately 300 feet directly behind the plant. Discharge #002 is into Doris Creek 150 feet downstream from U.S. Highway #30 bridge.

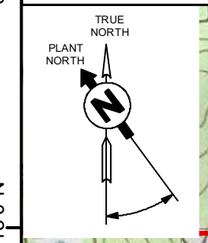
The Biosolids (dried sludge) is land applied to a pine tree forest and is not discharged to a receiving stream.

ITEM 3: Please locate the discharge on a U.S. Geological Survey 7 1/2 minute quad sheet (or a 15 minute quad if a 7 1/2 quad is not available for the area). The entire quad sheet need not be submitted. An 8 1/2 by 11 inch photocopy of the applicable portion of the map is sufficient. The quad sheet name must be provided on the copy submitted to the Department. USGS Maps are available at the SC Dept. Of Natural Resources/Map Division, 2221 Devine Street, Suite 222, Columbia, SC 29205. Phone number is 734-9108.

RETURN TO: SCDHEC
Bureau of Water
NPDES Administration
2600 Bull Street
Columbia, SC 29201

Savannah River Site - G-10 Outfall and G-10 Land Application Site





Central Sanitary Wastewater Treatment Facility

G-10 Outfall

New Ellenton SW

Girard NW

C Area

Substation

Burma Road

Road 3

G-10 Land Application Site

AIKEN CO
BARNWELL CO

Upper Three Runs

Fourmile Branch

BOUNDARY

BM Δ 154

81°44'30"W 81°44'0"W 81°43'30"W 81°43'0"W 81°42'30"W 81°42'0"W 81°41'30"W 81°41'0"W 81°40'30"W 81°40'0"W

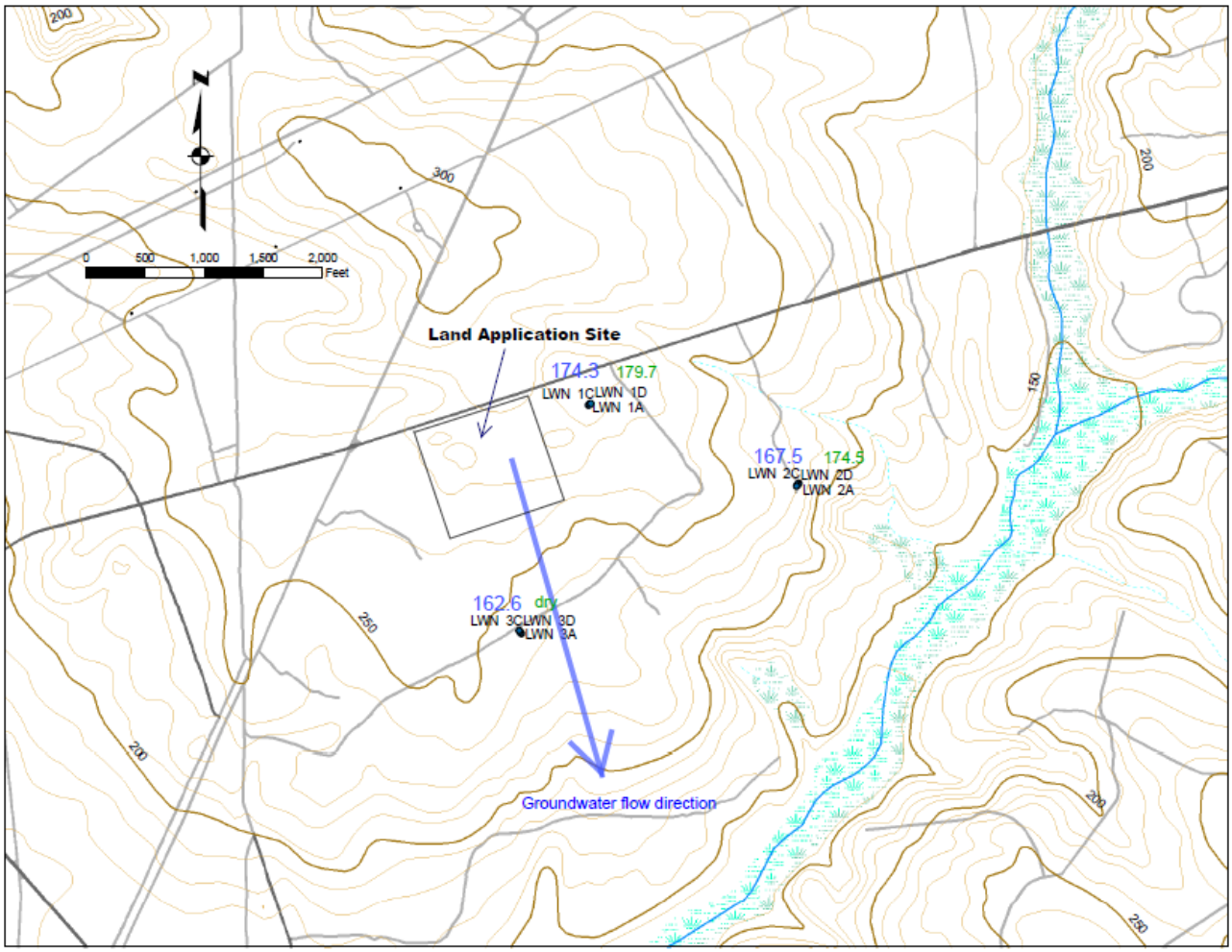
33°15'30"N 33°15'0"N 33°14'30"N 33°14'0"N 33°13'30"N

G-10 Land Application Site

USGS 24k Topo Map Boundaries

0 0.25 0.5 1 Miles

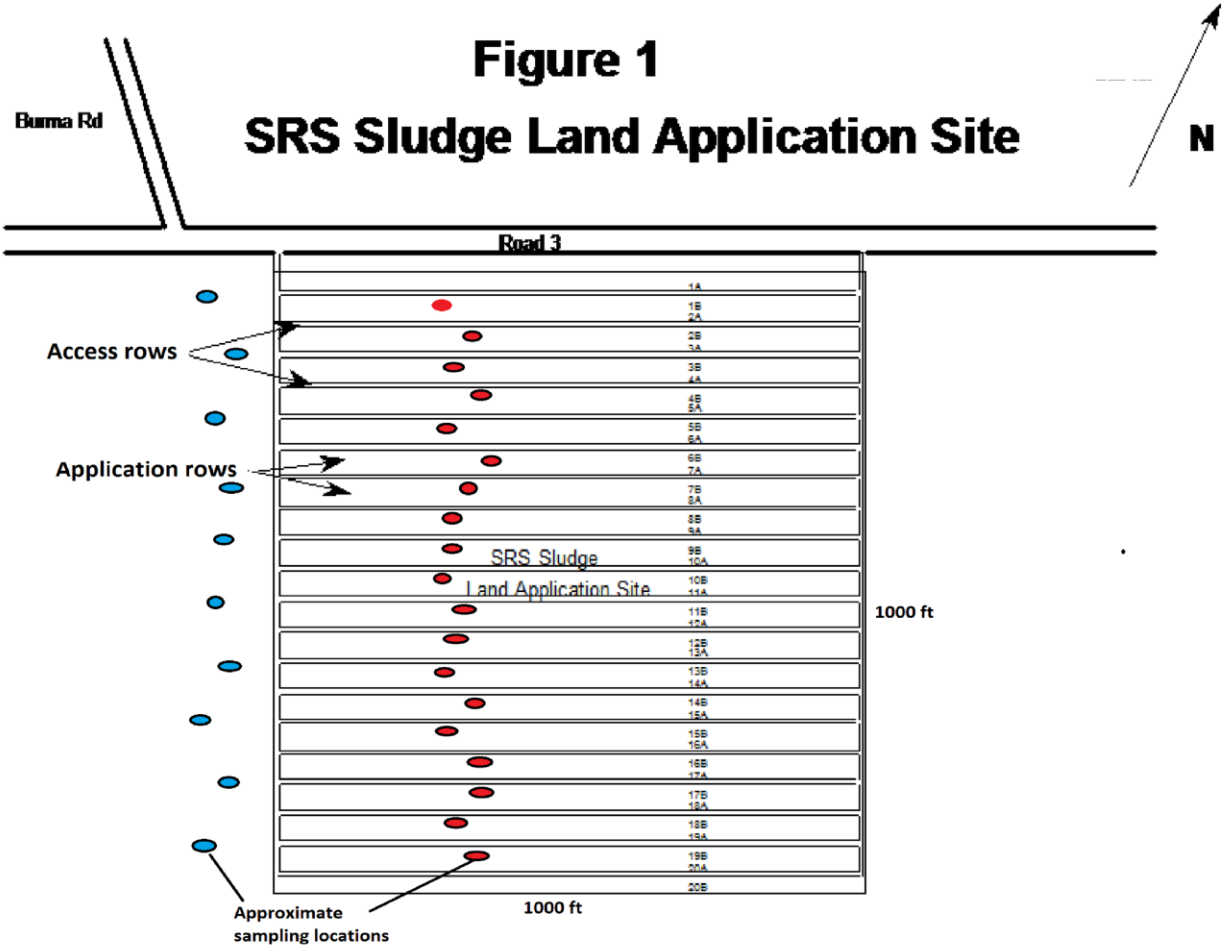
ND0072125 Sample Well Location Map



SRS Sludge Land Application Site Soil Sampling Plan Map

Background sample locations are designated by blue colored sample location icons.

Land Application Site sample locations are designated by red colored sample location icons.



Savannah River
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February 13, 2020

SRNS-J2200-2020-00045
RSM Track #: 10708

Ms. Melanie D. Hindman
Compliance Assurance Division
Bureau of Water
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

SAVANNAH RIVER SITE ANNUAL BIOSOLIDS REPORT FOR 2019

Ref: Permit #ND0072125

Ms. Melanie Hindman:

The Savannah River Site (SRS) applied biosolids during calendar year 2019. Please see accompanying information to report relative to pollutant land applied concentration or quantity. This letter is being provided to meet the regulatory requirement, to transmit an annual report to the SCDHEC.

SRS is located near Aiken, South Carolina, and operates under a biosolids land application "No Discharge" permit (#ND0072125) issued on November 15, 2010, modified July 6, 2015, by the South Carolina Department of Health and Environmental Control (SCDHEC). This permit incorporates requirements found in 40 CFR Part 503. Land application to pine forests at SRS began in July 1994 and is ongoing. The program continues to be a very beneficial reuse program. Biosolids are being stored on a covered pad for continued pathogen reduction and eventual land application planned in 2021.

If you have any questions regarding this information or any other aspect of biosolids land application at SRS, please feel free to contact Rob Backer at (803) 952-6719 or by e-mail at Robert.backer@srs.gov.

Sincerely,

Amy J. Meyer, Manager
Environmental Compliance
Environmental Compliance & Area Completion Projects

ajm/rb:

Enclosure: 2019 Biosolids Annual Program Report *

Savannah River
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ec: *electronic copy
J.G. DeMass, DOE-SR*
D. W. Stoudemire SCDHEC-Columbia*
M. D. Hindman SCDHEC-Columbia*

2019
Biosolids Annual Program Report
Savannah River Site
ND0072125

February 11, 2020

Savannah River Nuclear Solutions, LLC

U. S. Department of Energy
Savannah River Site

Table of Contents

Introduction

Savannah River Nuclear Solutions, LLC currently operates two package sanitary/industrial wastewater treatment plants (SWTPs) and one Central Sanitary Wastewater Treatment Facility (CSWTF), which treat the sanitary and industrial wastewater generated by the employee population and nine industrial plants of the Savannah River Site (SRS). Permit #ND0072125 for forested land application was issued to SRS by the South Carolina Department of Health and Environmental Control (SCDHEC) in the year 2000 and was renewed (with revisions) for an additional ten years in 2010. It was revised on 7/6/15 to include preparation of the SCDHEC Sludge Annual Agronomic Loading Rate Worksheet, and the collection of groundwater samples every five years (sampled in 2019). This permit expires 9/30/2020.

Treatment Process

The sanitary wastewater treatment package plants at SRS are extended aeration, activated sludge plants. Each package plant has an equalization basin, aeration basin, two clarifiers, a sludge holding tank, ultraviolet light disinfection channel, stilling basin, and outfall weir.

The Centralized Sanitary Wastewater Treatment Facility (CSWTF) began operation in May 1995. This facility treats sanitary and industrial wastewater from nine production areas. The CSWTF consists of a bar screen, centrifugal grit removal system, equalization basin, three oxidation ditches with intra-channel clarifiers, an ultraviolet light disinfection system, a cascade aeration system, a gravity sludge thickener, and four sludge drying beds.

Each package plant's sludge holding tank is sized to hold 10% of its treatment plant's daily capacity, which in addition to the gravity sludge thickener at the CSWTF provides approximately 59,900 gallons of liquid sludge storage volume. Diffused air is used for odor control and aerobic digestion in the sludge holding tanks and the gravity sludge thickener. Once the sludge holding tank at each package plant is full and sufficiently thickened, the sludge is removed via a pump truck and transferred to the gravity sludge thickener at the CSWTF.

This sludge is thickened further and applied to drying beds for dewatering. Cationic polymer is added as a dewatering aid as the sludge is pumped from the thickener to the drying beds. Sludge dewaters and air dries on the drying beds for at least 90 days, and then is removed to a covered sludge storage area. Once every year or two, a manure spreader is used to haul the air-dried sludge from the CSWTF to the forested land application site where sludge is land applied in accordance with permit requirements. Approximately 40 cubic yards of sludge are currently stored on the drying beds or in the storage sheds at the CSWTF.

Pathogen/Vector Attraction Reduction

Vector attraction reduction is accomplished by aerobic digestion. The Specific Oxygen Uptake Rate (SOUR) test is periodically performed per EPA/625/R-92/013 requirements at the CSWTF laboratory to verify the sludge is sufficiently stabilized for land application. The average $SOUR_{20}$ result for 2019 was 0.60 mg/g/hr, which is below the EPA limit of 1.5 mg/g/hr (40 CFR Part 503).

Process to Significantly Reduce Pathogens (PSRP) standards were met since the dewatered sludge was allowed to air dry on the drying beds for at least ninety (90) days, or the geometric mean of the fecal coliform concentration in seven samples collected before each application was below 2,000,000 colonies per gram of dry weight, as shown in the table below.

Sludge Application	Sampling Date	Fecal Coliform (col./g dry weight)	Regulatory Limit (col./g dry weight)
2019	4/25/19	31,948	2,000,000

Further precautions to protect against the spread of pathogens are taken in addition to maintaining very low pathogen levels in the sludge. The sludge land application site is a forested area on the SRS, which is protected from public access. Employee access to the sludge land application site is administratively restricted. No food crops are grown on this site, and no grazing animals are present. No turf is harvested, however pine trees may be harvested from this site in the future, after sludge applications have ceased.

Soil Samples and Allowable Nitrogen Loading Rates

As required by the permit, soil samples were collected from the front ten rows, from the back ten rows, and from an area adjacent to the site were sludge has never been applied (the background sample). Each sample consisted of ten corings from surface to twelve inches depth from random locations, mixed to form a composite sample analyzed for Ammonia-Nitrogen (NH_3-N). Results are provided below.

Front 10 Rows NH_3-N (mg/kg)	Back 10 Rows NH_3-N (mg/kg)	Background NH_3-N (mg/kg)	Avg. Background NH_3-N* (mg/kg)
0.0	0.0	0.0	11

* The average of the last four background results is subtracted from front ten row and back ten row results when determining allowable loading rates.

Allowable nitrogen loading rates were determined by completing Sludge Annual Agronomic Loading Rate Worksheets for the front ten rows and the back ten rows. The allowable loading rate for both the front ten rows and the back ten rows was less than 75 lbs PAN/acre/yr (the ND0072125 permit limit), which equals 1.6 dry tons/acre.

Pollutant Concentrations

Sludge samples were collected prior to application and were analyzed for pollutants of concern. All analytical results were below the regulatory limits (see table below).

Pollutant	SRS Sludge Concentration 2019 Application mg/kg	Ceiling Concentration Limits mg/kg
Arsenic	0.0	75
Cadmium	2.1	85
Copper	1,800	4,300
Lead	27	840
Mercury	0.0	57
Molybdenum	16	75
Nickel	97	420
Selenium	6.3	100
Zinc	1,600	7,500
Ammonia Nitrogen	39	MR**
Inorganic Nitrogen	2,439	MR
Nitrate Nitrogen	2,200	MR
Total Kjeldahl Nitrogen	65,000	MR
PAN*	21,798	MR
pH	5.80 (S.U.)	MR
Phosphorus	21,000	MR
Potassium	2800	MR
Dry Solids	21.8% (220,899 mg/L)	MR
Volatile Solids (% volatile in dry solids)	73% (159,140 mg/kg)	MR

*PAN – Plant Available Nitrogen
**MR – Monitor and Report

RCRA Status

Sludge samples were analyzed using Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedures (TCLP) for volatiles and semi-volatiles. All values were below detection limits. See Attachment 5.

Sludge Application Rates

Approximately 168.0 cubic yards of dewatered sludge was applied to the land application site in October 2019 (28.4 dry metric tons). There were no other sludge applications in 2019.

Maps of the land application site are attached, showing the site location and row numbers listed below. (Attachments 1 and 2)

Application Dates	Loads Applied Per Half Row*	Half Row Numbers
10/01/19 – 10/02/19	0.5	1A,1B,2A,2B,3A,3B,4A,4B,5A,5B,6A 6B,7A,7B,8A,8B,9A,9B,10A,1OB,11A,11 B,12A,12B,13A,13B,14A,14B,15A,15B,1 6A,16B,17A,17B,18A,18B,19A,19B,20A, 20B

* 1 load equals 8.4 cubic yards. Half rows (1B, 2A, etc.) are 0.5 acres each.

Pollutant Loading Rates

All pollutant loading rates were below SCDHEC cumulative loading limits, as shown in the table below. The PAN loading rate was less than 75 lbs/acre/year, as required by the permit. Supporting calculations are attached.

Pollutant	2019 Loading Rate (lbs/acre/yr)	Loading Rate Limit (lbs/acre/yr)	Cumulative Loading (kg/ha)	Cumulative Loading Limit (kg/ha)
Arsenic	-	-	2.6	41
Cadmium	-	-	0.8	39
Copper	-	-	194.1	1500
Lead	-	-	42.9	300
Mercury	-	-	0.5	17
Nickel	-	-	11.8	420
Selenium	-	-	2.7	100
Zinc	-	-	472.5	2800
Ammonia Nitrogen	0	MR	-	-
Inorganic Nitrogen	8	MR	-	-
Nitrate Nitrogen	7	MR	-	-
TKN	203	MR	-	-
PAN	68	75	-	-
Phosphorus	66	MR	-	-
Potassium	9	MR	-	-

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed:

Amy J. Meyer, Manager Environmental Compliance

2/11/2020
Date

Attachments

SRS Sanitary Wastewater Systems Map

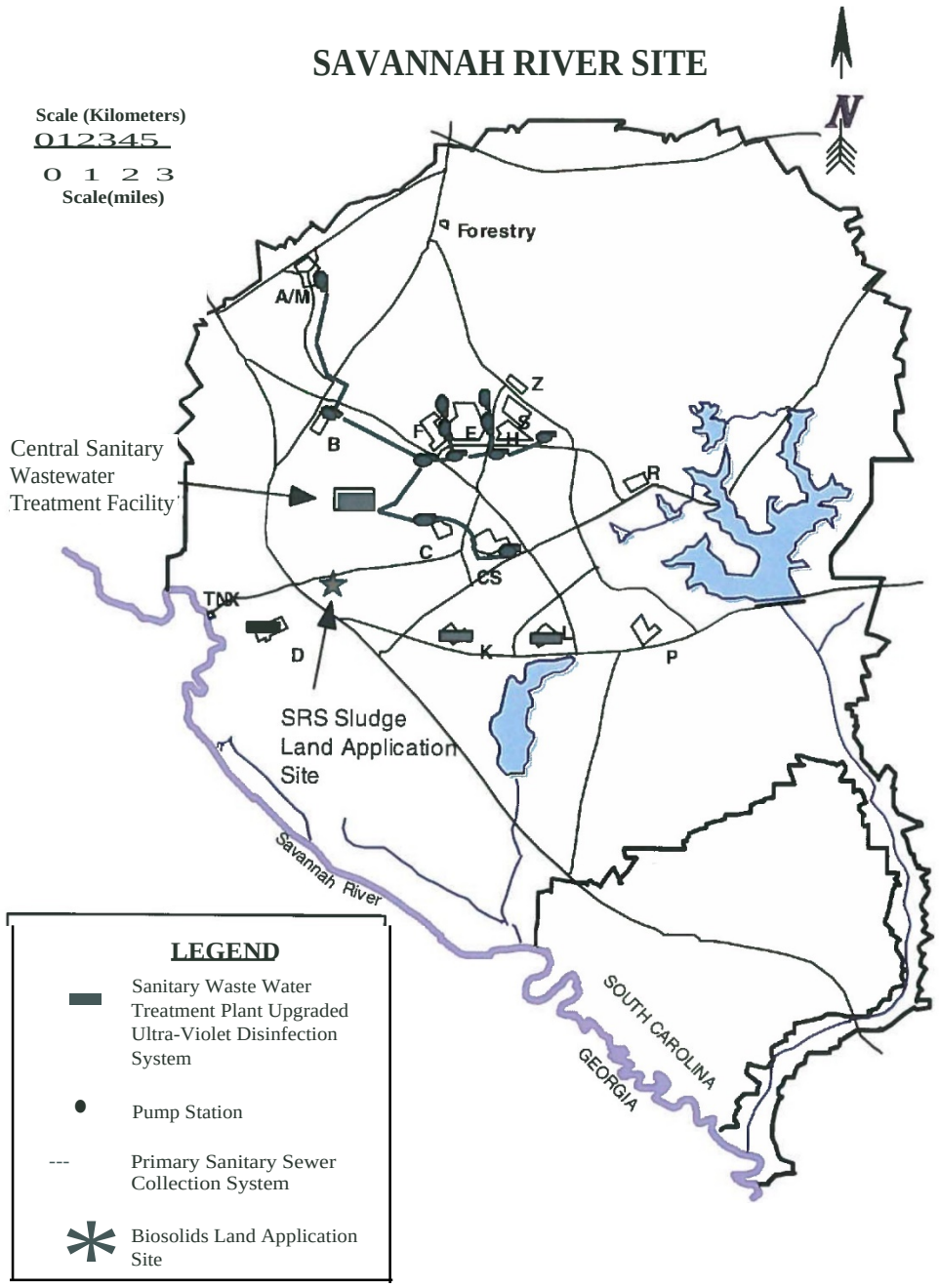
SRS Sludge Land Application Site Map

Sludge Annual Agronomic Loading Rate Worksheets

Land Application Site Loading Calculations

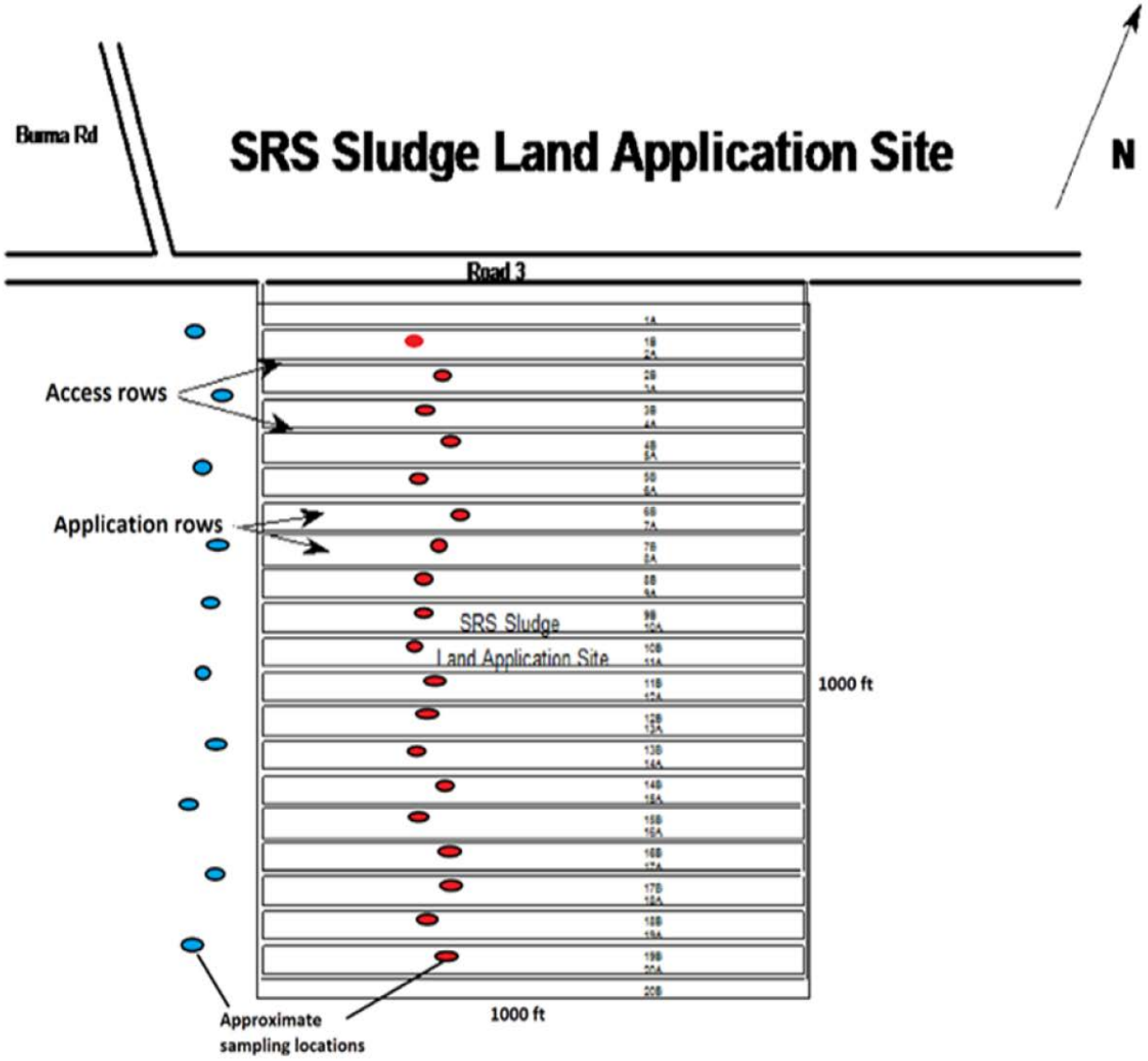
Laboratory Results

Attachment 1



SRS Sanitary Wastewater Treatment and Collection

Attachment 2



SLUDGE ANNUAL AGRONOMIC LOADING RATE WORKSHEET

(To be completed prior to each application)

Permit No: ND0072125
Field Front 10 Rows
Calendar Year 2019
Site SRS

Crop Pine Trees
*Yield Goal _____

1. Total crop nitrogen requirement
(*From the Plant Nutrient Element Management of Agricultural Soils in South Carolina by Clemson University 2007*) — 1 **100** lb/acre **(not to exceed 240 lbs/acre)**

2. Nitrogen provided from other sources either added to or mineralized in the soil

a. ***Nitrogen contributions from previous years activities***

1. N from previous legume crop
(Clemson University 2007 Guide- Part IV.2.a "...When a non-legume crop follows a legume crop, the nitrogen fertilizer recommendation is reduced by 25 pounds nitrogen per acre...") — **0** lb/acre

2. Estimate of mineralized organic N from previous sludge applications
(Calculating Mineralized Organic Nitrogen from Previous Sludge Application Worksheet) — **9.15** lb/acre

3. Estimate of available residual N from **historical** manure applications
(Manure Application Supplemental Worksheet) — **0** lb/acre

Sum of **(a.1. + a.2. + a.3.)** — 2a **9.15** lb/acre
(Use greater of 2b or 2c below)

b. ***Nitrogen contributions from current year's activities***

1. Estimate of available N from **current** manure application
(Manure Application Supplemental Worksheet) — **0** lb/acre

2. N from chemical fertilizers — **0** lb/acre

3. N from other sources (e.g. food processing waste) — **0** lb/acre

4. PAN from current calendar year's sludge application (if applicable) — **0** lb/acre

Sum of **(b.1. + b.2. + b.3. + b.4.)** — 2b **0** lb/acre
(OR)

c. Current Available Nitrogen in Soil (from soil test results) — 2c **0** lb/acre
(Current Available Nitrogen in Soil Worksheet).
If current available nitrogen in soil is greater than 240 lbs PAN/acre, then no land application can occur.)

Plant available nitrogen from other sources **[2a + (Greater of 2b or 2c)]** — 2 **9.15** lb/acre

3. Adjusted crop nitrogen requirement **(Subtract 2 from 1)** — 3 **90.85** lb/acre
↳ 750 Permit Limit

4. Total plant available nitrogen (PAN) from sludge (based on sludge analysis)
(**0.5** k_{vol} *(Vol Factor Table)* x **0.08** NH_3-N lb/ton) + **4.4** NO_3-N lb/ton +
0.3 k_{min} *(Min Factor Table)* x (**130** TKN lb/ton − **0.08** NH_3-N lb/ton) = — 4 **43.4** lb/ton PAN
(lb/ton = mg/kg / 500) from Analysis

5. **Calculate the agronomic loading rate for sludge application (Divide 3 by 4)** — 5 **1.7** dry tons/acre

6. **Calculate amount of sludge to be applied**

43.4 lbs PAN/ton (item 4) x **1.7** dry tons/acre (item 5) = **73.8** lbs PAN/acre **(not to exceed 240 lbs PAN/acre)**

1.7 dry tons/acre (item 5) ÷ **21.4** % solids x 100 = **7.8** **wet tons/acre**

_____ wet tons/acre x 2,000 lb/ton ÷ 8.5 lbs/gallon = _____ **gallons/acre**

6 **7.8**
☑ **wet tons/acre or** ☐ **gallons/acre**

*See Application Requirements to Meet Agronomic Rate on following page.

Application Requirements to Meet Agronomic Rate

1. The timing of sludge application should be relevant to the time when selected crops will uptake nitrogen.

2. Splitting applications of the total allowable loading (from worksheet) should be performed consistent with typical crop management practices.

3. Crop removal (e.g., hay harvesting, yield goal) shall be integral to site management.

This document and associated attachments were prepared under my direction or supervision:

Print Name: David Shepherd Title: ECA

Signature: [signature] Date: 5/29/19

CALCULATING MINERALIZED ORGANIC NITROGEN FROM PREVIOUS SLUDGE APPLICATION WORKSHEET

Permit No. ND0072125
Field Front 10 Rows
Site SRS

Calendar Year 2019

2016 4th Year					
1. Year	2. Starting Org- N (lbs/acre)	3. Mineralization Factor (K_{min} decimal) (*Min. Factors Table*)	4. Mineralized Org- N in lbs/acre (PAN) (Column 2 times 3)	5. Org- N Remaining (lbs/acre) (Column 2 minus 4)	6. Final Mineralized Org- N in Lbs/acre PAN (from Column 4)
0-1 (first application Year ____)	0	0	0	0	
1-2 (Year ____)	0	0	0	0	
2-3 (Year ____)	0	0	0	0	
3-4 (Year ____)	0	0	0	0	0
2017 3rd Year					
0-1 (first application Year ____)	192.2	0.30	57.66	134.54	
1-2 (Year ____)	134.54	0.15	20.18	114.36	
2-3 (Year ____)	114.36	0.08	9.15	105.21	9.15
2018 2nd Year					
0-1 (first application Year ____)	0	0	0	0	
1-2 (Year ____)	0	0	0	0	0
Sum of Final Mineralized Org-N in lbs/acre PAN					9.15

Additional Information

(Phosphorus Potassium - Nutrient management information for the farmer)

P_2O_5 and K_2O fertilizer equivalent in sludge (based on sludge analysis)

a	_____	% P in sludge	x	2.29	=	_____	% P_2O_5 in sludge
	_____	% P_2O_5	x	2,000 lb/ton	=	_____	lb/ton P_2O_5
b	_____	% K in sludge	x	1.2	=	_____	% K_2O in sludge
	_____	% K_2O	x	2,000 lb/ton	=	_____	lb/ton K_2O

VOLATILIZATION AND MINERALIZATION FACTORS TABLES

Volatilization Factors (K_{vol}) Table [1]

If sludge application method is:	Factor K_{vol} is:
Surface spreading	.50
Surface spreading followed by incorporation	.75
Subsurface injection	1.0

Mineralization Factors (K_{min}) Table [2]

	% of Org-N Mineralized from				
Time after Sludge Application (Year)	Unstabilized Primary and Waste Activated Sewage Sludge	Alkaline stabilized Sludge	Aerobically Digested Sludge	Anaerobically Digested Sludge	Composted Sludge
0-1	40	30	30	20	10
1-2	20	15	15	10	5
2-3	10	8	8	5	-*
3-4	5	4	4	-*	-*

[1] Percentage of Ammonia/Ammonium Nitrogen applied that volatilizes after application

[2] Percentage of Org-N mineralized during the time interval shown

*Once the mineralization rate becomes less than 3% (i.e., 0.03), no net gain of PAN above that normally obtained from the mineralization of soil organic matter is typically expected. Therefore, additional credits for residual sludge N do not need to be calculated.

MANURE APPLICATION
SUPPLEMENTAL WORKSHEET

Permit No. ND0072125
Field Front 10 Rows
Site SRS

Calendar Year 2019

AVAILABLE RESIDUAL NITROGEN FROM HISTORICAL MANURE APPLICATIONS

	Residual N Availability (lb/acre)*
Rarely received manure in the past (<2 out of 5 years)	0
Frequently received manure (2-3 out of 5 years)	10
Continuously received manure (4-5 out of 5 years)	20

*The value from the table above should be recorded in item 2.a.3. on the Sludge Annual Agronomic Loading Rate Worksheet of this document.

AVAILABLE NITROGEN FROM CURRENT MANURE APPLICATIONS

(Includes Previous Fall and Winter Applications For Spring Grain or Summer Annuals)

Expected Manure Application Rate ✓ tons/acre or 1,000 gallons/acre	Nitrogen lb/ton or lb/1,000 gal *(Clemson University Cooperative Extension Service or manure analysis)*	Available Nitrogen lb/acre**
0	0	0

Enter the expected manure application rate in either tons/acre or 1000 gallons/acre and enter the nitrogen in lbs/ton or lb/1000 gallons. Calculate the Available Nitrogen in lbs/acre.

** This manure loading value goes in item 2.b.1 on the Sludge Annual Agronomic Loading Rate Worksheet of this document.

CURRENT AVAILABLE NITROGEN IN SOIL WORKSHEET

Permit No. ND0072125
Field Front 10 rows
Site SRS

Calendar Year 2019

Soil Sampling Procedure:
(1) The number of samples should be either a minimum of one composite sample per field (as described below) or no less than one composite sample per twenty (20) cropland acres.
(2) Samples should be collected from the surface to 12 inch depth. A minimum of ten (10) discrete samples for each composite should be taken at randomly selected locations within the field. Soil samples collected must be mixed together forming a single composite sample.
(3) If one field is being managed differently (e.g. multiple crops are being grown), then a single composite soil sample from each managed area (with at least one per twenty (20) cropland acres) should be provided.
(4) The soil scoop for any composite soil test should be approximately the same volume.
(5) Changes to the soils sampling plan based on specific requested circumstances may be approved.

SOIL DEPTH (inches)	*AVAILABLE NITROGEN* FROM SOIL ANALYSIS (ppm)*	*AVAILABLE NITROGEN IN LBS/ACRE (lbs/acre = ppm x 4)***	*EXCEEDS 240 LBS/ACRE? (Yes/No) If yes, then no land application*
0-12	* 0	* 0	**No**

**Current Available N from Soil will include NO_3-N (Nitrate Nitrogen) and NH_3- N (Ammonia Ammonium Nitrogen). See example below.*

*** This value should be reported in item 2c on the Sludge Annual Agronomic Loading Rate Worksheet*

* Ammonia results were ND

EXAMPLE SOIL ANALYSIS CONVERSION (ppm to lbs/acre):

CALCULATION: Available N (lb/acre) = [NO_3-N (Nitrate Nitrogen) concentration (ppm) + Ammonia/Ammonium –N (NH_3- N)] x 4

(Assuming 2 million pounds of dry soil in upper 6 in/acre)

EXAMPLE:

Depth	*NO_3-N + NH_3-N*
0-12 inch	*4 ppm*

N in 0-12 inch increment = 4 x 4 = 16 lb N/acre (Total N in soil profile)

SLUDGE ANNUAL AGRONOMIC LOADING RATE WORKSHEET

(To be completed prior to each application)

Permit No: ND0072125
Field Back 10 Rows
Calendar Year 2019
Site SRS

Crop Pine Trees
*Yield Goal _____

1. Total crop nitrogen requirement
(*From the Plant Nutrient Element Management of Agricultural Soils in South Carolina by Clemson University 2007*) — 1 **100** lb/acre **(not to exceed 240 lbs/acre)**

2. Nitrogen provided from other sources either added to or mineralized in the soil

a. ***Nitrogen contributions from previous years activities***

1 N from previous legume crop
(Clemson University 2007 Guide- Part IV.2.a "...When a non-legume crop follows a legume crop, the nitrogen fertilizer recommendation is reduced by 25 pounds nitrogen per acre...") — **0** lb/acre

2 Estimate of mineralized organic N from previous sludge applications
(Calculating Mineralized Organic Nitrogen from Previous Sludge Application Worksheet) — **9.15** lb/acre

3 Estimate of available residual N from **historical** manure applications
(Manure Application Supplemental Worksheet.) — **0** lb/acre

Sum of **(a.1. + a.2. + a.3.)** — 2a **9.15** lb/acre
(Use greater of 2b or 2c below)

b. ***Nitrogen contributions from current year's activities***

1 Estimate of available N from **current** manure application
(Manure Application Supplemental Worksheet.) — **0** lb/acre

2 N from chemical fertilizers — **0** lb/acre

3 N from other sources (e.g. food processing waste) — **0** lb/acre

4 PAN from current calendar year's sludge application (if applicable) — **0** lb/acre

Sum of **(b.1. + b.2. + b.3. + b.4.)** — 2b **0** lb/acre
(OR)

c Current Available Nitrogen in Soil (from soil test results) — 2c **0** lb/acre
(Current Available Nitrogen in Soil Worksheet).
If current available nitrogen in soil is greater than 240 lbs PAN/acre, then no land application can occur.)

Plant available nitrogen from other sources **[2a + (Greater of 2b or 2c)]** — 2 **9.15** lb/acre

3. Adjusted crop nitrogen requirement **(Subtract 2 from 1)** — 3 **90.85** lb/acre
→ 75.0 Permit Limit

4. Total plant available nitrogen (PAN) from sludge (based on sludge analysis)
(**0.5** k_{vol} (*Vol Factor Table*) x **0.08** NH_3-N lb/ton) + **4.4** NO_3-N lb/ton +
0.3 k_{min} (*Min Factor Table*) x (**130** TKN lb/ton − **0.08** NH_3-N lb/ton) = — 4 **43.4** lb/ton PAN

5. **Calculate the agronomic loading rate for sludge application (Divide 3 by 4)** — 5 **1.7** dry tons/acre

6. **Calculate amount of sludge to be applied**

43.4 lbs PAN/ton (item 4) x **1.7** dry tons/acre (item 5) = **73.8** lbs PAN/acre **(not to exceed 240 lbs PAN/acre)**

1.7 dry tons/acre (item 5) ÷ **21.8** % solids x 100 = **7.8** **wet tons/acre**

_____ wet tons/acre x 2,000 lb/ton ÷ 8.5 lbs/gallon = _____ **gallons/acre**

6 **7.8**
☒ **wet tons/acre** or ☐ **gallons/acre**

*See Application Requirements to Meet Agronomic Rate on following page.

Application Requirements to Meet Agronomic Rate

1. The timing of sludge application should be relevant to the time when selected crops will uptake nitrogen.

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3. Crop removal (e.g., hay harvesting, yield goal) shall be integral to site management.

This document and associated attachments were prepared under my direction or supervision:

Print Name: David Shepherd Title: ECA

Signature: Date: 05/29/19

CALCULATING MINERALIZED ORGANIC NITROGEN FROM PREVIOUS SLUDGE APPLICATION WORKSHEET

Permit No. ND0072125
Field Back 10 Rows
Site SRS

Calendar Year 2019

2016 4th Year					
1. Year	2. Starting Org- N (lbs/acre)	3. Mineralization Factor (K_{min} decimal) (*Min. Factors Table*)	4. Mineralized Org- N in lbs/acre (PAN) (Column 2 times 3)	5. Org- N Remaining (lbs/acre) (Column 2 minus 4)	6. Final Mineralized Org- N in Lbs/acre PAN (from Column 4)
0-1 (first application Year ____)	0	0	0	0	
1-2 (Year ____)	0	0	0	0	
2-3 (Year ____)	0	0	0	0	
3-4 (Year ____)	0	0	0	0	0
2017 3rd Year					
0-1 (first application Year ____)	192.2	0.30	57.66	134.54	
1-2 (Year ____)	134.54	0.15	20.18	114.36	
2-3 (Year ____)	114.36	0.08	9.15	105.21	9.15
2018 2nd Year					
0-1 (first application Year ____)	0	0	0	0	
1-2 (Year ____)	0	0	0	0	0
Sum of Final Mineralized Org-N in lbs/acre PAN					9.15

Additional Information

(Phosphorus Potassium : Nutrient management information for the farmer)

P_2O_5 and K_2O fertilizer equivalent in sludge (based on sludge analysis)

a	_____	% P in sludge	x	2.29	=	_____	% P_2O_5 in sludge
	_____	% P_2O_5	x	2,000 lb/ton	=	_____	lb/ton P_2O_5
b	_____	% K in sludge	x	1.2	=	_____	% K_2O in sludge
	_____	% K_2O	x	2,000 lb/ton	=	_____	lb/ton K_2O

VOLATILIZATION AND MINERALIZATION FACTORS TABLES

Volatilization Factors (K_{vol}) Table [1]

If sludge application method is:	Factor K_{vol} is:
Surface spreading	.50
Surface spreading followed by incorporation	.75
Subsurface injection	1.0

Mineralization Factors (K_{min}) Table [2]

	% of Org-N Mineralized from				
Time after Sludge Application (Year)	Unstabilized Primary and Waste Activated Sewage Sludge	Alkaline stabilized Sludge	Aerobically Digested Sludge	Anaerobically Digested Sludge	Composted Sludge
0-1	40	30	30	20	10
1-2	20	15	15	10	5
2-3	10	8	8	5	_*
3-4	5	4	4	_*	_*

[1] Percentage of Ammonia/Ammonium Nitrogen applied that volatilizes after application

[2] Percentage of Org-N mineralized during the time interval shown

*Once the mineralization rate becomes less than 3% (i.e., 0.03), no net gain of PAN above that normally obtained from the mineralization of soil organic matter is typically expected. Therefore, additional credits for residual sludge N do not need to be calculated.

MANURE APPLICATION
SUPPLEMENTAL WORKSHEET

Permit No. NI0072125
Field Back 10 Rows
Site SRS

Calendar Year 2019

AVAILABLE RESIDUAL NITROGEN FROM HISTORICAL MANURE APPLICATIONS

	Residual N Availability (lb/acre)*
Rarely received manure in the past (<2 out of 5 years)	0
Frequently received manure (2-3 out of 5 years)	10
Continuously received manure (4-5 out of 5 years)	20

*The value from the table above should be recorded in item 2.a.3. on the Sludge Annual Agronomic Loading Rate Worksheet of this document.

AVAILABLE NITROGEN FROM CURRENT MANURE APPLICATIONS

(*Includes Previous Fall and Winter Applications For Spring Grain or Summer Annuals*)

Expected Manure Application Rate ☐ tons/acre or ☐ 1,000 gallons/acre	Nitrogen lb/ton or lb/1,000 gal (*Clemson University Cooperative Extension Service or manure analysis*)	Available Nitrogen lb/acre**
0	0	0

Enter the expected manure application rate in either tons/acre or 1000 gallons/acre and enter the nitrogen in lbs/ton or lb/1000 gallons. Calculate the Available Nitrogen in lbs/acre.
** This manure loading value goes in item 2.b.1 on the Sludge Annual Agronomic Loading Rate Worksheet of this document.

CURRENT AVAILABLE NITROGEN IN SOIL WORKSHEET

Permit No. ND0072125
Field Back 10 Rows
Site SRS

Calendar Year 2019

Soil Sampling Procedure:
(1) The number of samples should be either a minimum of one composite sample per field (as described below) or no less than one composite sample per twenty (20) cropland acres.
(2) Samples should be collected from the surface to 12 inch depth. A minimum of ten (10) discrete samples for each composite should be taken at randomly selected locations within the field. Soil samples collected must be mixed together forming a single composite sample.
(3) If one field is being managed differently (e.g. multiple crops are being grown), then a single composite soil sample from each managed area (with at least one per twenty (20) cropland acres) should be provided.
(4) The soil scoop for any composite soil test should be approximately the same volume.
(5) Changes to the soils sampling plan based on specific requested circumstances may be approved.

SOIL DEPTH (inches)	*AVAILABLE NITROGEN* FROM SOIL ANALYSIS (ppm)*	*AVAILABLE NITROGEN IN LBS/ACRE (lbs/acre = ppm x 4)***	*EXCEEDS 240 LBS/ACRE? (Yes/No) If yes, then no land application*
0-12	*0	*0	**No**

**Current Available N from Soil will include NO_3-N (Nitrate Nitrogen) and NH_4- N (Ammonia Ammonium Nitrogen). See example below.*

*** This value should be reported in item 2c on the Sludge Annual Agronomic Loading Rate Worksheet*

* Ammonia analysis was ND

EXAMPLE SOIL ANALYSIS CONVERSION (ppm to lbs/acre):

CALCULATION: *Available N (lb/acre) = [NO_3-N (Nitrate Nitrogen) concentration (ppm) + Ammonia/Ammonium –N (NH_4- N)] x 4*
(Assuming 2 million pounds of dry soil in upper 6 in/acre)

EXAMPLE:

Depth	***NO_3-N + NH_4-N***
0-12 inch	*4 ppm*

N in 0-12 inch increment = 4 x 4 = 16 lb N/acre (Total N in soil profile)

Sludge Land Application Site Calculations

2019 Sludge Land Application Site Calculations

Sludge & Soil Results from Shealy Lab Reports Dated 4/27/19 - 5/4/19

Note: The calcs below use the max loading rate per half row, when more than one loading rate ap Note: Shealy Lab results are in mg/kg, which equals lbs per 10^6 lbs.

Instructions: In the blue cells, enter lab results. Verify results are OK. Enter max PAN* from DHEC Loading Rate Worksheet. Enter sludge loads, verify PAN is below ma

	Max Loads Per Half Row		Total Loads Applied		Total Cubic Yds Applied		Dry Tons Applied		Metric Dry Tons		Max Dry Tons/Acre		Max Cubic Yds/Acre	
Front 10 Rows:	0.5	Front 10:	10.0	Front 10:	84.0	Front 10:	15.6	Front 10:	14.2	Front 10:	1.6	Front 10:	8.4
Back 10 Rows:	0.5	Back 10:	10.0	Back 10:	84.0	Back 10:	15.6	Back 10:	14.2	Back 10:	1.6	Back 10:	8.4

Density: 1.0133 % Volatile Solids: 73 (% of dry solids that are volatile)

% Dry Solids: 21.8 Total solids (mg/l): 220,899 Vol. solids (mg/kg): 159,140

Lbs Org-N Applied Per Acre:

Front 10 Rows: 195.6

Back 10 Rows: 195.6

Avg Background-N: 11

(mg/kg) | Front 10: 0.0 | Back 10: 17 | Backgrnd: 1.2 | 24

Pollutant Concent.	Arsenic	Cadmium	Copper	Lead	Mercury	Molybden.	Nickel	Selenium	Zinc	Fecal Coliform* (col/gram dry weight)			
(mg/kg)	0	2.1	1800	27	0.0	16	97	6.3	1600	69787	13415	1263	30147
Reg Limit (mg/kg)	75	85	4300	840	57	75	420	100	7500	78135	93071	131074	
Results OK?	OK	OK	OK	OK	OK	OK	OK	OK	OK			OK	

Geometric Mean: 31949

Regulatory Limit: 2,000,000

* ND = 1 col/gr per NPDES protocol

Cumul. Loading Rates	Arsenic	Cadmium	Copper	Lead	Mercury	Molybden.	Nickel	Selenium	Zinc
Max 2019 (kg/ha):	0.00	0.01	6.31	0.09	0.00	0.06	0.34	0.02	5.60
2000-2019 (kg/ha):	2.6	0.8	194.1	42.9	0.5	4.0	11.8	2.7	472.5
Reg Limit (kg/ha):	41	39	1500	300	17	N/A	420	100	2800
Results OK?	OK	OK	OK	OK	OK	OK	OK	OK	OK

Soil-N	Front 10	Back 10	Backgrnd
Results:	0	0	0.0

Max Loading Rates*	Amm-N	Inorg-N**	Nitrate-N	NO_3-NO_2-N	TKN	Org-N***	Phosp.	Potassium	PAN-Front	PAN-Back
Concentration (mg/kg)	39	2439	2200	2400	65000	62561	21000	2800	21707.8	21707.8
(lbs/acre/yr)	0	8	7	8	203	196	66	9	68	68
Reg Rqmnt (lbs/acre/yr)	MR	MR	MR	N/A	MR	N/A	MR	MR	75	75
Results OK?									OK	OK

PAN = Plant Available Nitrogen

Cell k29 and l29 reg limits are from Line 3 of the Sludge Annual Agronomic Loading Rate Worksheet

*Max Loading Rate (lbs/acre/yr) = max loads / half row x 1 half row / 0.5 acre x 8.4 yd^3 / load x 27 ft^3 / yd^3 x density (lbs wet sludge) / (lbs water) x 62.4 lbs water / ft^3 x % solids (lbs dry solids) / (lbs wet sludge) x lab result as lbs / 10^6 lbs dry solids

**Inorg-N = Amm-N + N ***Org-N = TKN - Inorg-N MR = Monitor and Report PAN = NO_3-N + 0.5(Amm-N) + 0.3(TKN-Amm-N)

18-'19 SOUR* Results:	1.04	0.77	0.62	0.35	0.53	Avg SOUR: 0.66 mg/g/hr

*SOUR = Specific Oxygen Uptake Rate

2019 Land Applications

Half Rows:	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B
Loads:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Half Rows:	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B
Loads:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Half Rows:	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B	18A	18B
Loads:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Half Rows:	19A	19B	20A	20B								
Loads:	0.5	0.5	0.5	0.5								

Conversion Factors

1 ton = 0.9078 metric tons

1 lb/acre = 1.1208 kg/hectare

1 mg/kg = 1 lb/10^6lbs

1 acre = 0.4047 hectare

Calculation Peer Review

I have reviewed the above calculations and have verified they are correct

Brian Kuntz 5/30/19

Brian Kuntz, Sanitary Wastewater Systems Design Authority Engineer

2/3/2020 Final review for DHEC/EPA sludge reports

Date

Assumptions

1) Spreader Capacity = 8.4 yd^3 per load
   Basis: John Deere specification sheet for model 874 spreader
2) STREAM Team fills spreader full each time (level with top of spreader)
   Basis: Spreader is mounded in middle, but overall equals full (level with top)
3) Half rows are 0.5 acres each.
   Basis: Engineering report to DHEC and site dimensions.
4) Laboratory results are based on oven dried weight of sludge
   Basis: Shealy lab report, and verbal confirmation from Shealy.

SHEALY ENVIRONMENTAL SERVICES, INC.

Report of Analysis

Savannah River Nuclear Solutions
PO Box 616
Building 735-B
Aiken, SC 29808
Attention: Siobhan Kitchen

Project Name: SHE-19-2-SLUDGE

Project Number: SHE19115D 0000351395

Lot Number:**UD25066**

Date Completed:05/07/2019

05/08/2019 5:03 PM
Approved and released by:
Project Manager: Grant Wilton

The electronic signature above is the equivalent of a handwritten signature.

Shealy Environmental Services, Inc.
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

Case Narrative
Savannah River Nuclear Solutions
Lot Number: UD25066

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved NELAC standards, the Shealy Environmental Services, Inc. ("Shealy") Quality Assurance Management Plan (QAMP), standard operating procedures (SOPs), and Shealy policies. Any exceptions to the NELAC standards, the QAMP, SOPs or policies are qualified on the results page or discussed below.

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W" qualifier

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

Sample Summary
Savannah River Nuclear Solutions
Lot Number: UD25066
Project Name: SHE-19-2-SLUDGE
Project Number: SHE19115D 0000351395

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	SLUDGE-000018	Solid	04/25/2019 0927	04/25/2019
002	SLUDGE-000019	Solid	04/25/2019 0911	04/25/2019
003	SLUDGE-000020	Solid	04/25/2019 0911	04/25/2019
004	SLUDGE-000021	Solid	04/25/2019 0911	04/25/2019
005	SLUDGE-000022	Solid	04/25/2019 0911	04/25/2019
006	SLUDGE-000023	Solid	04/25/2019 0911	04/25/2019
007	SLUDGE-000024	Solid	04/25/2019 0911	04/25/2019

(7 samples)

Inorganic non-metals

Client: **Savannah River Nuclear Solutions**		Laboratory ID: **UD25066-001**	
Description: **SLUDGE-000018**		Matrix: **Solid**	
Date Sampled: **04/25/2019 0927**	Project Name: **SHE-19-2-SLUDGE**	% Solids: **38.7**	**04/27/2019 0052**
Date Received: **04/25/2019**	Project Number: **SHE19115D 0000351395**		

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(Fecal Colifo) SM 9222 D-2006	1	04/27/2019 0015	MDD	04/25/2019 2054	

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Fecal Coliform-MF		**SM 9222 D-**	**69787**		**20**	**col/g**	**1**

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	Q = Surrogate failure
ND = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis		S = MS/MSD failure

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Inorganic non-metals

Client: **Savannah River Nuclear Solutions** Laboratory ID: **UD25066-002**

Description: **SLUDGE-000019** Matrix: **Solid**

Date Sampled: **04/25/2019 0911** Project Name: **SHE-19-2-SLUDGE** % Solids: **14.9** **04/27/2019 0052**

Date Received: **04/25/2019** Project Number: **SHE19115D 0000351395**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(Fecal Colifo) SM 9222 D-2006	1	04/27/2019 0015	MDD	04/25/2019 2054	

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Fecal Coliform-MF		**SM 9222 D-**	**13415**		**20**	**col/g**	**1**

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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Inorganic non-metals

Client: **Savannah River Nuclear Solutions** Laboratory ID: **UD25066-003**

Description: **SLUDGE-000020** Matrix: **Solid**

Date Sampled: **04/25/2019 0911** Project Name: **SHE-19-2-SLUDGE** % Solids: **79.2** **04/27/2019 0052**

Date Received: **04/25/2019** Project Number: **SHE19115D 0000351395**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(Fecal Colifo) SM 9222 D-2006	1	04/27/2019 0015	MDD	04/25/2019 2054	

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Fecal Coliform-MF		**SM 9222 D-**	**1263**		**20**	**col/g**	**1**

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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Inorganic non-metals

Client: **Savannah River Nuclear Solutions** Laboratory ID: **UD25066-004**

Description: **SLUDGE-000021** Matrix: **Solid**

Date Sampled: **04/25/2019 0911** Project Name: **SHE-19-2-SLUDGE** % Solids: **28.2** **05/01/2019 0118**

Date Received: **04/25/2019** Project Number: **SHE19115D 0000351395**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(Fecal Colifo) SM 9222 D-2006	1	04/27/2019 0015	MDD	04/25/2019 2054	

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Fecal Coliform-MF		**SM 9222 D-**	**30147**		**20**	**col/g**	**1**

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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Inorganic non-metals

Client: **Savannah River Nuclear Solutions** Laboratory ID: **UD25066-005**

Description: **SLUDGE-000022** Matrix: **Solid**

Date Sampled: **04/25/2019 0911** Project Name: **SHE-19-2-SLUDGE** % Solids: **15.3** **04/27/2019 0052**

Date Received: **04/25/2019** Project Number: **SHE19115D 0000351395**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(Fecal Colifo) SM 9222 D-2006	1	04/27/2019 0015	MDD	04/25/2019 2054	

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Fecal Coliform-MF		**SM 9222 D-**	**131074**		**20**	**col/g**	**1**

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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Inorganic non-metals

Client: **Savannah River Nuclear Solutions**		Laboratory ID: **UD25066-006**	
Description: **SLUDGE-000023**		Matrix: **Solid**	
Date Sampled: **04/25/2019 0911**	Project Name: **SHE-19-2-SLUDGE**	% Solids: **17.9**	**04/27/2019 0052**
Date Received: **04/25/2019**	Project Number: **SHE19115D 0000351395**		

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(Fecal Colifo) SM 9222 D-2006	1	04/27/2019 0015	MDD	04/25/2019 2054	

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Fecal Coliform-MF		**SM 9222 D-**	**78135**		**20**	**col/g**	**1**

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	Q = Surrogate failure
ND = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis		S = MS/MSD failure

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Inorganic non-metals

Client: **Savannah River Nuclear Solutions** Laboratory ID: **UD25066-007**

Description: **SLUDGE-000024** Matrix: **Solid**

Date Sampled: **04/25/2019 0911** Project Name: **SHE-19-2-SLUDGE** % Solids: **18.3** **04/27/2019 0052**

Date Received: **04/25/2019** Project Number: **SHE19115D 0000351395**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(Fecal Colifo) SM 9222 D-2006	1	04/27/2019 0015	MDD	04/25/2019 2054	

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Fecal Coliform-MF		**SM 9222 D-**	**93071**		**20**	**col/g**	**1**

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

Shealy Environmental Services, Inc.
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Chain of Custody
and
Miscellaneous Documents

Shealy Environmental Services, Inc.
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FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 0927
Sample Id: SLUDGE-000018
Station ID: CSWTF-SLUDGE-2
Interval:
Field QC Code:
Matrix: SLUDGE
Comp. Start Date: 4-25-19
Comp. Stop Date: 4-25-19
SDN:
Group COC #: SES/9115.0
Sample Method: GRAB
Comp. Start Time: 0927
Comp. Stop Time: 0927

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	NA2S2O3/COLD		1	250 mL STERILE POLY		FECAL COLIFORM [95]

UD25066
BRW

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1	
Cooler number	Items in cooler	Cooler temp.

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS		4-25-19	1010	
1		SRNS	Charles E Boyd	4/25/19	1300	
1	Charles E Boyd	Shealy	Lindsey Hite / Jimmy Hite	4/25/19	1614	

(1) optional (2) pH: C-correct, I-incorrect (3) First relinquisher is the sampler

of 1

4/4/2019

SHEALY ENVIRONMENTAL SERVICES, INC.

FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 0911
Sample Id: SLUDGE-000019
Station ID: CSWTF-SLUDGE-3
Interval:
Field QC Code:
Matrix: SLUDGE
Comp. Start Date:
Comp. Stop Date:
SDN:
Group COC #: SES/9115D
Sample Method: Grab
Comp. Start Time:
Comp. Stop Time:

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	NA2S2O3/COLD		1	250 mL STERILE POLY		FECAL COLIFORM [95]

UD25066
GRW

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1	
Cooler number	Items in cooler	Cooler temp.

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS		4-25-19	1010	
1		SRNS	Charles E Boyd	4/25/19	1340	
1	Charles E Boyd	Shealy	Lindsay Hall	4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

of 1

4/4/2019

Shealy Environmental Services, Inc.
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 0911
Sample Id: SLUDGE-000020
Station ID: CSWTF-SLUDGE-4
Interval: SDN:
Field QC Code: Group COC #: SES/94150
Matrix: SLUDGE Sample Method: grab
Comp. Start Date: Comp. Start Time:
Comp. Stop Date: Comp. Stop Time:

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	NA2S2O3/COLD		1	250 mL STERILE POLY		FECAL COLIFORM [95]

UD25066
GRN

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1	
Cooler number	Items in cooler	Cooler temp.

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS	[illegible]	4-25-19	1010	
1	[illegible]	SRNS	Charles E Boyd / [illegible]	4/25/19	1300	
1	Charles E Boyd / [illegible]	Shealy	Lindsay Hite / [illegible]	4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

of 1

4/4/2019

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FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 8011
Sample Id: SLUDGE-000021
Station ID: CSWTF-SLUDGE-5
Interval: SDN:
Field QC Code: Group COC #: 565/9116 O
Matrix: SLUDGE Sample Method: 3246
Comp. Start Date: Comp. Start Time:
Comp. Stop Date: Comp. Stop Time:

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	NA2S2O3/COLD		1	250 mL STERILE POLY		FECAL COLIFORM [95]

UD25066
GRW

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1	
Cooler number	Items in cooler	Cooler temp.

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS		4-25-19	1010	
1		SRNS	Charles E Boyd	4/25/19	1300	
1	Charles E Boyd	Shealy	Lindsay Hitt /	4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

of 1

4/4/2019

SHEALY ENVIRONMENTAL SERVICES, INC.

FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 0911
Sample Id: SLUDGE-000022
Station ID: CSWTF-SLUDGE-6
Interval: SDN:
Field QC Code: Group COC #: SES4915 0
Matrix: SLUDGE Sample Method: GRAB
Comp. Start Date: Comp. Start Time:
Comp. Stop Date: Comp. Stop Time:

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	NA2S2O3/COLD		1	250 mL STERILE POLY		FECAL COLIFORM [95]

UD25066
GRW

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1	
Cooler number	Items in cooler	Cooler temp.

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS		4-25-19	1010	
1		SRNS	Charles E Boyd	4/25/19	1300	
1	Charles E Boyd	Shealy		4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

of 1

4/4/2019

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FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 0911
Sample Id: SLUDGE-000023
Station ID: CSWTF-SLUDGE-7
Interval:
Field QC Code:
Matrix: SLUDGE
Comp. Start Date:
Comp. Stop Date:
SDN:
Group COC #: SES/9115 0
Sample Method: GRAB
Comp. Start Time:
Comp. Stop Time:

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	NA2S2O3/COLD		1	250 mL STERILE POLY		FECAL COLIFORM [95]

UD25066
GRW

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1	
Cooler number	Items in cooler	Cooler temp.

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS		4-25-19	1040	
1	Phil Ahlstrom	SRNS	Charles E Boyd	4/25/19	1340	
1	Charles E Boyd	Shealy	Lindsay Hite	4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

of 1

4/4/2019

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FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 0911
Sample Id: SLUDGE-000024
Station ID: CSWTF-SLUDGE-8
Interval:
Field QC Code:
Matrix: SLUDGE
Comp. Start Date:
Comp. Stop Date:
SDN:
Group COC #: SE519115D
Sample Method: grab
Comp. Start Time:
Comp. Stop Time:

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	NA2S2O3/COLD		1	250 mL STERILE POLY		FECAL COLIFORM [95]

UD25066

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1	
Cooler number	Items in cooler	Cooler temp.

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS		4-25-19	1010	
1		SRNS	Charles E Boyd	4/25/19	1300	
1	Charles E Boyd	Shealy	Lindsay Hite	4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

4/4/2019

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Shealy Environmental Services, Inc.
Document Number: ME0018C-14

Page 1 of 1
Effective Date: 8/2/2018

Sample Receipt Checklist (SRC)

Client: SRS Cooler Inspected by/date: LKH / 04-25-2019 Lot #: UD25066

Means of receipt: ☑ SESI ☐ Client ☐ UPS ☐ FedEx ☐ Other: _____

☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: 19-611

5.8 / 5.8 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 5 IR Gun Correction Factor: 0 °C

Method of coolant: ☐ Wet Ice ☑ Ice Packs ☐ Dry Ice ☐ None

☐ Yes	☐ No	☑ NA	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
☐ Yes	☐ No	☑ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC?
☑ Yes	☐ No		7. Were sample IDs listed on all sample containers?
☑ Yes	☐ No		8. Was collection date & time listed on the COC?
☑ Yes	☐ No		9. Was collection date & time listed on all sample containers?
☑ Yes	☐ No		10. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		11. Were tests to be performed listed on the COC?
☑ Yes	☐ No		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)? _____
☑ Yes	☐ No		13. Was adequate sample volume available?
☑ Yes	☐ No		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☐ Yes	☑ No		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
☐ Yes	☐ No	☑ NA	16. For VOA and RSK-175 samples, were bubbles present >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	18. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	19. Were all applicable NH_3/TKN/cyanide/phenol/625 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	20. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
☐ Yes	☑ No		21. Was the quote number listed on the container label? If yes, Quote # NA

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA _____ were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H2SO4, HNO3, HCl, NaOH using SR # NA.

Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA _____ were received with bubbles >6 mm in diameter.

Samples(s) NA _____ were received with TRC > 0.5 mg/L (If #19 is ***no***) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: NA.

SR barcode labels applied by: LKH Date: 04-25-2019

Comments:

SHEALY ENVIRONMENTAL SERVICES, INC.

Report of Analysis

Savannah River Nuclear Solutions
PO Box 616
Building 735-B
Aiken, SC 29808
Attention: Siobhan Kitchen

Project Name: SHE-19-2-SLAS

Project Number: SHE19115E 0000351395

Lot Number:**UD26005**

Date Completed:05/02/2019

05/06/2019 3:06 PM
Approved and released by:
Project Manager: Grant Wilton

The electronic signature above is the equivalent of a handwritten signature.

Shealy Environmental Services, Inc.
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Case Narrative
Savannah River Nuclear Solutions
Lot Number: UD26005

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved NELAC standards, the Shealy Environmental Services, Inc. ("Shealy") Quality Assurance Management Plan (QAMP), standard operating procedures (SOPs), and Shealy policies. Any exceptions to the NELAC standards, the QAMP, SOPs or policies are qualified on the results page or discussed below.

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W" qualifier

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

Sample Summary

Savannah River Nuclear Solutions

Lot Number: UD26005

Project Name: SHE-19-2-SLAS

Project Number: SHE19115E 0000351395

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	SLAS-00000007	Solid	04/23/2019 0930	04/25/2019
002	SLAS-00000008	Solid	04/23/2019 0955	04/25/2019
003	SLAS-00000009	Solid	04/23/2019 1010	04/25/2019

(3 samples)

Inorganic non-metals

Client: Savannah River Nuclear Solutions		Laboratory ID: UD26005-001	
Description: SLAS-00000007		Matrix: Solid	
Date Sampled: 04/23/2019 0930	Project Name: SHE-19-2-SLAS	% Solids: 93.8	04/27/2019 0052
Date Received: 04/25/2019	Project Number: SHE19115E 0000351395		

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	350.1	(Ammonia - N) 350.1	1	05/01/2019 1421	DMA		15286

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Ammonia - N (gas diffusion)		350.1	ND		1.1	mg/kg	1

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	Q = Surrogate failure
ND = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis		S = MS/MSD failure

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Inorganic non-metals

Client: Savannah River Nuclear Solutions		Laboratory ID: UD26005-002	
Description: SLAS-00000008		Matrix: Solid	
Date Sampled: 04/23/2019 0955	Project Name: SHE-19-2-SLAS	% Solids: 95.2	04/27/2019 0052
Date Received: 04/25/2019	Project Number: SHE19115E 0000351395		

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	350.1	(Ammonia - N) 350.1	1	05/01/2019 1429	DMA		15286

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Ammonia - N (gas diffusion)		350.1	ND		1.0	mg/kg	1

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	Q = Surrogate failure
ND = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis		S = MS/MSD failure

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Inorganic non-metals

Client: Savannah River Nuclear Solutions		Laboratory ID: UD26005-003	
Description: SLAS-00000009		Matrix: Solid	
Date Sampled: 04/23/2019 1010	Project Name: SHE-19-2-SLAS	% Solids: 93.4	04/27/2019 0052
Date Received: 04/25/2019	Project Number: SHE19115E 0000351395		

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	350.1	(Ammonia - N) 350.1	1	05/01/2019 1433	DMA		15286

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Ammonia - N (gas diffusion)		350.1	ND		1.1	mg/kg	1

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	Q = Surrogate failure
ND = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis		S = MS/MSD failure

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Chain of Custody

and

Miscellaneous Documents

FIELD CHAIN OF CUSTODY for 2Q19SLAS

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-23-19 Time: 0930
Sample Id: SLAS-00000007
Station ID: SLAS-COMP-1
Interval:
Field QC Code:
Matrix: SOIL
Comp. Start Date: 4-23-19
Comp. Stop Date: 4-23-19
SDN:
Group COC #: SES19115E
Sample Method: COMP
Comp. Start Time: 0930
Comp. Stop Time: 0930

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLAS
Sampling Event: 2Q19SLAS
SEIR Name: 2Q19SLAS-01

Laboratory Work Request Form

Lab ID: (1)

UD26005

GRW

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	COLD		1	2 oz WM CLEAR GLASS		AMMONIA [81]

Comments (1)

LAB: 10-DAY TAT

Cooler Information

Cooler number	Items in cooler	Cooler temp.
17	1	
Cooler number	Items in cooler	Cooler temp.
		2-1

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	David Shepherd (Sampler)	SRNS	Carl Anderson	4-23-19	1046	
	Carl Anderson	SRNS	[illegible]	4-25-19	1010	
1	[illegible]	SRNS	Charles E Boyd	4/25/19	1300	
1	Charles E Boyd	Shealy		4/25/19	1614	
				4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

4/4/2019

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FIELD CHAIN OF CUSTODY for 2Q19SLAS

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-23-19 Time: 0955
Sample Id: SLAS-00000008
Station ID: SLAS-COMP-2
Interval:
Field QC Code:
Matrix: SOIL
Comp. Start Date: 4-23-19
Comp. Stop Date: 4-23-19
SDN:
Group COC #: SHE-5/4/115-E
Sample Method: Comp
Comp. Start Time: 0955
Comp. Stop Time: 0955

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLAS
Sampling Event: 2Q19SLAS
SEIR Name: 2Q19SLAS-01

Laboratory Work Request Form

Lab ID: (1)

UD26005

GRW

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	COLD		1	2 oz WM CLEAR GLASS		AMMONIA [81]

Comments (1)

LAB: 10-DAY TAT

Cooler Information

Cooler number	Items in cooler	Cooler temp.
17	1	
Cooler number	Items in cooler	Cooler temp.
		2.1

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	David Shepherd (Sampler)	SRNS	Carl Anderson	4-23-19	1047	
	Carl Anderson	SRNS	Phil Abbott	4-25-19	1010	
1	Phil Abbott	SRNS	Charles E Boyd	4/25/19	1300	
1	Charles E Boyd	Shealy		4/25/19	1614	
				4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

4/4/2019

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SHEALY ENVIRONMENTAL SERVICES, INC.

FIELD CHAIN OF CUSTODY for 2Q19SLAS

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-23-19 Time: 1010
Sample Id: SLAS-00000009
Station ID: SLAS-COMP-3
Interval:
Field QC Code:
Matrix: SOIL
Comp. Start Date: 4-23-19
Comp. Stop Date: 4-23-19
SDN:
Group COC #: 565/9115E
Sample Method: COMP
Comp. Start Time: 1010
Comp. Stop Time: 1010

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLAS
Sampling Event: 2Q19SLAS
SEIR Name: 2Q19SLAS-01

Laboratory Work Request Form

Lab ID: (1)

UD26005
GRW

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	COLD		1	2 oz WM CLEAR GLASS		AMMONIA [81]

Comments (1)

LAB: 10-DAY TAT

Cooler Information

Cooler number	Items in cooler	Cooler temp.
17	1	
Cooler number	Items in cooler	Cooler temp.
		2.1

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	David Shepherd (Sampler)	SRNS	Carl Anderson	4-23-19	1045	
	Carl Anderson	SRNS	Phil Albert	4-25-19	1010	
1	Phil Albert	SRNS	Charles E Boyd	4/25/19	1360	
1	Charles E Boyd	Shealy		4/25/19	1614	
				4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

1

4/4/2019

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Shealy Environmental Services, Inc.
Document Number: ME0018C-14

Page 1 of 1
Effective Date: 8/2/2018

Sample Receipt Checklist (SRC)

Client: Savannah River Site Cooler Inspected by/date: MEC / 4/26/19 Lot #: UD26005

Means of receipt: ☑ SESI ☐ Client ☐ UPS ☐ FedEx ☐ Other: ____

☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: 19-611

2.1 / 2.1 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 5 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☐ Yes	☐ No	☑ NA	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
☐ Yes	☐ No	☑ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC?
☑ Yes	☐ No		7. Were sample IDs listed on all sample containers?
☑ Yes	☐ No		8. Was collection date & time listed on the COC?
☑ Yes	☐ No		9. Was collection date & time listed on all sample containers?
☑ Yes	☐ No		10. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		11. Were tests to be performed listed on the COC?
☑ Yes	☐ No		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
☑ Yes	☐ No		13. Was adequate sample volume available?
☐ Yes	☑ No		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☐ Yes	☑ No		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
☐ Yes	☐ No	☑ NA	16. For VOA and RSK-175 samples, were bubbles present >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	18. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	19. Were all applicable NH_3/TKN/cyanide/phenol/625 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	20. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
☐ Yes	☑ No		21. Was the quote number listed on the container label? If yes, Quote # NA

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA ____ were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # NA.

Time of preservation NA. If more than one preservative is needed, please note in the comments below.

Sample(s) NA ____ were received with bubbles >6 mm in diameter.

Samples(s) NA ____ were received with TRC > 0.5 mg/L (If #19 is ***no***) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: NA.

SR barcode labels applied by: MEC Date: 4/26/19

Comments:

SHEALY ENVIRONMENTAL SERVICES, INC.

Report of Analysis

Savannah River Nuclear Solutions
PO Box 616
Building 735-B
Aiken, SC 29808
Attention: Siobhan Kitchen

Project Name: SHE-19-2-SLUDGE

Project Number: SHE19115D 0000351395

Lot Number:**UD26006**

Date Completed:05/09/2019

05/13/2019 4:35 PM
Approved and released by:
Project Manager: Grant Wilton

The electronic signature above is the equivalent of a handwritten signature.

Shealy Environmental Services, Inc.
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

Case Narrative
Savannah River Nuclear Solutions
Lot Number: UD26006

This Report of Analysis contains the analytical result(s) for the sample(s) listed on the Sample Summary following this Case Narrative. The sample receiving date is documented in the header information associated with each sample.

All results listed in this report relate only to the samples that are contained within this report.

Sample receipt, sample analysis, and data review have been performed in accordance with the most current approved NELAC standards, the Shealy Environmental Services, Inc. ("Shealy") Quality Assurance Management Plan (QAMP), standard operating procedures (SOPs), and Shealy policies. Any exceptions to the NELAC standards, the QAMP, SOPs or policies are qualified on the results page or discussed below.

Where applicable, all soil sample analysis are reported on a dry weight basis unless flagged with a "W" qualifier

If you have any questions regarding this report please contact the Shealy Project Manager listed on the cover page.

Nitrate, Nitrate-Nitrite - Method 353.2
Nitrate and Nitrate-Nitrite were recovered outside the control limit in the MS/MSD associated with Sample -001. Since the LCS and Method Blank were within control limits it was determined that matrix interference caused the MS/MSD to fail.

Sample Summary

Savannah River Nuclear Solutions

Lot Number: UD26006

Project Name: SHE-19-2-SLUDGE

Project Number: SHE19115D 0000351395

Sample Number	Sample ID	Matrix	Date Sampled	Date Received
001	SLUDGE-000017	Solid	04/25/2019 0930	04/25/2019

(1 sample)

Inorganic non-metals

Client: Savannah River Nuclear Solutions | Laboratory ID: UD26006-001
Description: SLUDGE-000017 | Matrix: Solid
Date Sampled: 04/25/2019 0930 | Project Name: SHE-19-2-SLUDGE | % Solids: 21.8 04/27/2019 0052
Date Received: 04/25/2019 | Project Number: SHE19115D 0000351395

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1		(% Volatile S) SM 2540G-1997	1	04/30/2019 2245	MGM		15218
1	350.1	(Ammonia - N) 350.1	1	05/01/2019 1431	DMA		15286
1		(Bulk Density) D 5057-90	1	04/30/2019 2130	MGM		
1		(Nitrate - N) 353.2	50	05/04/2019 1624	MDD		15682
1		(Nitrate-Nitr) 353.2	50	05/04/2019 1624	MDD		15683
1		(Phosphorus) 365.1	120	05/02/2019 1054	DMA	05/01/2019 1217	15297
1	351.4	(TKN) 351.2	10	05/02/2019 1325	DMA	05/01/2019 1721	15334

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
% Volatile Solids		SM 2540G-	73			%	1
Ammonia - N (gas diffusion)		350.1	39		4.6	mg/kg	1
Bulk Density		D 5057-90	1.0133			g/mL	1
Nitrate - N (soluble)		353.2	2200	S	46	mg/kg	1
Nitrate-Nitrite - N (soluble)		353.2	2400	S	46	mg/kg	1
Phosphorus	7723-14-0	365.1	21000		2800	mg/kg	1
TKN		351.2	65000		1100	mg/kg	1

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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TCLP Volatiles

Client: Savannah River Nuclear Solutions		Laboratory ID: UD26006-001	
Description: SLUDGE-000017		Matrix: Solid	
Date Sampled: 04/25/2019 0930	Project Name: SHE-19-2-SLUDGE	% Solids: 21.8	04/27/2019 0052
Date Received: 04/25/2019	Project Number: SHE19115D 0000351395		

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Leachate Date
1	1311/5030B	8260B	10	05/02/2019 0449	KGT		15405	04/30/2019 2103

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Benzene	71-43-2	8260B	ND		0.050	mg/L	1
2-Butanone (MEK)	78-93-3	8260B	ND		0.10	mg/L	1
Carbon tetrachloride	56-23-5	8260B	ND		0.050	mg/L	1
Chlorobenzene	108-90-7	8260B	ND		0.050	mg/L	1
Chloroform	67-66-3	8260B	ND		0.050	mg/L	1
1,2-Dichloroethane	107-06-2	8260B	ND		0.050	mg/L	1
1,1-Dichloroethene	75-35-4	8260B	ND		0.050	mg/L	1
Tetrachloroethene	127-18-4	8260B	ND		0.050	mg/L	1
Trichloroethene	79-01-6	8260B	ND		0.050	mg/L	1
Vinyl chloride	75-01-4	8260B	ND		0.010	mg/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
1,2-Dichloroethane-d4		105	70-130
Bromofluorobenzene		104	70-130
Toluene-d8		106	70-130

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	Q = Surrogate failure
ND = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis		S = MS/MSD failure

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TCLP Semivolatiles

Client: Savannah River Nuclear Solutions | Laboratory ID: UD26006-001
Description: SLUDGE-000017 | Matrix: Solid
Date Sampled: 04/25/2019 0930 | Project Name: SHE-19-2-SLUDGE | % Solids: 21.8 04/27/2019 0052
Date Received: 04/25/2019 | Project Number: SHE19115D 0000351395

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Leachate Date
1	1311/3520C	8270D	1	05/08/2019 2004	JCG	04/30/2019 1820	15177	04/29/2019 2049

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
1,4-Dichlorobenzene	106-46-7	8270D	ND		0.040	mg/L	1
2,4-Dinitrotoluene	121-14-2	8270D	ND		0.080	mg/L	1
Hexachlorobenzene	118-74-1	8270D	ND		0.040	mg/L	1
Hexachlorobutadiene	87-68-3	8270D	ND		0.040	mg/L	1
Hexachloroethane	67-72-1	8270D	ND		0.040	mg/L	1
2-Methylphenol	95-48-7	8270D	ND		0.040	mg/L	1
3+4-Methylphenol	106-44-5	8270D	ND		0.040	mg/L	1
Nitrobenzene	98-95-3	8270D	ND		0.040	mg/L	1
Pentachlorophenol	87-86-5	8270D	ND		0.20	mg/L	1
Pyridine	110-86-1	8270D	ND		0.040	mg/L	1
2,4,5-Trichlorophenol	95-95-4	8270D	ND		0.040	mg/L	1
2,4,6-Trichlorophenol	88-06-2	8270D	ND		0.040	mg/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
2-Fluorobiphenyl		67	37-129
2-Fluorophenol		40	24-127
Nitrobenzene-d5		83	38-127
Phenol-d5		76	28-128
Terphenyl-d14		101	10-148
2,4,6-Tribromophenol		65	41-144

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
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S = MS/MSD failure

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CVAA

Client: Savannah River Nuclear Solutions
Laboratory ID: UD26006-001
Description: SLUDGE-000017
Matrix: Solid
Date Sampled: 04/25/2019 0930
Project Name: SHE-19-2-SLUDGE
% Solids: 21.8 04/27/2019 0052
Date Received: 04/25/2019
Project Number: SHE19115D 0000351395

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	7471B	7471B	10	05/01/2019 1549	JMH	05/01/2019 1100	14872

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Mercury	7439-97-6	7471B	ND		3.3	mg/kg	1

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
N = Recovery is out of criteria
W = Reported on wet weight basis
E = Quantitation of compound exceeded the calibration range
P = The RPD between two GC columns exceeds 40%
Q = Surrogate failure
L = LCS/LCSD failure
S = MS/MSD failure

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ICP-AES

Client: Savannah River Nuclear Solutions
Laboratory ID: UD26006-001
Description: SLUDGE-000017
Matrix: Solid
Date Sampled: 04/25/2019 0930
Project Name: SHE-19-2-SLUDGE
% Solids: 21.8 04/27/2019 0052
Date Received: 04/25/2019
Project Number: SHE19115D 0000351395

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	3050B	6010D	1	05/01/2019 0449	LLL	04/29/2019 1021	14867

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	Units	Run
Arsenic	7440-38-2	6010D	ND		3.2	mg/kg	1
Cadmium	7440-43-9	6010D	2.1		1.1	mg/kg	1
Copper	7440-50-8	6010D	1800		2.1	mg/kg	1
Lead	7439-92-1	6010D	27		2.1	mg/kg	1
Molybdenum	7439-98-7	6010D	16		8.5	mg/kg	1
Nickel	7440-02-0	6010D	97		8.5	mg/kg	1
Potassium	7440-09-7	6010D	2800		1100	mg/kg	1
Selenium	7782-49-2	6010D	6.3		4.2	mg/kg	1
Zinc	7440-66-6	6010D	1600		11	mg/kg	1

LOQ = Limit of Quantitation
ND = Not detected at or above the LOQ
H = Out of holding time
B = Detected in the method blank
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Chain of Custody

and

Miscellaneous Documents

FIELD CHAIN OF CUSTODY for 2Q19SLUDGE

Savannah River Site
SGCP/GM
Building 730-2B
Aiken, SC 29808
GM Contact: David Shepherd

Date: 4-25-19 Time: 0930
Sample Id: SLUDGE-000017
Station ID: CSWTF-SLUDGE-1
Interval:
Field QC Code:
Matrix: SLUDGE
Comp. Start Date: 4-25-19
Comp. Stop Date: 4-25-19
SDN:
Group COC #: SES19115.0
Sample Method: Comp
Comp. Start Time: 0930
Comp. Stop Time: 0930

Ship To: Shealy Environmental Services
106 Vantage Point Dr
West Columbia, SC 29172
803-791-9700
Contract: 0000351395/SHE-19-2-SLUDGE
Sampling Event: 2Q19SLUDGE
SEIR Name: 2Q19SLUDGE-01

Laboratory Work Request Form

Lab ID: (1)

Item	Preservative	pH(2)	Qty	Container	Filter?	Analysis Requested
1	COLD		1	1 L GLASS		MERCURY [102], TCLP ACID COMPOUNDS [74]
(Cont.)						, TCLP BASE/NEUTRAL COMPOUNDS [75], AMMONIA [81], ARSENIC [83]
(Cont.)						, BULK DENSITY [87], CADMIUM [88], COPPER [93]
(Cont.)						, KJELDAHL NITROGEN - TOTAL [98], LEAD [99], PERCENT SOLIDS [45]
(Cont.)						, PHOSPHORUS, TOTAL [51], MOLYBDENUM [103], NICKEL [104]
(Cont.)						, NITRATE (AS N) [105], NITRATE-NITRITE [106], POTASSIUM [110]
(Cont.)						, SELENIUM [111], VOLATILE SOLIDS, PERCENT [121], ZINC [122]
2	COLD		1	2 oz GLASS W/TEFLON		TCLP, VOLATILES [79]
(Cont.)				SEPTA		

UD26006
GRW

Comments (1)

LAB: 10-DAY TAT

T=5.8°C

Cooler Information

Cooler number	Items in cooler	Cooler temp.
18	1-2	
Cooler number	Items in cooler	Cooler temp.
		5.8

Custody Transfer Record

	Relinquished By (3) (print/sign)	Company	Received By (print/sign)	Date	Time	Reason for Transfer (1)
	Carl Anderson (Sampler)	SRNS	[illegible]	4-25-19	1010	
1-2	[illegible]	SRNS	Charles E Boyd/CEB	4/25/19	1300	
1-2	Charles E Boyd/CEB	Shealy		4/25/19	1614	
			[illegible]	4/25/19	1614	

(1) optional (2) pH: C-correct I-incorrect (3) First relinquisher is the sampler

pl 1

4/4/2019

Shealy Environmental Services, Inc.
106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

Shealy Environmental Services, Inc.
Document Number: ME0018C-14

Page 1 of 1
Effective Date: 8/2/2018

Sample Receipt Checklist (SRC)

Client: SRS Cooler Inspected by/date: JSH / 04-25-2019 Lot #: UD26006

Means of receipt: ☑ SESI ☐ Client ☐ UPS ☐ FedEx ☐ Other: _____

☐ Yes	☑ No		1. Were custody seals present on the cooler?
☐ Yes	☐ No	☑ NA	2. If custody seals were present, were they intact and unbroken?

pH Strip ID: NA Chlorine Strip ID: NA Tested by: NA

Original temperature upon receipt / Derived (Corrected) temperature upon receipt %Solid Snap-Cup ID: 19-611

5.8 / 5.8 °C NA / NA °C NA / NA °C NA / NA °C

Method: ☑ Temperature Blank ☐ Against Bottles IR Gun ID: 5 IR Gun Correction Factor: 0 °C

Method of coolant: ☑ Wet Ice ☐ Ice Packs ☐ Dry Ice ☐ None

☐ Yes	☐ No	☑ NA	3. If temperature of any cooler exceeded 6.0°C, was Project Manager Notified? PM was Notified by: phone / email / face-to-face (circle one).
☐ Yes	☐ No	☑ NA	4. Is the commercial courier's packing slip attached to this form?
☑ Yes	☐ No		5. Were proper custody procedures (relinquished/received) followed?
☑ Yes	☐ No		6. Were sample IDs listed on the COC?
☑ Yes	☐ No		7. Were sample IDs listed on all sample containers?
☑ Yes	☐ No		8. Was collection date & time listed on the COC?
☑ Yes	☐ No		9. Was collection date & time listed on all sample containers?
☑ Yes	☐ No		10. Did all container label information (ID, date, time) agree with the COC?
☑ Yes	☐ No		11. Were tests to be performed listed on the COC?
☑ Yes	☐ No		12. Did all samples arrive in the proper containers for each test and/or in good condition (unbroken, lids on, etc.)?
☑ Yes	☐ No		13. Was adequate sample volume available?
☑ Yes	☐ No		14. Were all samples received within ½ the holding time or 48 hours, whichever comes first?
☐ Yes	☑ No		15. Were any samples containers missing/excess (circle one) samples Not listed on COC?
☐ Yes	☐ No	☑ NA	16. For VOA and RSK-175 samples, were bubbles present >"pea-size" (¼"or 6mm in diameter) in any of the VOA vials?
☐ Yes	☐ No	☑ NA	17. Were all DRO/metals/nutrient samples received at a pH of < 2?
☐ Yes	☐ No	☑ NA	18. Were all cyanide samples received at a pH > 12 and sulfide samples received at a pH > 9?
☐ Yes	☐ No	☑ NA	19. Were all applicable NH_3/TKN/cyanide/phenol/625 (< 0.5mg/L) samples free of residual chlorine?
☐ Yes	☐ No	☑ NA	20. Were client remarks/requests (i.e. requested dilutions, MS/MSD designations, etc…) correctly transcribed from the COC into the comment section in LIMS?
☐ Yes	☑ No		21. Was the quote number listed on the container label? If yes, Quote # NA

Sample Preservation (Must be completed for any sample(s) incorrectly preserved or with headspace.)

Sample(s) NA were received incorrectly preserved and were adjusted accordingly in sample receiving with NA mL of circle one: H_2SO_4, HNO_3, HCl, NaOH using SR # NA.
Time of preservation NA. If more than one preservative is needed, please note in the comments below.

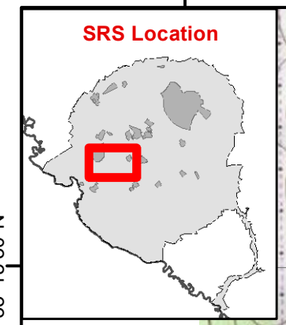
Sample(s) NA were received with bubbles >6 mm in diameter.

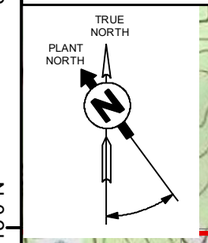
Samples(s) NA were received with TRC > 0.5 mg/L (If #19 is ***no***) and were adjusted accordingly in sample receiving with sodium thiosulfate ($Na_2S_2O_3$) with Shealy ID: NA.

SR barcode labels applied by: MEC Date: 04-26-2019

Comments:

Savannah River Site - G-10 Outfall and G-10 Land Application Site





Central Sanitary Wastewater Treatment Facility

G-10 Outfall

New Ellenton SW

Girard NW

C Area

Substation

Burma Road

Road 3

G-10 Land Application Site

AIKEN CO
BARNWELL CO

Upper Three Runs

Fourmile Branch

BOUNDARY

BM Δ 154

81°44'30"W 81°44'0"W 81°43'30"W 81°43'0"W 81°42'30"W 81°42'0"W 81°41'30"W 81°41'0"W 81°40'30"W 81°40'0"W

33°15'30"N 33°15'0"N 33°14'30"N 33°14'0"N 33°13'30"N

G-10 Land Application Site

USGS 24k Topo Map Boundaries

0 0.25 0.5 1 Miles

SLUDGE DISPOSAL BY LAND APPLICATION OR OTHER BENEFICIAL USE

Vector/Pathogen Control and Odor Control

R.61-9.504.50 and Permit ND0072125, Part V.B.7 (a-f)

1. Sludge Generator
    1. Name: US DOE
    2. Address: Savannah River Site, Aiken, SC, 29808
    3. Phone: 803 952-6719
    4. County: Aiken, Barnwell
    5. NPDES or ND Permit Number: ND0072125
    6. Plant capacity (MGD): 1.01 MGD
    7. Amount of sludge generated per year (dry weight tons): 14.2 dry weight tons per year
    8. Size, description, and location of sludge storage: approximately 168 cubic yards, storage shed, at the Central Sanitary Wastewater Treatment Facility.
    9. Amount of stockpiled sludge and sludge age: 168 cubic yards of sludge, one to two years
    10. The sanitary wastewater treatment package plants at SRS are extended aeration, activated sludge plants. Each package plant has an equalization basin, aeration basin, two clarifiers, a sludge holding tank, ultraviolet light disinfection channel, stilling basin, and outfall weir. The Centralized Sanitary Wastewater Treatment Facility (CSWTF) began operation in May 1995. This facility treats sanitary and industrial wastewater from nine production areas. The CSWTF consists of a bar screen, centrifugal grit removal system, equalization basin, three oxidation ditches with intra-channel clarifiers, an ultraviolet light disinfection system, a cascade aeration system, a gravity sludge thickener, and four sludge drying beds. Each package plant's sludge holding tank is sized to hold 10% of its treatment plant's daily capacity, which in addition to the gravity sludge thickener at the CSWTF provides approximately 59,900 gallons of liquid sludge storage volume. Diffused air is used for odor control and aerobic digestion in the sludge holding tanks and the gravity sludge thickener. Once the sludge holding tank at each package plant is full and sufficiently thickened, the sludge is removed via a pump truck and transferred to the gravity sludge thickener at the CSWTF. This sludge is thickened further and applied to drying beds for dewatering. Cationic polymer is added as a dewatering aid as the sludge is pumped from the thickener to the drying beds. Sludge dewaters and air dries on the drying beds for at least 90 days, and then is removed to a covered sludge storage area. Once every year or two, a manure spreader is used to haul the air-dried sludge from the CSWTF to the forested land application site where sludge is land applied in accordance with permit requirements. Approximately 40 cubic yards of sludge are currently stored on the drying beds or in the storage sheds at the CSWTF.
    11. Current method of sludge disposal: Land application to pine forest.
    12. Letter of acceptance: ND0072125
    13. Amount of sludge transported: 14.2 dry tons per year, 28.4 dry tons per application
    14. Estimated percent solids and total liquid volume: 59,900 gallons, 21.8% dry solids

2. Sludge Analysis Information
    1. TCLP toxicity test: see attached lab result
    2. Name of certified lab conducting analysis: Shealy Environmental Services, In. 106 Vantage Point Dr., West Columbia, SC 29172, (803) 791-9111
    3. Other compounds required by NPDS permit in effluent to treatment plant: not required.
    4. Method used to determine the reliability of sludge composition: Sample analysis performed by SC DHEC certified laboratory using DHEC required Standard Methods per Laboratory certification. Please see attached laboratory report.
    5. Total organic nitrogen: 64,961 mg/kg
    6. Total inorganic nitrogen: 2,439 mg/kg
    7. Ammonia nitrogen: 39 mg/kg
    8. pH: 5.80 (SU)
    9. Calcium Carbonate: NA
    10. Percent total solids: 21.8%
    11. Total arsenic: 0.0 mg/kg
    12. Total cadmium: 2.1 mg/kg
    13. Total copper: 1,800 mg/kg
    14. Total lead: 27 mg/kg
    15. Total mercury: 0.0 mg/kg
    16. Total molybdenum: 16 mg/kg
    17. Total nickel: 97 mg/kg
    18. Total selenium: 6.3 mg/kg
    19. Total zinc: 1,600 mg/kg

3. Application of Sludge
    1. Description of method of transportation to the proposed land site: a manure spreader is used to haul the air-dried sludge from the CSWTF to the forested land application site.
    2. Approximate time of year or schedule for the sludge application and how it relates to crop planting and/or harvesting: Sludge is land applied to pine tree forested lot, once every two years during the permit limit season of April through October. No harvesting will be conducted during lifetime of sludge application to specific area.
    3. Description of application method: Dried sludge is applied using a John Deere Model 874 fertilizer spreader, capacity 8.4 cubic yards.
    4. Name of contractor applying sludge: self
    5. Type of equipment used to spread the sludge: John Deere Model 874 fertilizer spreader.

4. Application Site Information
    1. General
        a. Name, address, and signature of landowner: United States Department of Energy, Savannah River Site, Aiken, SC 29808
        b. Name, address and party managing the site: Savannah River Nuclear Solutions, Savannah River Site, Aiken, SC 29808

c. Approximate schedule for sludge application: Approximately every two years, Permit required March through October
d. Previous sludge application amounts covered under Permit #ND0072125: in 2017, 158.8 cubic yards (43.9 dry metric tons) of dried sludge was land applied.
e. Additional soil additives applied on site: NONE
f. Description of method to control access to the site: fence, Site police guarded gate, Site police patrol.
g. Method of odor control: the dewatered sludge was allowed to air dry on the drying beds for at least 90 days
h. Letter from each county stating that the proposed land application activity is consistent with the county solid waste management plan: NA

2. Site Description
Scale Maps indicating:
a. Site location
b. Slope and drainage characteristics including the surrounding land
c. Adjacent land usage and locations of inhabited dwellings: Forest, no dwellings
d. All water supply wells within 1000 feet: None
e. Adjacent surface water bodies: ¾ mile
f. Sludge disposal boundaries
g. Location of existing groundwater monitoring wells
h. Private Roads, public roads, and rights-of-way.
i. Certification of site suitability

3. Site Monitoring Plan Proposed method of site monitoring indicating:
a. Groundwater monitoring well locations: southeast of land application site, see map
b. Soil monitoring methods and locations. See map, 12-inch depth core sample from each of the 20 rows and a core sample adjacent to the rows outside of the application area. Composite the 10 front rows, composite the back 10 rows and composite the background from outside the application area, soil cores.
c. Surface water sampling methods and locations: NA
d. Proposed parameters and frequency of sampling groundwater, and soil: the soil is to be sampled before every sludge land application event (approx. every two years) for permit required Ammonia-Nitrogen (NH_3-N).
e. Metals testing: NA for the application site
f. Monitoring schedule to insure that soil pH will remain in agronomic ranges during land application: Once before each application.

4. Sludge Application Plan
a. Typical crops to be grown and crop management plan: Pine trees, with land application.
b. Sludge application rate: 1.7 dry tons per acre
c. Total organic nitrogen: 64,961 mg/kg
d. Total inorganic nitrogen: 2,439 mg/kg
e. Ammonia nitrogen: 39 mg/kg
f. pH: 5.80 su
g. Calcium Carbonate Equivalency: NA
h. Percent total solids: 21.8%

i. Total arsenic: 0.0 mg/kg
j. Total cadmium: 201 mg/kg
k. Total copper: 1,800 mg/kg
l. Total lead: 27 mg/kg
m. Total mercury: 0.0 mg/kg
n. Total molybdenum 16 mg/kg
o. Total nickel: 97 mg/kg
p. Total selenium 6.3 mg/kg
q. Total zinc 1,600 mg/kg
r. Formula and calculations used to determine plant available nitrogen and application rate: based on sludge analysis (0.5 k_{vol}(Vol. Factor Table) X 0.08 NH_3N lb/ton) + 4.4 NO_3-N lb/ton + 0.3 k_{min} (Min. Factor Table) X 130 TKN lb/ton – 0.08 NH_3- N lb/ton = 43.4 lb/ton PAN.
s. Estimated hydraulic loading rate: NA
t. Certification of crop management plan:

E. Distribution & Marketing or other Alternative Programs: NA