Winyah Generating Station
Initial Certification Statement
Bottom Ash Transport Water Discharge

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santee cooper

INITIAL CERTIFICATION STATEMENT

I, the undersigned Professional Engineer registered in good standing in the State of South Carolina, do hereby certify that I have personally examined and am familiar with the information submitted in this document, and that, based on my knowledge of those individuals immediately responsible for providing the enclosed compiled information, I believe that the submitted information is true, accurate, and complete. I certify, for the enclosed referenced Bottom Ash Transport Water system, that I am familiar with the requirements of 40 CFR § 423.13(k)(2)(i)(A) and 40 CFR § 423.19(c), and that I am familiar with the Winyah Generating Station facility to the extent required to attest to the information provided in this submittal.

Domenic J. Ciccolella

Printed Name of Professional Engineer

Signature of Professional Engineer

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
No. 29982
DOMENIC J. CICCOLELLA

1. INTRODUCTION

Title 40 of the Code of Federal Regulations (CFR) Section 423-*Steam Electric Power Generating Point Source Category* defines and regulates wastewater discharges associated with fossil-type fuel electric utility generating facilities. Specifically, 40 CFR § 423.13(k)(2)(i)(A) maintains allowances for the discharge of Bottom Ash Transport Water (BATW) under the following conditions:

(A) The discharge of pollutants in bottom ash transport water from a properly installed, operated, and maintained bottom ash system is authorized under the following conditions:

(1) To maintain system water balance when precipitation-related inflows are generated from storm events exceeding a 10-year storm event of 24-hours or longer duration (e.g., 30-day storm event) and cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment; or

(2) To maintain system water balance when regular inflows from wastestreams other than bottom ash transport water exceed the ability of the bottom ash system to accept recycled water and segregating these other wastestreams is not feasible; or

(3) To maintain system water chemistry where installed equipment at the facility is unable to manage pH, corrosive substances, substances or conditions causing scaling, or fine particulates to below levels which impact system operation or maintenance; or

(4) To conduct maintenance not otherwise included in paragraphs (k)(2)(i)(A) (1), (2), or (3) of this section and not exempted from the definition of transport water in § 423.11(p), and when water volumes cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment.

Additionally, 40 CFR § 423.19(c) requires facilities seeking to discharge BATW to provide an Initial Certifying Statement to include the following.

(B) (c) Requirements for facilities discharging bottom ash transport water pursuant to § 423.13(k)(2)(i) or 423.16(g)(2)(i).

(1) Initial Certification Statement. For sources seeking to discharge bottom ash transport water pursuant to § 423.13(k)(2)(i) or 423.16(g)(2)(i), an initial certification shall be submitted to the permitting authority by the as soon as possible date determined under § 423.11(t), or the control authority by October 13, 2023 in the case of an indirect discharger.

(2) Signature and certification. The certification statement must be signed and certified by a professional engineer.

(3) Contents. An initial certification shall include the following:

(A) A statement that the professional engineer is a licensed professional engineer.

(B) A statement that the professional engineer is familiar with the regulation requirements.

(C) A statement that the professional engineer is familiar with the facility.

(D) The primary active wetted bottom ash system volume in § 423.11(aa).

(E) Material assumptions, information, and calculations used by the certifying professional engineer to determine the primary active wetted bottom ash system volume.

(F) A list of all potential discharges under § 423.13(k)(2)(i)(A)(1) through (4) or § 423.16(g)(2)(i)(A) through (D), the expected volume of each discharge, and the expected frequency of each discharge.

(G) Material assumptions, information, and calculations used by the certifying professional engineer to determine the expected volume and frequency of each discharge including a narrative discussion of why such water cannot be managed within the system and must be discharged.

(H) A list of all wastewater treatment systems at the facility currently, or otherwise required by a date certain under this section.

(I) A narrative discussion of each treatment system including the system type, design capacity, and current or expected operation.

The contents of this document are intended to satisfy the Initial Certifying Statement for the Winyah Generating Station (WGS) located at 661 Steam Plant Drive, Georgetown, SC 29440 and operating under the National Pollutant Discharge Elimination System (NPDES) Permit No. SC0022471.

2. SYSTEM DISCUSSION

WGS currently operates as a fossil-type fuel steam electric generating facility with two NPDES waste water discharge outfalls to off-site receiving waters. Facility operating information and contributing wastewater discharges have previously been defined in the existing administratively-continued permit and the October 20, 2023 draft permit renewal documents currently under review with the South Carolina Department of Health and Environmental Control (SCDHEC). The discussion herein focuses on the potential BATW system discharges at WGS as they relate to the provisions and allowances of 40 CFR § 423.13(k)(2)(i)(A) and 40 CFR § 423.19(c).

2.1 BATW System Information

In order to comply with the prohibition of BATW discharges as of October 13, 2021 and defined in 40 CFR § 423.13(k)(1)(i), Santee Cooper and WGS installed a Remote Submerged Chain Conveyor System (RSCCS) in early-2020. This system was properly designed to separate the bottom ash from transport water and recycle the liquids back to the boiler unit bottom ash hoppers for a net zero BATW discharge during proper operating conditions. However, as contemplated by the § 423.13(k)(2)(i)(A) regulations, when the BATW collection and conveyance system experiences exceptional weather conditions, operational excursions, or other non-exempt maintenance issues, BATW discharges may be experienced by station operators and these discharges should continue to be allowed within limits. Based on the real-world operation of these systems, and within the allowances of the applicable regulations, the enclosed information describes the potential volume of BATW that may need to be discharged to the internal wastewater systems at WGS.

2.2 BATW System Volume

Santee Cooper staff completed calculations of the total Primary Active Wetted Bottom Ash System Volume following the published 2023 proposed rule changes regarding the technology-based effluent limitations guidance (ELG). Those calculations are included herewith as **Appendix A - Primary Active Wetted Bottom Ash System Volume.** Based on the account of all primary systems, the maximum volume of the Primary Active Wetted Bottom Ash System for WGS is estimated to be 1,605,951 gallons. Utilizing the maximum threshold of ten percent allowed in 40 CFR § 423.13(k)(2)(i)(B), the maximum allowable regulatory discharge volume for a 30-day rolling average would be approximately **160,595 gallons** or ten percent of the Primary Active Wetted Bottom Ash System Volume.

2.3 Material Assumptions

Santee Cooper staff coordinated with Winyah Station personnel and facility development engineers to determine the potential discharges that may occur during and exceptional weather event, operational excursion or non-exempt maintenance activity. Based on a review of the system design and operation, two critical conditions may occur that could require the discharge of BATW via the existing low volume wastewater treatment system to the facility's cooling pond as the final facility waste water treatment mechanism. The two scenarios would be as follows; 1) a blow down of a unit bottom ash hopper wetted seal volume to allow for the physical removal of bottom ash that is either bridged over the bottom ash grinders, or clogged in the base of the bottom ash hopper due to boiler system components that fail and fall out of the boiler due to heat exposure, 2) a clean-out of the RSCCS Overflow Tank or the Bottom Ash Service Water Tank due to sludge or solids build up. For each of these scenarios a calculation has been provided in the following section.

For scenario 1, Unit Bottom Ash Hopper blowdown, this condition may occur after prolonged unit operation in which bottom ash "clinkers" (i.e. large bottom ash slag clumps) or ancillary internal boiler components (i.e. boiler tube shields) clog the base of the bottom ash hoppers to the extent that the bottom ash transport system is not sufficiently clearing bottom ash from the boiler unit. In this instance physical entry into the bottom ash hopper must be facilitated and the blockages removed. Removal of the blockage is often times facilitated via a hopper blowdown or a high pressure, high volume liquids pressure washing.

Scenario 2, RSCCS Overflow Tank/Bottom Ash Service Water Tank Maintenance, may occur when residual solids cause operational limitations of the RSCCS or BATW conveyance operations. Over time the approximately 557,305-gallon Overflow Tank or 682,414-gallon Service Water Tank would require draining and physical solids removal. Based on an interview with WGS operations staff the worst-case design condition controlling the potential discharge volume would be experienced when the Service Water Tank requires a clean out. In this case, the tank would be reduced to a minimum operating depth of an estimated five-feet by transferring the water within the BATW system. Once the tank reaches the five foot depth the system transfer pumps would begin experiencing cavitation and the remaining volume would need to be drained from the lower tank nozzles to the low volume waste treatment system. At this point final cleanout of the tank would be facilitated by staff via physical entry into the tank. The cleanout would be facilitated by high pressure wash water to remove the solids accumulated in the base of the tank.

2.4 Scenario Calculations and Frequencies

Scenario 1 – Bottom Ash Hopper Blowdown

The total volume of each bottom ash hopper as documented in Major Tanks and Equipment table line items 9-12 of **Appendix A** are calculated to be 29,920 gallons. In any one event in which these hoppers have to be drained the total volume could require a blowdown to the respective boiler sump which routes waste water to the West Low Volume Treatment pond. The potential to complete these blowdowns would be during routine and non-routine unit outages. For this calculation it is assumed that the maximum volume within a 30-day rolling period would occur during a Spring or Fall unit outage where two units require a bottom ash hopper cleanout. Thus, the total volume would equal the volume of two Bottom Ash Hoppers or 59,840-gallons, and the potential for this situation to occur would be annually.

Scenario 2 – Overflow Tank/Bottom Ash Service Water Tank Maintenance

The total diameter of the Bottom Ash Service Water Tank is 88-feet. WGS operations staff estimated that the minimum operating condition in the tank is at an estimated depth of five-feet, at which time the tank discharge pumps can no longer remove and recirculate water to the bottom ash hoppers without pump cavitation. Utilizing these assumptions, the total volume of water is defined by the below calculation.

$$V = \left(\frac{\pi(88ft)^2}{4}\right) \times 5ft \times 7.48gal/ft^3$$

$$V = 227{,}471\ gallons$$

Thus, the total volume of water expected to be discharged under this scenario is 227,471 gallons. The potential for this situation to occur is estimated to be twice per permit term (5-years).

3. CONCLUSION

Based on the enclosed information and calculations, Santee Cooper and Winyah Generating Station are requesting a 30 day rolling average BATW discharge allowance that would accommodate a worst case scenario where both scenario 1 bottom ash hopper blowdown and scenario 2 tank maintenance activities were performed during the same 30 day period. In addition to the combined volume of 287,311 gallons estimated for these scenarios, Santee Cooper proposes to add 20% (57,462 gallons) to account for practical variations from these estimates, additional volumes of water needed for cleaning/maintenance activities and flow meter error. Based on this total volume of 344,773 gallons, the 30 day rolling average discharge limit proposed would be one thirtieth of this amount, 11,492 gallons. This discharge allowance would only apply if one or more of the described maintenance activities were performed within the 30 day rolling average period. This discharge allowance request is well below ten percent of the primary active wetted bottom ash system volume which is calculated to be 160,595 gallons.

Santee Cooper and the Winyah Generating Station have herein provided the complete and necessary information required to satisfy 40 CFR § 423.19(c) via this Initial Certification Statement for the discharge of Bottom Ash Transport Water. Based on this submittal, it is requested that provisions be made to include Bottom Ash Transport Water discharge allowances in the facility Permit No. SC0022471.

APPENDIX A: Primary Active Wetted Bottom Ash System Volume

Winyah Generating Station - Bottom Ash Volume Calculation

Major	Tank and Equipment Volumes	Tank Height (ft)	Tank Diameter (ft)	Tank Volume (cu. ft.)	Equip. Volume (cu. ft.)	Calc. Volume (gallons)
1	RSSC "A"			0		100,000
2	RSSC "B"			0		-
3	RSSC Overflow Tank	12.25	88	74506		557,305
4	Lamella Clarifier "A" Flash/Floc Mix Tank	24	10	1885		14,099
5	Lamella Clarifier "B" Flash/Floc Mix Tank	24	10	1885		-
6	Lamella Clarifier "A"			0		36,900
7	Lamella Clarifier "B"			0		-
8	Bottom Ash Service Water Tank	15	88	91232		682,414
9	Unit 1 Bottom Ash Hoppers			0	4000	29,920
10	Unit 2 Bottom Ash Hoppers			0	4000	29,920
11	Unit 3 Bottom Ash Hoppers			0	4000	29,920
12	Unit 4 Bottom Ash Hoppers			0	4000	29,920
13	Unit 1 BA Overflow Collection Tank			0		2,500
14	Unit 2 BA Overflow Collection Tank			0		2,500
15	Unit 3 BA Overflow Collection Tank			0		2,500
16	Unit 4 BA Overflow Collection Tank			0		4,000
	Total Tank and Equipment Volume (gallons)					1,521,899

Major	Pipeline Volumes	Pipe Size (inches)	Pipe ID (inches)	Pipe Length (ft)	Pipe Volume (cu. ft.)	Calc. Volume (gallons)
1	RSSC "A" to Overflow Tank	18	17.25	50	81	607
2	RSSC "B" to Overflow Tank	18	17.25	50	81	-
3	Unit 1 BA OF Col. Tank to RSSC Overflow Tank	4	4	1600	140	1,044
4	Unit 2 BA OF Col. Tank to RSSC Overflow Tank	4	4	1840	161	1,201
5	Unit 3 BA OF Col. Tank to RSSC Overflow Tank	4	4	2100	183	1,371
6	Unit 4 BA OF Col. Tank to RSSC Overflow Tank	6	6	2370	465	3,481
7	RSSC Overflow Tank to Forwarding Pumps	14	13.25	20	19	143
8	RSSC Overflow Forwarding Pumps to LC Mix Tanks	10	10	210	115	857
9	RSSC Overflow Tank to Agitation Pumps	16	15.25	55	70	522
10	RSSC Overflow Tank Agitation Pumps to Overflow Tank	18	17.25	105	170	1,275
11	LC "A" Mix Tank to Lamella Clarifier "A"	30	29.25	4	19	140
12	LC "B" Mix Tank to Lamella Clarifier "B"	30	29.25	4	19	-
13	Lamella Clarifiers to BA Service Water Tank	14	13.25	20	19	143
14	Sludge from Lamella Clarifiers to RSSCs	4	4	1350	118	881
15	BA SW Tank to HP Sluice Water Pumps "A/B/C"	20	19.25	22	44	333
16	BA SW Tank to HP Sluice Water Pumps "A/B/C"	14	13.25	72	69	-
17	BA SW Tank to LP Service Water Pumps "A/B/C"	14	13.25	12	11	86
18	BA SW Tank to LP Service Water Pumps "A/B/C"	10	10	77	42	-
19	HP Sluice Water Pump Recirc to BA SW Tank	6	6	50	10	73
20	LP Service Water Pump Recirc to BA SW Tank	6	6	50	10	73
21	HP Sluice Water Pump Discharge Pipe	10	10	75	41	306
22	HP Sluice Water Header to Control Valve	16	15.25	115	146	1,091
23	HP Sluice Water Control Valve Bypass	10	10	25	14	102
24	HP Sluice Water From CV Tie-in to Exist. HP SW Header	16	15.25	600	761	5,693
25	HP SW Tie-in to Unit 3/4 HP SW Tee	18	17.25	1350	2191	16,389
26	Unit 3/4 HP SW Tee to Unit 3 BA Hoppers	12	12	310	243	1,821
27	HP SW Piping at Unit 3 BA Hoppers	8	8	100	35	261
28	Unit 3/4 HP SW Tee to Unit 4 BA Hoppers	12	12	170	134	999
29	HP SW Piping at Unit 4 BA Hoppers	8	8	100	35	261
30	HP SW Header to Unit 1/2 HP SW System	16	15.25	450	571	4,270
31	Unit 1/2 HP SW Header to Tie-in to Unit 1 HP SW System	10	10	220	120	898
32	Tie-in to Unit 1 HP SW System to Unit 1 BA Hoppers	12	12	220	173	1,292
33	HP SW Piping at Unit 1 BA Hoppers	8	8	100	35	261
34	Unit 1/2 HP SW Header to Tie-in to Unit 2 HP SW System	10	10	50	27	204
35	Tie-in to Unit 1 HP SW System to Unit 2 BA Hoppers	12	12	220	173	1,292
36	HP SW Piping at Unit 2 BA Hoppers	8	8	100	35	261
37	Unit 1 and 2 Jet Pumps to RSSCs	10	9.5	2000	984	7,364
38	Unit 3 and 4 Jet Pumps to RSSCs	10	9.5	2500	1231	9,205
39	Common Line from Jet Pumps to RSSCs	10	9.5	2700	1329	9,941
40	U1 BA OF to U1 OF Collection Tank	10	10	20	11	82
41	U2 BA OF to U2 OF Collection Tank	10	10	20	11	82
42	U3 BA OF to U3 OF Collection Tank	10	10	20	11	82
43	U4 BA OF to U4 OF Collection Tank	10	10	60	33	245
44	LP Service Water Pumps to Boiler Area	10	10	2000	1091	8,159
45	LP Service Water to Unit 1 Hoppers	6	6	120	24	176
46	LP Service Water at Unit 1 Hoppers	6	6	100	20	-
47	LP Service Water to Unit 2 Hoppers	6	6	120	24	176
48	LP Service Water at Unit 2 Hoppers	6	6	100	20	-
49	LP Service Water to Unit 3 Hoppers	6	6	120	24	176
50	LP Service Water at Unit 3 Hoppers	6	6	100	20	-
51	LP Service Water to Unit 4 Hoppers	6	6	500	98	734
52	LP Service Water at Unit 4 Hoppers	6	6	100	20	-
	Total Pipeline Volume (gallons)					84,053
	Total Bottom Ash System Volume (gallons)					**1,605,951**

Disclaimer: All dimensions or designated equipment volumes are based on historical Santee Cooper system drawings or Recirculating Suspended Solids Collection (RSSC) system design drawings completed by WorleyParsons Group, Inc. Individual volumes should be considered reasonable approximations and/or estimates based on the data and drawings reviewed by Santee Cooper engineering staff. Additional verification of system volumes or the provision of additional data may be provided upon request.

Note: Grey shaded line items have been considered redundant volumes for purposes of the "Primary Active Wetted Bottom Ash System Volume" calculation.