# HYDROLOGIC AND HYDRAULIC CAPACITY DEMONSTRATION

# NEW FGD POND WILLIAMS STATION GOOSE CREEK, SOUTH CAROLINA

**Prepared For:** 

### DOMINION ENERGY SOUTH CAROLINA, INC. COLUMBIA, SOUTH CAROLINA

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#### **1.0 OBJECTIVE**

This report has been prepared for South Carolina Generating Company (SCGENCO) and Dominion Energy South Carolina, Inc. (DESC) to demonstrate that the A.M. Williams Station (Williams Station) Coal Combustion Residuals (CCR) Unit described as the New FGD Pond meets the requirements of the United States Environmental Protection Agency (USEPA) CCR Rule which has been published in the Federal Register (FR) on April 17, 2015 as part of the Code of Federal Regulations (CFR) Title 40, Part 257 (§257). Specifically, this report demonstrates the hydrologic and hydraulic capacity requirements as defined in §257.82 are met by the New FGD Pond. The New FGD Pond is classified as a new CCR Surface Impoundment by definition in §257.53 and is required to meet the hydrologic and hydraulic capacity requirements for CCR surface impoundments (§257.82).

#### 2.0 BACKGROUND INFORMATION

### 2.1 INTRODUCTION

The Williams Station is a coal-fired power generation station located at 2242 Bushy Park Road in Goose Creek, South Carolina (refer to Figure 1) that is owned by SCGENCO and operated by DESC. The 650 MW coal-fired electric generating station is generally positioned within a small strip of lowlands between meanders of the Back River (west) and the Cooper River (east) as depicted in Figure 2. The station property is bound by Bushy Park Road to the west and tidal wetlands and/or lowlands border the remainder of the property. The Williams Station wastewater management impoundment complex, comprised of six interconnected separate ponds labeled Ponds A through E and the Coal Pile Runoff Pond, is located north of main station structures (refer to Figures 3 and 4).

Williams Station infrastructure includes a flue gas desulfurization (FGD) air quality control system that produces an FGD wastewater blowdown waste stream that is managed in an on-site FGD Pond originally constructed in 2009 in accordance with applicable South Carolina Department of Health and Environmental Control (SCDHEC) regulations and permits. This CCR Unit is also regulated as a CCR Surface Impoundment per Title 40 CFR, Part 257, Subpart D published in April 2015 (CCR Rule) by the USEPA and subsequent revisions.

### **2.2 DESCRIPTION OF THE CCR UNIT**

The FGD Pond is located within the boundaries of the wastewater management impoundment complex at the Williams Station facility and was originally constructed within the footprint of former Pond C in 2009. Figures 2 and 3 depict the location of the New FGD Pond in relation to Williams Station and the wastewater management impoundment complex, respectively. The New FGD Pond occupies essentially the same footprint as the former FGD Pond and is comprised of two approximate 700,000 gallon forebays (identified as Forebay 1 and Forebay 2) and approximately two acres in total. Each forebay was constructed with a composite liner system comprised of the following, from bottom to top:

- 18-inch thick compacted clay soil liner (CCL);
- 60-mil textured HDPE geomembrane liner;
- 28-ounce per square yard geotextile cushion; and,
- 6-inch thick fabric formed concrete protection layer.

The original FGD Pond was designed, constructed, and operated in accordance with SCDHEC Bureau of Water Permit Number 19263-IW. The original construction was completed in 2009 and was certified to meet the design documents and Construction Quality Assurance (CQA) Plan by Garrett & Moore (CQA Report, Williams Station FGD Scrubber Blowdown Wastewater Pond, dated September 14, 2009). In accordance with the FGD Pond Closure Plan – Amendment 1 dated February 2021, the original FGD Pond underwent construction to improve the structural integrity and increase the seismic stability of the perimeter dikes to meet the requirements of §257.63(a) – Seismic Impact Zones, and then closure by removal in accordance with the criteria defined in §257.102.

The only waste stream to be placed in the New FGD Pond is wet FGD blowdown from the FGD system. The FGD blowdown contains residual gypsum solids that are discharged from the secondary hydrocyclone overflows and pumped to the operating forebay of the New FGD Pond. Each FGD forebay allows the gypsum solids to settle and provide temporary storage until removed, dewatered, and disposed in the Williams Station Highway 52 Landfill. A solids removal treatment system (i.e., Lamella clarifier with one filter press) is used to remove solids prior to discharge to the New FGD Pond. The New FGD Pond is permitted to receive approximately 0.319 million gallons a day (MGD) of wastewater which is the same as the former FGD Pond. There will be no non-CCR waste streams discharged to or placed in the New FGD Pond. The New FGD Pond E and then to the National Pollutant Discharge Elimination System (NPDES) permitted outfall in accordance with SCDHEC NPDES Permit SC0003883 (effective January 1, 2017).

#### **3.0 COMPLIANCE DEMONSTRATIONS**

The applicable sections of §257.82 (Hydrologic and hydraulic capacity requirements for CCR surface impoundments) are presented below in bold, italic font. The responses follow each section of the rule and are provided in normal font.

# 3.1 §257.82 HYDROLOGIC AND HYDRAULIC CAPACITY REQUIREMENTS FOR CCR SURFACE IMPOUNDMENTS

3.1.1 §257.82(a) Rule Description

40 CFR §257.82(a) states:

(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.

(a)(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood specified in paragraph (a)(3) of this section.

(a)(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (a)(3) of this section.

(a)(3) The inflow design flood is:

(a)(3)(i) For a high hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the probable maximum flood;

(a)(3)(ii) For a significant hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the 1,000-year flood;

(a)(3)(iii) For a low hazard potential CCR surface impoundment, as determined under §257.73(a)(2) or §257.74(a)(2), the 100-year flood; or

(a)(3)(iv) For an incised CCR surface impoundment, the 25-year flood.

#### 3.1.2 Compliance With 40 CFR §257.82(a)

The enclosed report in Appendix A entitled "Inflow Design Flood Control System Plan", prepared by Garrett & Moore, dated July 2016 was prepared to document and certify that the originally constructed FGD Pond inflow design flood control system adequately manages flow into and from the CCR unit in accordance with the criteria stated in §257.82. The New FGD Pond is a low hazard potential CCR impoundment per §257.74(a)(2) as certified in the "Structural Integrity Criteria Demonstration" prepared by CEC dated May 2021; and therefore, the New FGD Pond inflow design flood control system must adequately manage flow into and out of the CCR unit associated with the 100-year flood in accordance with §257.82(a)(3)(iii). The above referenced report by Garrett & Moore provides the following supporting data in Section 5 "Flow Into The Pond" and Section 6 "Flow From The Pond" to demonstrate conformance with §257.82(a): 1) the constructed top of the FGD Pond berm is at 13.5 feet above mean sea level (amsl); 2) the published 100-year flood elevation at the location of the FGD pond is elevation 8 feet amsl; 3) the normal operating pool of each Forebay is 11.5 feet amsl; 4) the rainfall depth associated with the 100-year flood at the location of the FGD Pond is 9.8 inches (0.8 feet), resulting in a 100-year flood maximum water surface elevation of 12.3 feet amsl within the FGD Pond; and, 5) the FGD Pond is dewatered by a series of gravity outlet pipes in each forebay that will discharge the 100-year flood rainfall in a controlled manner to return the FGD Pond to normal operating level. Based on this data, discharge from the 100-year flood does not flow into the FGD Pond, the FGD pond has sufficient capacity to adequately manage the rainfall associated with the 100-year flood, and the dewatering system can sufficiently collect and control the peak discharge from the FGD pond resulting from the 100-year flood. As a result, the referenced report by Garrett & Moore (Section 8 "Conclusions") states the following: 1) "As constructed the Williams Station FGD pond is not susceptible to inflow from the 100-year flood. The pond is capable of receiving and storing permitted wastewater flows as well as direct rainfall from the 100-year, 24-hour storm. The FGD pond's outlet pipes are sufficient to collect and discharge the 100-year flood in a controlled manner."; and, 2) "Based on the discussion above, the Williams Station FGD Pond Inflow Design Flood Control System Plan meets the requirements of CCR rule §257.82 - Hydrologic and Hydraulic Capacity Requirements."

As the New FGD Pond is located within the footprint of the original FGD Pond without modification to the pond configuration, storage capacity, discharge pipes, base liner grades, berm height, surrounding topography/land use or operations, there have been no changes in conditions that would affect the above referenced report and the previous certification of demonstrated compliance with the requirements in 40 CFR §257.82(a) remains valid for the New FGD Pond. CEC has reviewed the Certification prepared by Garrett & Moore and the current site information and has determined that the New FGD Pond complies with CCR Rule §257.82(a); and therefore, certifies the New FGD Pond meets the criteria of §257.82(a).

3.1.3 §257.82(b) Rule Description

40 CFR §257.82(b) states:

# (b) Discharge from the CCR unit must be handled in accordance with the surface water requirements under §257.3-3.

3.1.4 Compliance with 40 CFR §257.82(b)

The New FGD Pond discharges to Pond D which flows into Pond E and then to the NPDES permitted outfall in accordance with SCDHEC NPDES Permit SC0003883 (effective January 1, 2017) and the Federal Clean Water Act. Therefore, by complying with the NPDES permit, the discharge from the New FGD Pond is being handled in accordance with the surface water requirements under §257.3-3. Because the New FGD Pond discharge will be operated under a NPDES permit, CEC certifies the New FGD Pond meets the criteria of §257.82(b).

3.1.5 §257.82(c) Rule Description

40 CFR §257.82(c) states:

(c) Inflow design flood control system plan—(1) Content of the plan. The owner or operator must prepare initial and periodic inflow design flood control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the inflow design flood control system has been designed and constructed

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to meet the requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator of the CCR unit has completed the inflow design flood control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(4).

(c)(2) Amendment of the plan. The owner or operator of the CCR unit may amend the written inflow design flood control system plan at any time provided the revised plan is placed in the facility's operating record as required by  $\S257.105(g)(4)$ . The owner or operator must amend the written inflow design flood control system plan whenever there is a change in conditions that would substantially affect the written plan in effect.

(c)(3) Timeframes for preparing the initial plan—(i) Existing CCR surface impoundments. The owner or operator of the CCR unit must prepare the initial inflow design flood control system plan no later than October 17, 2016.

(c)(3)(ii) New CCR surface impoundments and any lateral expansion of a CCR surface impoundment. The owner or operator must prepare the initial inflow design flood control system plan no later than the date of initial receipt of CCR in the CCR unit.

(c)(4) Frequency for revising the plan. The owner or operator must prepare periodic inflow design flood control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first periodic plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed an inflow design flood control system plan when the plan has been placed in the facility's operating record as required by §257.105(g)(4).

(c)(5) The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the initial and periodic inflow design flood control system plans meet the requirements of this section.

### 3.1.6 Compliance With 40 CFR §257.82(c)

This demonstration serves as the certified initial Inflow Design Flood Control System Plan and has been prepared to meet the criteria of \$257.82(c)(1). In accordance with the criteria of \$257.82(c)(2), this demonstration will be amended, as needed, if changes occur to the pond configuration, storage capacity, discharge pipes, base liner grades, berm height, surrounding

topography/land use or operations that would substantially affect the conclusions and certification contained in this demonstration.

This demonstration has been prepared prior to receipt of CCR waste in the New FGD Pond in accordance with the criteria of §257.82(c)(3).

Periodic inflow design flood control system plans will be prepared every 5 years in accordance with the criteria of §257.82(c)(4).

# (d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(g), the notification requirements specified in §257.106(g), and the internet requirements specified in §257.107(g).

This demonstration will be placed in the Operating Record and the CCR Unit website, as well as a notification to SCDHEC, to meet the record keeping [§257.105(g)], notification [§257.106(g)], and the internet posting [§257.107(g)] requirements.

#### 4.0 CERTIFICATION

This Hydrologic and Hydraulic Capacity Demonstration and enclosed Inflow Design Flood Control System Plan confirms that the New FGD Pond complies with the hydrologic and hydraulic capacity requirements of the CCR Rule. In summary, Williams Station New FGD Pond has been designed and constructed to meet the CCR Rule Hydrologic and Hydraulic Capacity requirements as defined in §257.82. Section 3.0 of this report provides supporting information and conclusions demonstrating that the New FGD Pond meets the criteria defined in §257.82.

The following certification statement provides confirmation that this report was prepared by a qualified professional engineer and that there is sufficient information to demonstrate that the New FGD Pond meets the Hydrologic and Hydraulic Capacity requirements defined in §257.82.

#### **Professional Engineer's Certification**

By means of this certification, I certify that I have reviewed this Hydrologic and Hydraulic Capacity Demonstration and the enclosed Inflow Design Flood Control System Plan for the New FGD Pond meets the requirements of Section 40 CFR 257.82.

Scott L. Brown, P.E. Printed Name of Professional Engineer

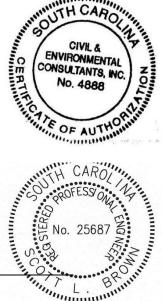
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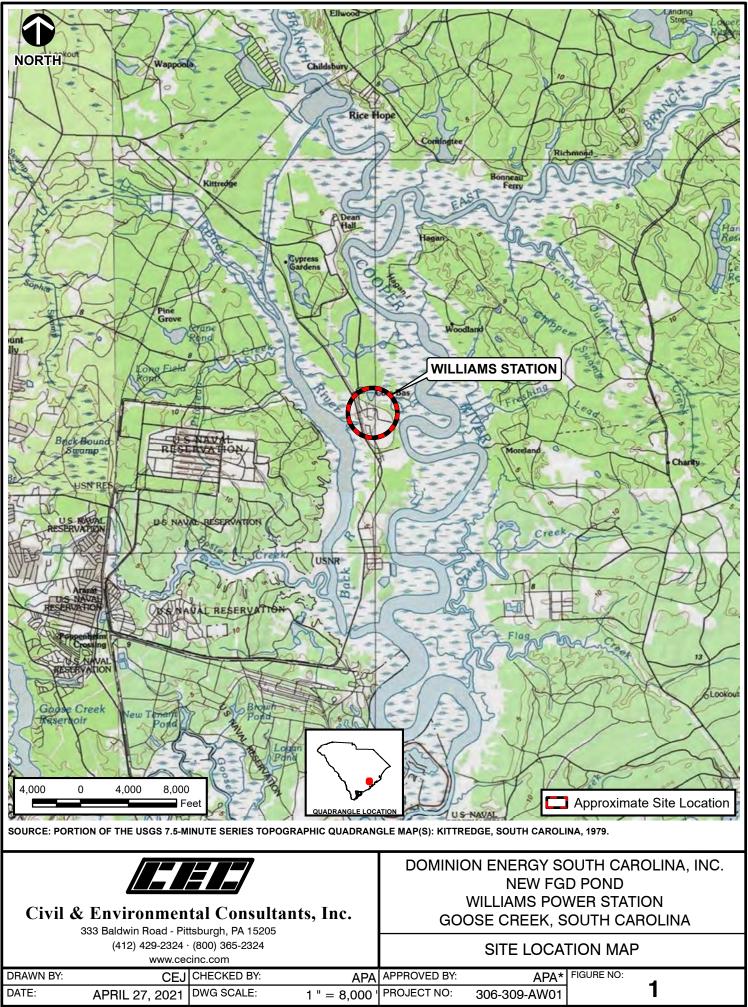
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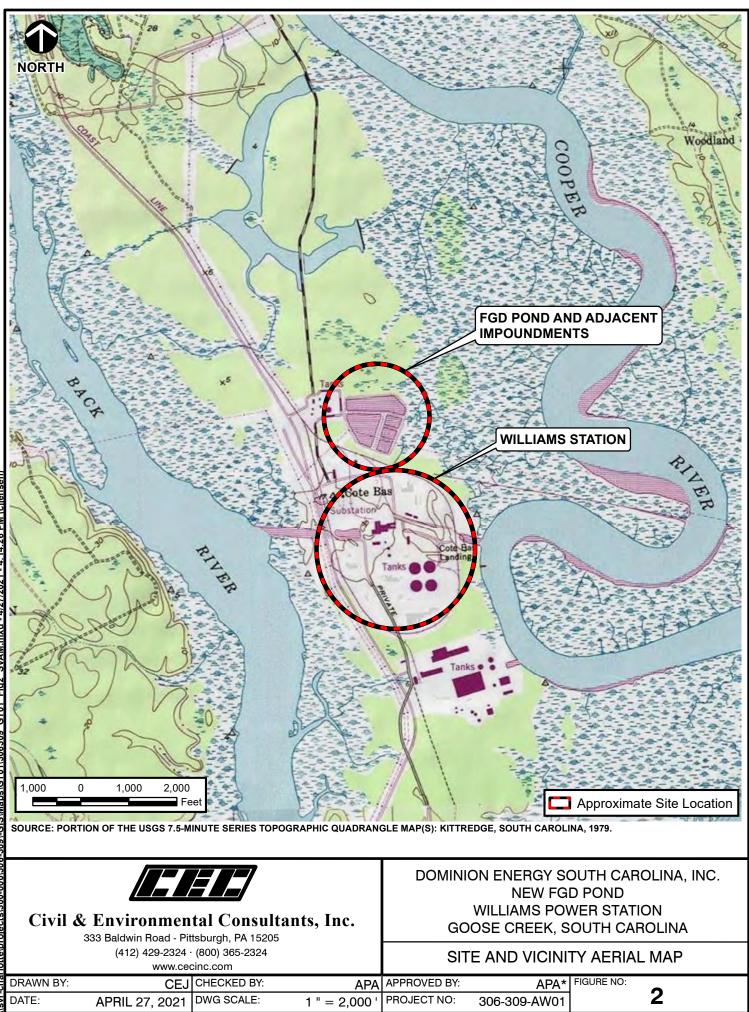
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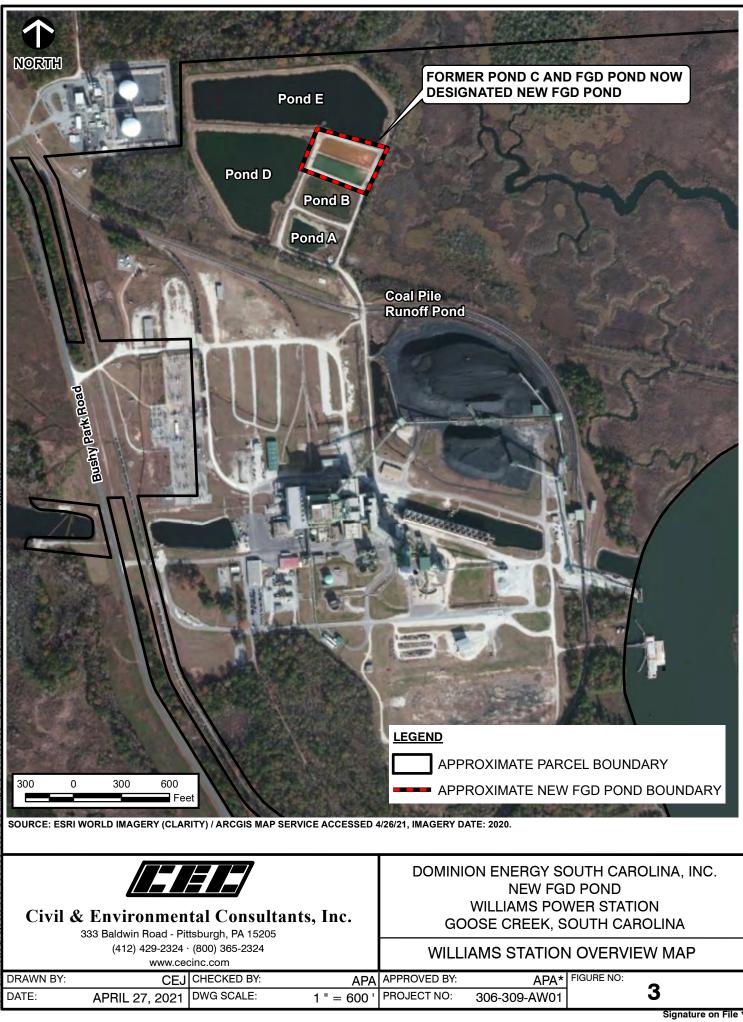


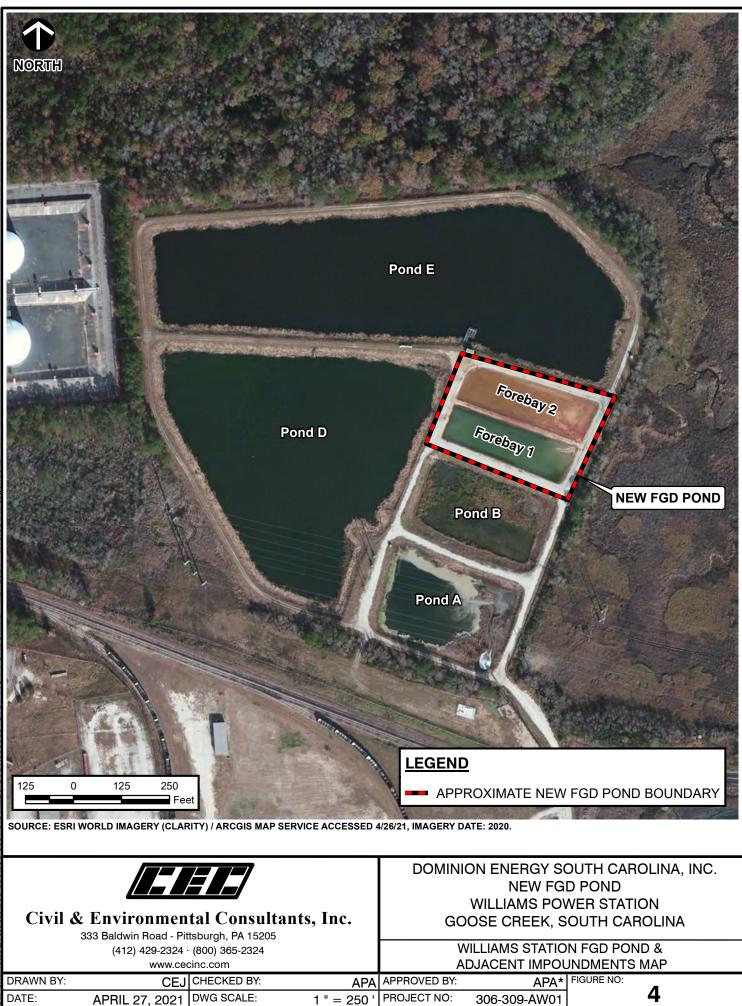
# FIGURES



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# APPENDIX A

# INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

# SOUTH CAROLINA ELECTRIC & GAS



# INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

# FOR THE WILLIAMS STATION FGD POND

BERKELEY COUNTY, SOUTH CAROLINA



**JULY 2016** 





#### 1 OVERVIEW

The EPA Administrator, Gina McCarthy, signed the Disposal of Coal Combustion Residuals from Electric Utilities final rule on December 19, 2014, and it was published in the Federal Register (FR) on April 17, 2015. The regulations provide a comprehensive set of requirements for the safe disposal of coal combustion residuals (CCRs), commonly known as coal ash, from coal-fired power plants. The rule will be administered as part of the Resource Conservation and Recovery Act [RCRA, 42 United States Code (U.S.C.) §6901 et seq.], using the Subtitle D approach.

South Carolina Electric & Gas (SCE&G) is subject to the CCR Rule. Based on SCE&G's review of the rule, the **Flue Gas Desulfurization (FGD) Pond at SCE&G Williams Station** has been determined to be an existing CCR surface impoundment subject to the CCR rule requirements.

#### 2 PURPOSE

The purpose of this report is to document that the Williams Station FGD Pond Inflow Design Flood Control System Plan meets the requirements of CCR rule §257.82 – *Hydrologic and Hydraulic Capacity Requirements.* 

#### 3 APPLICABLE REGULATIONS

CCR rule §257.82 – Hydrologic and Hydraulic Capacity Requirements states the following:

(a) The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.

(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood specified in paragraph (a)(3) of this section.

(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (a)(3) of this section.

(3) The inflow design flood is:

(i) For a high hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the probable maximum flood;

(ii) For a significant hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the 1,000-year flood;

(iii) For a low hazard potential CCR surface impoundment, as determined under § 257.73(a)(2) or § 257.74(a)(2), the 100-year flood; or

(iv) For an incised CCR surface impoundment, the 25-year flood.

(b) Discharge from the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.

(c) Inflow design flood control system plan—(1) Content of the plan. The owner or operator must prepare initial and periodic inflow design flood control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the inflow design flood control system has been designed and constructed to meet the requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator of the CCR unit has completed the inflow design flood control system placed in the facility's operating record as required by § 257.105(g)(4).

40 CFR Rule § 257.3-3 Surface Water states the following:

(a) For purposes of section 4004(a) of the Act, a facility shall not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES) under section 402 of the Clean Water Act, as amended.

(b) For purposes of section 4004(a) of the Act, a facility shall not cause a discharge of dredged material or fill material to waters of the United States that is in violation of the requirements under section 404 of the Clean Water Act, as amended.

(c) A facility or practice shall not cause non-point source pollution of waters of the United States that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been approved by the Administrator under section 208 of the Clean Water Act, as amended.

#### 4 FGD POND DESCRIPTION

Williams Station is coal-fired electric generation plant located in Goose Creek, Berkeley County, South Carolina. The FGD Pond is used to manage wastewater generated from the flue gas desulfurization scrubber system. The FGD pond was constructed in accordance with construction permit (permit 19263-IW) issued from the South Carolina Department of Health and Environmental Control (DHEC) on March 9, 2009, and placed into operation in accordance with an operation approval issued by DHEC on October 6, 2009. Effluent discharge for the FGD Pond is regulated under NPDES Permit #SC0003883.

The FGD Pond includes two settling bays, each approximately 1.0 acre.

Based on SCE&G's review of the rule, the FDG Pond at Williams Station is a low hazard potential CCR surface impoundment.

#### 5 FLOW INTO THE POND

Given the FDG Pond is considered a low hazard potential CCR surface impoundment, in accordance with 257.82 (a)(1) and 257.82 (a)(3), the FGD Pond's inflow design flood control system must adequately manage flow **into** the CCR unit during and following the peak discharge of the 100-year flood.

The topographic grades associated with the FGD Pond are higher than those of the surrounding land surface. Sheet 2 from the FGD Pond construction plans (Attachment 1) illustrates the location of the pond and associated grades. The FGD Pond rim sits at elevation 13.5. Surrounding grades in the vicinity of the pond sit at approximately elevation 10.

The Federal Emergency Management Agency (FEMA) provides mapping for the 100-year flood. The FGD Pond occurs on FEMA's FIRM Panel map 45015C0620D, effective 2003, in flood zone AE. The published 100-year flood elevation at the location of the FGD Pond is elevation 8. The rim of the FGD Pond sits at elevation 13.5. Therefore, discharge from the 100-year flood does not flow into the FGD Pond.

As constructed, flow into the FGD Pond during and following the peak discharge of the 100-year flood is limited to normal operational flows and direct precipitation from the 100-year storm event that falls on the pond.

The normal operating pool of the settling bays resulting from plant flows is elevation 11.5. As prescribed by the Berkeley County Stormwater Management Program, Stormwater Design Standards Manual (adopted December 1, 2009), the rainfall depth for the 100-year, 24-hour storm event in Berkeley County (South) is 9.8 inches. Therefore, the 100-year water surface in the pond settling is elevation 12.3, and the resultant freeboard is 1.1 feet. Therefore, flow into the pond during and following the peak discharge of the 100-year flood can be adequately managed via containment and storage in the pond.

#### 6 FLOW FROM THE POND

Given the FGD Pond is considered a low hazard potential CCR surface impoundment, in accordance with 257.82 (a)(2) and 257.82 (a)(3), the pond's inflow design flood control system must adequately manage flow **from** the CCR unit to collect and control the peak discharge resulting from the 100-year flood.

The FGD pond is dewatered by gravity by a series of outlet pipes in each settling bay as shown on the attached Sheet 2. The FGD Pond's dewatering system will discharge the 100-year flood in a controlled manner to return the pond to its' normal operating, pre-flood conditions. Therefore, the existing systems can adequately collect and control the peak discharge from the FGD Pond resulting from the 100-year flood.

#### 7 DISCHARGE FROM THE POND

§257.82 (b) requires discharge from the FGD Pond must be handled in accordance with the surface water requirements under § 257.3–3.

As previously mentioned, discharge from the FGD Pond is regulated in accordance with a National Pollutant Discharge Elimination System (NPDES) permit issued by the SCDHEC. The NPDES permit grants

Williams Station permission to discharge from the facility in accordance with effluent limitations, monitoring requirements and other conditions. The NPDES permit is issued in accordance with the provisions of the Federal Clean Water Act. Therefore, by complying with the NPDES permit, the discharge from the FGD Pond is being handled in accordance with the surface water requirements under § 257.3-3.

#### 8 CONCLUSION

As constructed, the Williams Station FGD pond is not susceptible to inflow from the 100-year flood. The pond is capable of receiving and storing permitted wastewater flows as well as direct rainfall from the 100-year, 24-hour storm. The FGD Pond's outlet pipes are sufficient to collect and discharge the 100-year flood in a controlled manner. The discharge from the FGD Pond is permitted under a NPDES permit is issued in accordance with the provisions of the Federal Clean Water Act. Based on the discussions above, the Williams Station FGD Pond Inflow Design Flood Control System Plan meets the requirements of CCR rule §257.82 – Hydrologic and Hydraulic Capacity Requirements.

ATTACHMENT 1

