

STRUCTURAL INTEGRITY CRITERIA DEMONSTRATION

**NEW FGD POND
WILLIAMS STATION
GOOSE CREEK, SOUTH CAROLINA**

Prepared For:

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

Prepared By:

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CEC Project 306-309

MAY 2021



Civil & Environmental Consultants, Inc.

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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 was 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 requirements for Structural Integrity Criteria as defined in §257.74 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 structural integrity criteria that are established in §257.74.

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 on 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. The CCR Rule Location Restrictions compliance demonstration for the original FGD Pond dated October 2018, reported that the Williams Station FGD Pond did not satisfy the requirements of §257.63(a) – Seismic Impact Zones. As the FGD Pond is a critical operational component to Williams Station’s ability to produce electricity and there were no other technically feasible on-site or off-site options to manage the FGD blowdown wastewater, DESC elected to continue operation of the FGD Pond in accordance with the alternative closure requirements identified in §257.103. Subsequently, DESC determined that the fastest technically feasible pathway to compliance was to open a new CCR impoundment within the footprint of the originally constructed FGD Pond that meets the CCR Rule’s seismic impact zone location and liner design criteria. This action required a structural improvement to the FGD Pond perimeter dikes, closure of the currently operating FGD Pond in accordance with §257.102 and §257.103 for existing CCR surface impoundments, and then

opening a new pond (identified as the New FGD Pond) within the original pond footprint in accordance with the CCR Rule. This Structural Integrity Criteria Demonstration provides documentation and certification that the New FGD Pond, located in the footprint of the previously closed FGD Pond, is compliant with the Structural Integrity Criteria defined in §257.74.

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 occupies 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 perimeter dikes were structurally improved by installing Deep Soil Mix (DSM) columns, comprised of two secant 8.5-foot diameter boreholes spaced at approximate 9.5 to

24.0 feet intervals and about 28.5 to 34.5 feet deep, through and below the perimeter dikes surrounding the FGD Pond. The DSM construction occurred in February and March of 2021 and the closure by removal was completed in March and April of 2021. The DSM design and construction was certified by Terracon (Report of Ground Improvement Installation to Satisfy CCR Rule 257.63, dated April 27, 2021) and the FGD Pond closure by removal was certified by Civil & Environmental Consultants, Inc. [CEC] FGD Pond 40 CFR 257.102 (c) Closure By Removal Certification, Williams Station, dated May 2021). The perimeter dike stabilization and closure activities, inspections, test results and certification reports are contained in the Construction Summary Report, FGD Pond, Williams Station, dated May 2021, and contained in the New FGD Pond Operating Record.

The only waste stream 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 original FGD Pond. There are no non-CCR waste streams discharged to or placed in the New FGD Pond. The New FGD Pond discharges to Pond D which flows into 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 §257.74 (Structural integrity criteria for new CCR surface impoundments and any lateral expansion of a CCR surface impoundment) are presented below in bold, italic font. The responses follow each section of the rule and are provided in normal font.

3.1 §257.74 STRUCTURAL INTEGRITY CRITERIA FOR NEW CCR SURFACE IMPOUNDMENTS

3.1.1 §257.74(a) Rule Description

40 CFR 257.72(a) states:

(a) The requirements of paragraphs (a)(1) through (4) of this section apply to all new CCR surface impoundments and any lateral expansion of a CCR surface impoundment, except for those new CCR surface impoundments that are incised CCR units. If an incised CCR surface impoundment is subsequently modified (e.g., a dike is constructed) such that the CCR unit no longer meets the definition of an incised CCR unit, the CCR unit is subject to the requirements of paragraphs (a)(1) through (4) of this section.

(a)(1) No later than the initial receipt of CCR, the owner or operator of the CCR unit must place on or immediately adjacent to the CCR unit a permanent identification marker, at least six feet high showing the identification number of the CCR unit, if one has been assigned by the state, the name associated with the CCR unit and the name of the owner or operator of the CCR unit.

(a)(2)(i) The owner or operator of the CCR unit must conduct initial and periodic hazard potential classification assessments of the CCR unit according to the timeframes specified in paragraph (f) of this section. The owner or operator must document the hazard potential classification of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment. The owner or operator must also document the basis for each hazard potential classification.

(a)(2)(ii) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial hazard potential classification and each subsequent periodic classification specified in paragraph (a)(2)(i) of this section was conducted in accordance with the requirements of this section.

(a)(3) Emergency Action Plan (EAP)—(i) Development of the plan. Prior to the initial receipt of CCR in the CCR unit, the owner or operator of a CCR unit determined to be either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment under paragraph (a)(2) of this section must prepare and maintain a written EAP. At a minimum, the EAP must:

(a)(3)(i)(A) Define the events or circumstances involving the CCR unit that represent a safety emergency, along with a description of the procedures that will be followed to detect a safety emergency in a timely manner;

(a)(3)(i)(B) Define responsible persons, their respective responsibilities, and notification procedures in the event of a safety emergency involving the CCR unit;

(a)(3)(i)(C) Provide contact information of emergency responders;

(a)(3)(i)(D) Include a map which delineates the downstream area which would be affected in the event of a CCR unit failure and a physical description of the CCR unit; and

(a)(3)(i)(E) Include provisions for an annual face-to-face meeting or exercise between representatives of the owner or operator of the CCR unit and the local emergency responders.

(a)(3)(ii) Amendment of the plan. (A) The owner or operator of a CCR unit subject to the requirements of paragraph (a)(3)(i) of this section may amend the written EAP at any time provided the revised plan is placed in the facility's operating record as required by §257.105(f)(6). The owner or operator must amend the written EAP whenever there is a change in conditions that would substantially affect the EAP in effect.

(a)(3)(ii)(B) The written EAP must be evaluated, at a minimum, every five years to ensure the information required in paragraph (a)(3)(i) of this section is accurate. As necessary, the EAP must be updated and a revised EAP placed in the facility's operating record as required by §257.105(f)(6).

(a)(3)(iii) Changes in hazard potential classification. (A) If the owner or operator of a CCR unit determines during a periodic hazard potential assessment that the CCR unit is no longer classified as either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment, then the owner or operator of the CCR unit is no longer subject to the requirement to prepare and maintain a written EAP beginning on the date the periodic hazard potential assessment documentation is placed in the facility's operating record as required by §257.105(f)(5).

(a)(3)(iii)(B) If the owner or operator of a CCR unit classified as a low hazard potential CCR surface impoundment subsequently determines that the CCR unit is properly re-classified as either a high hazard potential CCR surface impoundment or a significant hazard potential CCR surface impoundment, then the owner or operator of the CCR unit

must prepare a written EAP for the CCR unit as required by paragraph (a)(3)(i) of this section within six months of completing such periodic hazard potential assessment.

(a)(3)(iv) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the written EAP, and any subsequent amendment of the EAP, meets the requirements of paragraph (a)(3) of this section.

(a)(3)(v) Activation of the EAP. The EAP must be implemented once events or circumstances involving the CCR unit that represent a safety emergency are detected, including conditions identified during periodic structural stability assessments, annual inspections, and inspections by a qualified person.

(a)(4) The CCR unit and surrounding areas must be designed, constructed, operated, and maintained with vegetated slopes of dikes not to exceed a height of six inches above the slope of the dike, except for slopes which are protected with an alternate form(s) of slope protection.

3.1.2 Compliance With 40 CFR §257.72(a)

A permanent identification marker has been installed to meet the requirements of §257.74(a)(1).

The enclosed report in Appendix A entitled “Hazard Potential Classification Assessment”, prepared by Garrett & Moore, dated September 2016 was prepared to confirm the hazard potential classification of the originally constructed FGD Pond in accordance with §257.73(a)(2) as either a high, significant or low hazard potential CCR surface impoundment. Specifically, the referenced report (Determination Section) states “It is determined that FGD Pond 1 & 2 is considered to be a Low Hazard Potential.”

CEC has reviewed the “Hazard Potential Classification Assessment” and compared the relevant information to the New FGD Pond conditions to confirm that there have been no changes in conditions that would affect the referenced report. Because there are no changed conditions and New FGD Pond is located within the footprint of the original FGD Pond without modification to the pond configuration, storage capacity, base liner grades or surrounding topography/land use, the previously demonstrated compliance with the requirements in 40 CFR §257.73 remains applicable; and therefore, CEC certifies the New FGD Pond is classified as a Low Hazard Potential in accordance with §257.74.

3.1.3 §257.74(b) Rule Description

40 CFR 257.74(b) states:

(b) The requirements of paragraphs (c) through (e) of this section apply to an owner or operator of a new CCR surface impoundment and any lateral expansion of a CCR surface impoundment that either:

(b)(1) Has a height of five feet or more and a storage volume of 20 acre-feet or more; or

(b)(2) Has a height of 20 feet or more.

3.1.4 Compliance With 40 CFR §257.74(b)

The enclosed report within Appendix B entitled “Design Criteria Exemptions”, prepared by Garrett & Moore, dated September 2016 was prepared to confirm that the originally constructed FGD Pond does not meet the CCR impoundment requirements of §257.73(b)(1) or (2); and therefore, is not subject to the requirements of §257.73(c) through (e). The referenced report provides the following dimensions for each Forebay of the FGD Pond: 1) FGD Pond Forebay No. 1: area = 0.94 acres, dike height = 5.5 feet, and volume = 5.2 acre-feet; and, 2) FGD Pond Forebay No. 2: area = 0.97 acres, dike height = 5.5 feet, and volume = 5.3 acre-feet. Based on this data, the FGD Pond has a storage volume less than 20 acre-feet and a height less than 20 feet. As a result, the referenced report (Findings Section) states “The CCR Surface Impoundments at Williams Station do not meet the criteria of 40 CFR 257.73(b).”

CEC has reviewed the “Design Criteria Exemptions” and compared the relevant information to the New FGD Pond conditions to confirm that there have been no changes in conditions that would affect the referenced report. Because there are no changed conditions and New FGD Pond is located within the footprint of the original FGD Pond without modification to the pond configuration, storage capacity, base liner grades, or surrounding topography/land use, the previously demonstrated certification that the original FGD Pond does not meet the criteria in 40 CFR §257.73(b) remains applicable; and therefore, CEC certifies the New FGD Pond does not

meet the requirements in §257.74(b), and is exempt from the requirements of §257.74(c) through (e).

3.1.5 §257.74(c) Rule Description

40 CFR 257.74(c) states:

(c)(1) No later than the initial receipt of CCR in the CCR unit, the owner or operator unit must compile the design and construction plans for the CCR unit, which must include, to the extent feasible, the information specified in paragraphs (c)(1)(i) through (xi) of this section.

3.1.6 Compliance With 40 CFR §257.74(c)

As stated in Section 3.1.4 the New FGD Pond does not meet the requirements of §257.74(b); and therefore, is exempt from the requirements in §257.74(c).

3.1.7 §257.74(d) Rule Description

40 CFR 257.74(d) states:

(d) Periodic structural stability assessments. (1) The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with:

3.1.8 Compliance With 40 CFR §257.74(d)

As stated in Section 3.1.4 the New FGD Pond does not meet the requirements of §257.74(b); and therefore, is exempt from the requirements in §257.74(d).

3.1.9 §257.74(e) Rule Description

40 CFR 257.74(e) states:

(e) Periodic safety factor assessments. (1) The owner or operator must conduct an initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in paragraphs (e)(1)(i) through (v) of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

3.1.10 Compliance With 40 CFR §257.74(e)

As stated in Section 3.1.4 the New FGD Pond does not meet the requirements of §257.74(b); and therefore, is exempt from the requirements in §257.74(e).

3.1.11 §257.74(f) Rule Description

40 CFR §257.74(f) states:

(f) Timeframes for periodic assessments—(1) Initial assessments. Except as provided by paragraph (f)(2) of this section, the owner or operator of the CCR unit must complete the initial assessments required by paragraphs (a)(2), (d), and (e) of this section prior to the initial receipt of CCR in the unit. The owner or operator has completed an initial assessment when the owner or operator has placed the assessment required by paragraphs (a)(2), (d), and (e) of this section in the facility's operating record as required by §257.105(f)(5), (10), and (12).

(f)(2) Frequency for conducting periodic assessments. The owner or operator of the CCR unit must conduct and complete the assessments required by paragraphs (a)(2), (d), and (e) of this section every five years. The date of completing the initial assessment is the basis for establishing the deadline to complete the first subsequent assessment. The owner or operator may complete any required assessment prior to the required deadline provided the owner or operator places the completed assessment(s) into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent assessments is based on the date of completing the previous assessment. For purposes of this paragraph (f)(2), the owner or operator has completed an assessment when the relevant assessment(s) required by paragraphs (a)(2), (d), and (e) of this section has been placed in the facility's operating record as required by §257.105(f)(5), (10), and (12).

(f)(3) Failure to document minimum safety factors during the initial assessment. Until the date an owner or operator of a CCR unit documents that the calculated factors of safety achieve the minimum safety factors specified in paragraphs (e)(1)(i) through (v) of this section, the owner or operator is prohibited from placing CCR in such unit.

(f)(4) Closure of the CCR unit. An owner or operator of a CCR unit who either fails to complete a timely periodic safety factor assessment or fails to demonstrate minimum safety factors as required by paragraph (e) of this section is subject to the requirements of §257.101(c).

3.1.12 Compliance With 40 CFR §257.74(f)(1) through (4)

This demonstration will be placed in the Operating Record prior to the initial receipt of CCR in the unit per §257.74(f)(1).

As stated in Section 3.1.4, the New FGD Pond is exempt from the periodic assessment requirements in §257.74(f)(2) through (4).

3.1.13 §257.74(g) Rule Description

40 CFR §257.74(g) states:

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

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(f)], notification [§257.106(f)], and the internet posting [§257.107(f)] requirements.

4.0 CERTIFICATION

This Structural Integrity Criteria Demonstration confirms that the New FGD Pond complies with the Structural Integrity requirements of the CCR Rule. In summary, Williams Station New FGD Pond has been designed and constructed to meet the CCR Rule Structural Integrity requirements as defined in §257.74. Section 3.0 of this report provides supporting information and conclusions demonstrating that the New FGD Pond meets the design criteria defined in §257.74.

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 composite liner meets the design criteria defined in §257.74.

Professional Engineer's Certification

By means of this certification, I certify that I have reviewed this Structural Integrity Criteria Demonstration, New FGD Pond, Williams Station, and the design and construction of New FGD Pond meets the requirements of Section 40 CFR 257.74.

Scott L. Brown, P.E.

Printed Name of Professional Engineer



Signature

25687

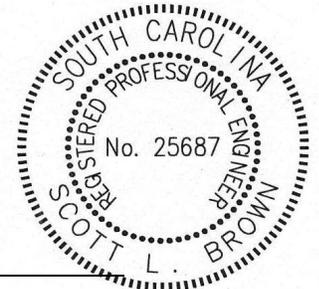
Registration No.

South Carolina

Registration State

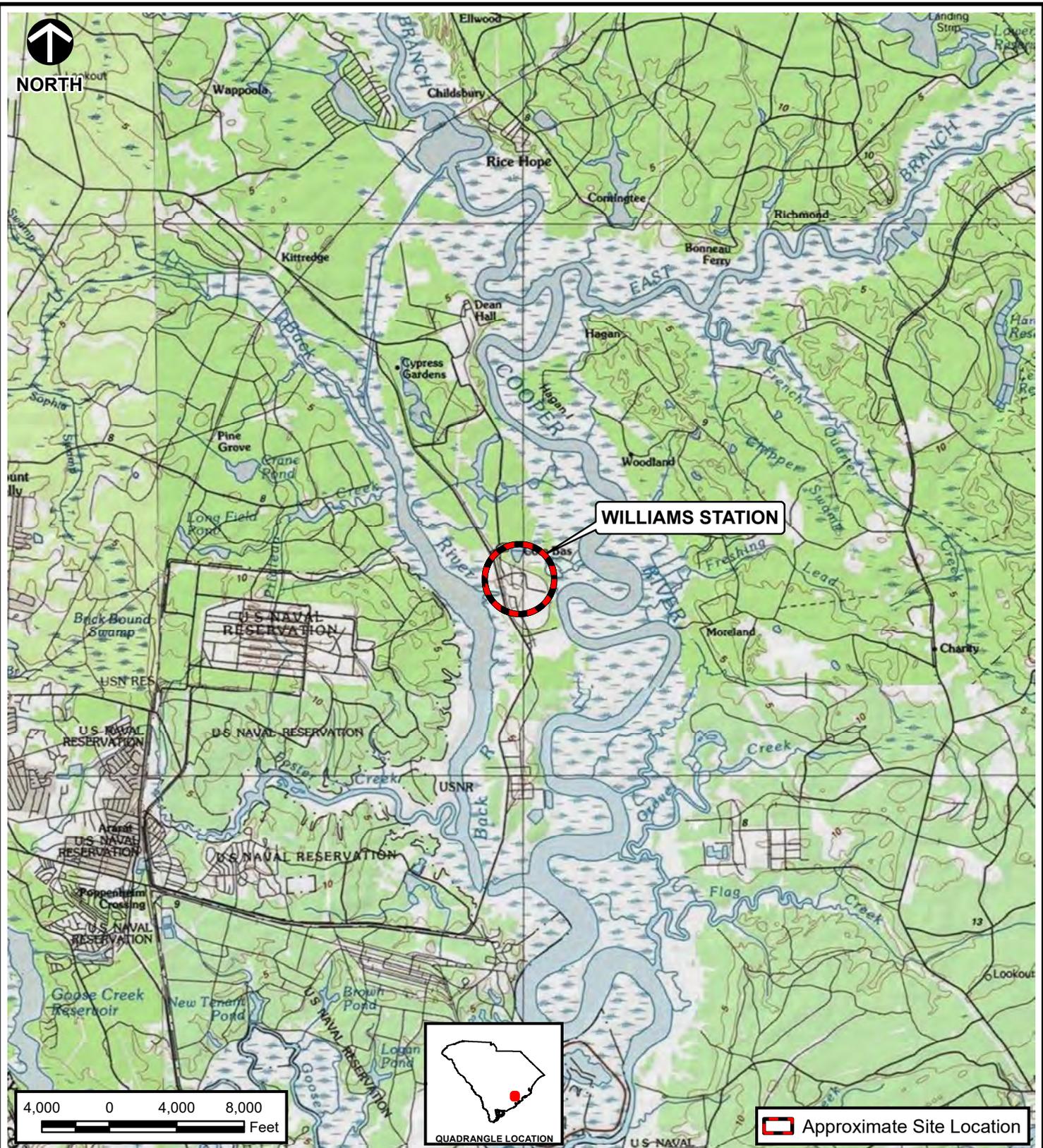
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Date



FIGURES

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SOURCE: PORTION OF THE USGS 7.5-MINUTE SERIES TOPOGRAPHIC QUADRANGLE MAP(S): KITTREDGE, SOUTH CAROLINA, 1979.



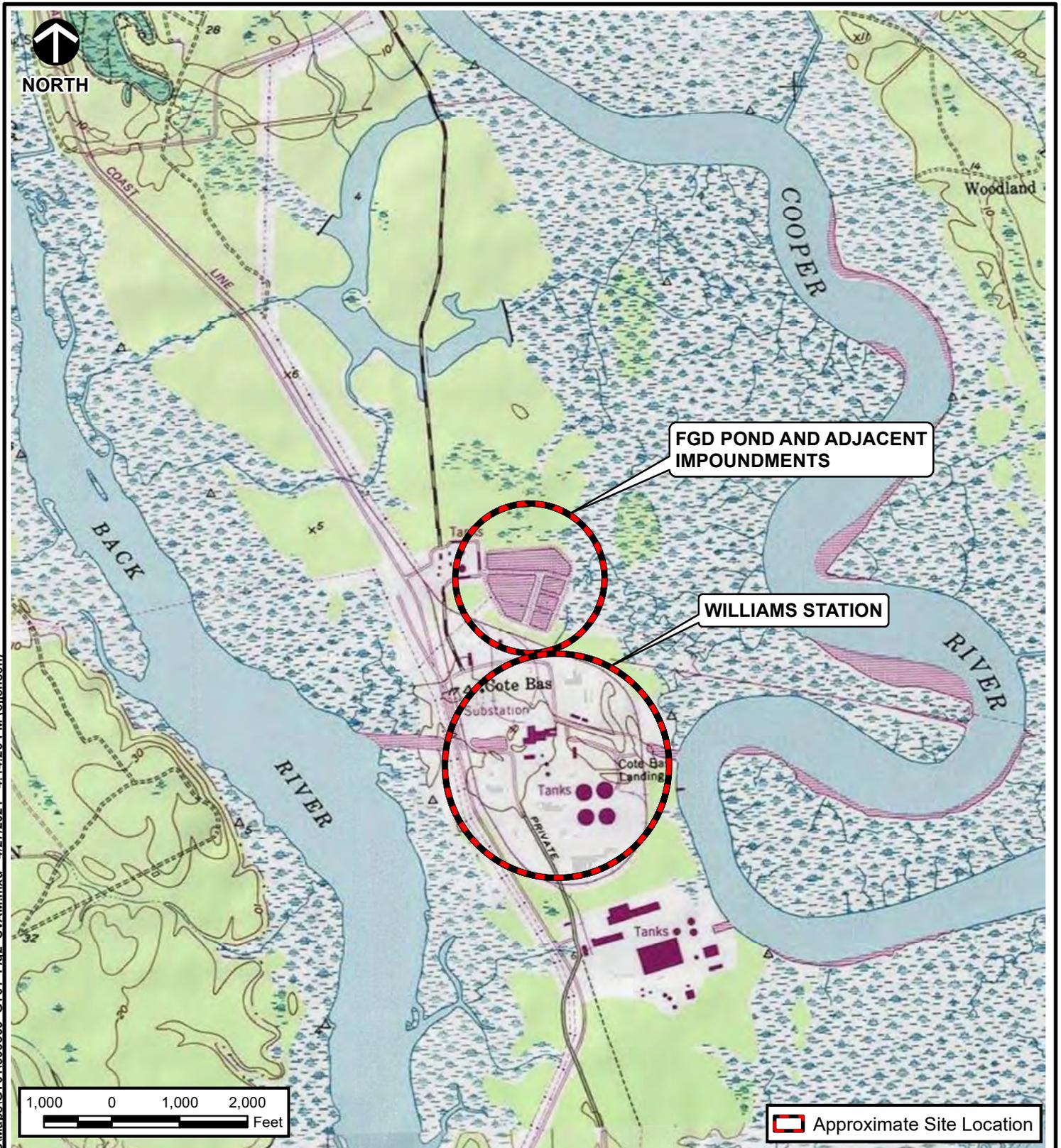
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DOMINION ENERGY SOUTH CAROLINA, INC.
 NEW FGD POND
 WILLIAMS POWER STATION
 GOOSE CREEK, SOUTH CAROLINA

SITE LOCATION MAP

DRAWN BY:	CEJ	CHECKED BY:	APA	APPROVED BY:	APA*	FIGURE NO:	1
DATE:	APRIL 27, 2021	DWG SCALE:	1" = 8,000'	PROJECT NO:	306-309-AW01		

Signature on File *



SOURCE: PORTION OF THE USGS 7.5-MINUTE SERIES TOPOGRAPHIC QUADRANGLE MAP(S): KITTREDGE, SOUTH CAROLINA, 1979.



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 WILLIAMS POWER STATION
 GOOSE CREEK, SOUTH CAROLINA

SITE AND VICINITY AERIAL MAP

DRAWN BY:	CEJ	CHECKED BY:	APA	APPROVED BY:	APA*	FIGURE NO:	2
DATE:	APRIL 27, 2021	DWG SCALE:	1" = 2,000'	PROJECT NO:	306-309-AW01		

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NORTH

FORMER POND C AND FGD POND NOW DESIGNATED NEW FGD POND

Pond E

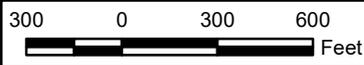
Pond D

Pond B

Pond A

Coal Pile Runoff Pond

Bushy Park Road



LEGEND



APPROXIMATE PARCEL BOUNDARY



APPROXIMATE NEW FGD POND BOUNDARY

SOURCE: ESRI WORLD IMAGERY (CLARITY) / ARCGIS MAP SERVICE ACCESSED 4/26/21, IMAGERY DATE: 2020.



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WILLIAMS STATION OVERVIEW MAP

DRAWN BY:	CEJ	CHECKED BY:	APA	APPROVED BY:	APA*	FIGURE NO:	3
DATE:	APRIL 27, 2021	DWG SCALE:	1" = 600'	PROJECT NO:	306-309-AW01		

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NORTH



SOURCE: ESRI WORLD IMAGERY (CLARITY) / ARCGIS MAP SERVICE ACCESSED 4/26/21, IMAGERY DATE: 2020.



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WILLIAMS STATION FGD POND &
ADJACENT IMPOUNDMENTS MAP

DRAWN BY:	CEJ	CHECKED BY:	APA	APPROVED BY:	APA*	FIGURE NO:	4
DATE:	APRIL 27, 2021	DWG SCALE:	1" = 250'	PROJECT NO:	306-309-AW01		

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APPENDIX A

HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

SOUTH CAROLINA ELECTRIC & GAS



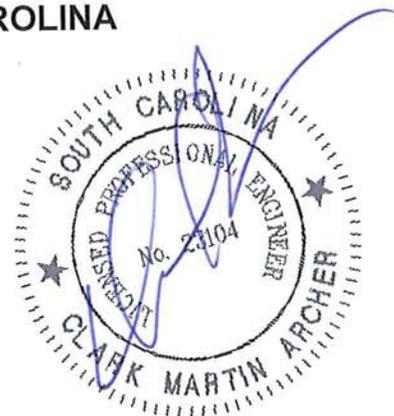
HAZARD POTENTIAL CLASSIFICATION ASSESSMENT

FOR THE

WILLIAMS STATION FGD POND

BERKELEY COUNTY, SOUTH CAROLINA

SEPTEMBER 2016



WILLIAMS STATION FGD POND 1 & 2 HAZARD POTENTIAL CLASSIFICATION ASSESSEMENT

SURFACE IMPOUNDMENT DESCRIPTION

The FGD POND 1 & 2 is located at the South Carolina Electric and Gas (SCE&G) Williams Station coal fired power generating facility in Berkeley County, South Carolina. Pond 1 & 2 are manmade impoundments constructed above existing ground, in an area above the 500-yr floodplain and with no wetlands nearby. The Pond bottom is concrete Fabriform placed on a HDPE constructed atop compacted clay fill. Pond 1 & 2 have surface areas of approximately 0.8 acres and 0.7 acres respectively with average depths of 4.5 feet and 1.5 feet of freeboard. Inner slopes range from 4:1 to 8:1. Outer slopes are no steeper than 3:1 with a maximum height of 10 feet. Top width of berm ranges from 10 to 20 feet with separation berm width of 6 feet.

Pond 1 & 2 alternately receive a single wastewater stream generated from the FGD scrubber system. Purge pumps discharge the wastewater from the secondary hydroclone overflow distribution tank to Pond 1 & 2. Solids are removed from the wastewater by settling in the Ponds. Pond 1 & 2 have volumes of approximately 0.6 million gallons and 0.5 million gallons, respectively. With a maximum average influent flowrate of 130 gpm, the residence times in Pond 1 and Pond 2 is approximately 4 days. Flow continues to Settling Pond D and then accumulates in Settling Pond until it is pumped out to the Cooling Tower Blowdown Basin. The wastewater pond are maintained periodically by dewatering to remove accumulated particulate material as well as inspect the concrete bottom.

REGULATION

§ 257.73 (a) (2) – Periodic hazard potential classification assessments.

(i) The owner or operator of the CCR unit must conduct initial and periodic hazard potential classification assessments of the CCR unit according to the timeframes specified in paragraph (f) of this section. The owner or operator must document the hazard potential classification of each CCR unit as either a high hazard potential CCR surface impoundment, a significant hazard potential CCR surface impoundment, or a low hazard potential CCR surface impoundment. The owner or operator must also document the basis for each hazard potential classification.

(ii) The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial hazard potential classification and each subsequent periodic classification specified in paragraph (a)(2)(i) of this section was conducted in accordance with the requirements of this section.

CLASSIFICATION SYSTEM

A primary purpose of any classification system is to select appropriate design criteria. In other words, design criteria will become more conservative as the potential for loss of life and/or property damage increases. However, postulating every conceivable circumstance that might remotely place a person in the inundation zone whenever a failure may occur should not be the basis for determining the conservatism in dam design criteria.

This hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests. Improbable loss of life exists where persons are only temporarily in the potential inundation area. For instance, this hazard potential classification system does not contemplate the improbable loss of life of the occasional recreational user of the river and downstream lands, passer-by, or non-overnight outdoor user of downstream lands. It should be understood that in any classification system, all possibilities cannot be defined. High usage areas of any type should be considered appropriately. Judgment and common sense must ultimately be a part of any decision on classification. Further, no allowances for evacuation or other emergency actions by the population should be considered because emergency procedures should not be a substitute for appropriate design, construction, and maintenance of dam structures.

Three classification levels are adopted as follows: LOW, SIGNIFICANT, and HIGH, listed in order of increasing adverse incremental consequences. The classification levels build on each other, i.e., the higher order classification levels add to the list of consequences for the lower classification levels, as noted in the table on the following page.

This hazard potential classification system is utilized with the understanding that the failure of any dam or water-retaining structure, no matter how small, could represent a danger to downstream life and property. Whenever there is an uncontrolled release of stored water, there is the possibility of someone, regardless of how unexpected, being in its path.

1. LOW HAZARD POTENTIAL

Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

2. SIGNIFICANT HAZARD POTENTIAL

Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

3. HIGH HAZARD POTENTIAL

Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

ASSESSMENT

The hazard potential classification assessment is made using a phased approach utilizing three levels of effort: presumptive, incremental hazard assessment (dam break studies), and risk based assessment. It is intended that the classification determination will proceed from the simplest method (presumptive) using existing data and field reconnaissance, to the most complex (risk based assessment) in a step sequence. In most cases, all three methods will not be required.

PRESUMPTIVE

Based on the design and construction of Pond 1 & 2, the ability to control incoming flow, and the inability for stormwater runoff to enter the surface impoundment; it is presumed that the Hazard Potential Classification would be Low. Structural failure is extremely unlikely unless a catastrophic event occurs. Overtopping occurs between 1 & 2 and then to Settling Pond D passing over a manmade structural spillway.

INCREMENTAL HAZARD

The Berm failure scenario may result in immediate damage to the outer slopes due to high velocities but would dissipate rapidly as the water level decreases. All flooding outside the Pond would occur on open area, roads, and ditches and would be limited to the volume of the impoundment. Flood waters would subside quickly in ditches. Hazard Potential Classification could be considered Low.

RISK BASED

South Carolina recently experience 1000-yr storm event in which no damage was sustained to Pond 1 & 2. The likelihood of any other catastrophic event and its probability of personal injury related to the Ponds is estimated below.

The following scale is used to rank the probability of event as low, significant, or high risk potential.

1% - 33% - Low

34% - 66% - Significant

67% - 99% - High

Earthquake: Probability of a person in the area of the failing berms during a major earthquake (magnitude 7.0) that may result in serious injury or death.
Disaster – 6% chance of 7.0 magnitude earthquake occurring in this area sometime during the next 50 years.
(U.S. Geological Survey 2009 PSHA Model, map included)
Exposure – 2% (30 /1440 Minutes per day) person in area
Vulnerability – 1% chance that constructed berms randomly fail. Berms unlikely to fail but use 1% as a measurable value

$.01 \times .02 = .0002 \rightarrow 0.02\%$ - berms fail while person in area

Assume berm failure $\rightarrow 99\%$ - berms fail during an earthquake

$.99 \times .02 = .0198 \rightarrow 2\%$ - berms fail during an earthquake and person in area

2% is considered Low risk.

Hurricane: Probability of a person in the area of the failing berms during a major hurricane (category 3 -5) that may result in serious injury or death.
Disaster – 4% chance of major hurricane occurring in this area sometime during the next 50 years.
(U.S. Geological Survey 2009 PSHA Model, map included)
Exposure – 0% person in area (Plant would be evacuated)
Vulnerability – 1% chance that constructed berms randomly fail. Berms unlikely to fail but use 1% as a measurable value

$.01 \times 0 = 0.0 \rightarrow 0\%$ - berms fail while person in area

Assume berm failure $\rightarrow 99\%$ - berms fail during a hurricane

$.99 \times 0 = 0 \rightarrow 0\%$ - berms fail during a hurricane and person in area

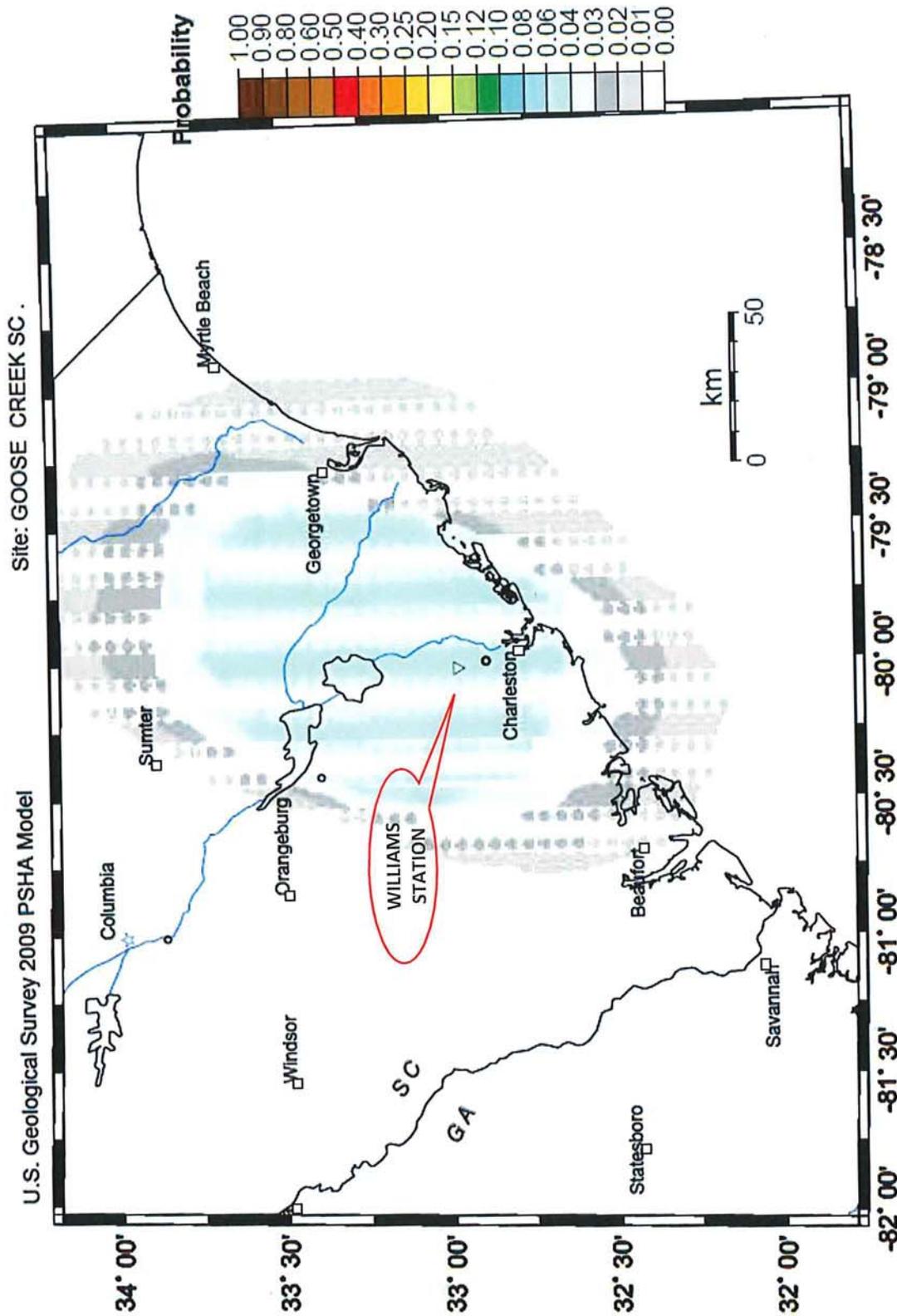
Round up to 1% (no absolute zero risk) and would be considered Low risk.

Due to early warning systems the probabilities of other natural disasters (tornados, flooding) for the location of Ponds 1 & 2 would be equivalent to hurricanes; resulting in probabilities estimated between 0-1%. Risk Based assessment presents Pond 1 & 2 to be Low Hazard Potential Classification.

DETERMINATION

It is determined that FGD Pond 1 & 2 is considered to be a **Low** Hazard Potential. The classification will be reassessed in the event that changes occur associated with the design or with the integrity of the surface impoundment.

Probability of earthquake with $M > 7.0$ within 50 years & 50 km



Earthquake probabilities from USGS OFR 08-1128 PSHA. 50 km maximum horizontal distance. Site of interest: triangle. Epicenters mb-5 black circles; rivers blue.

APPENDIX B

DESIGN CRITERIA EXEMPTIONS

SOUTH CAROLINA ELECTRIC & GAS



DESIGN CRITERIA EXEMPTIONS

FOR THE

WILLIAMS STATION FGD POND

BERKELEY COUNTY, SOUTH CAROLINA

SEPTEMBER 2016



MEMO

To: Joe Todd, Gene Delk, Lee Newman; F/H

Cc: Kevin Wicker, Mark Valerio; Williams Station

Darrell Shier, Jean-Claude Younan, Mike Moore, Rocky Archer; CESD

From: Tim Miller

Date: August 24, 2016

Subject: Williams Station – CCR Periodic Structural Stability Assessment
Exemption for Williams Station Flue Gas Desulfurization (FGD)
Ponds

Background:

The Flue Gas Desulfurization (FGD) Ponds at Williams Station were designed by Garrett and Moore, Inc., 1258 Benson Rd., Garner, NC 27529 and constructed in 2008.

Location:

Williams Station
2242 Bushy Park Rd.
Goose Creek, SC 29445

Flue Gas Desulfurization (FGD) Pond Dimensions:

FGD Pond #1: Area = 0.94 acres; dike height = 5.5'; Volume = 5.2 acre-ft.

FGD Pond #2: Area = 0.97 acres; dike height = 5.5'; Volume = 5.3 acre-ft.

Findings:

The CCR Surface Impoundments at Williams Station do not meet the criteria of 40 CFR 257.73 (b). According to subsection 257.73 (b), *The requirements of paragraphs (c) through (e) of this section (257.73) apply to an owner or operator of an existing CCR surface impoundment that either: (1) has a height of five (5) feet or more and a storage volume of 20 acre-feet or more; or (2) has a height of 20 feet or more.*

According to Section 257.73 (b)(1), the Williams Station Flue Gas Desulfurization (FGD)



Ponds are exempt from the periodic structural stability assessment requirement of subsection 257.73 (d).

References:

1. SCE&G Williams Station FGD Scrubber Blowdown Wastewater Pond Drawings, Sheet 2 Grading Plans and Sections, Garrett and Moore, Inc., December 2008
2. 40 CFR Part 257, Criteria for Classification of Solid Waste Disposal Facilities and Practices, Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments, Federal Register, Vol. 80 No. 74, April 17, 2015

A handwritten signature in black ink, appearing to read "Tim Miller, Jr.", is written over a horizontal line.

Tim Miller, Jr., P.E.
SCE&G Chief Dam Safety Engineer

24 Aug 2016

Date