



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

December 7, 2021

Ms. Cheryl A. Gayheart  
Regulatory Affairs Director  
Southern Nuclear Operating Co., Inc.  
3535 Colonnade Parkway  
Birmingham, AL 35243

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2, ISSUANCE OF AMENDMENT NOS. 210 AND 193, REGARDING REVISION TO TECHNICAL SPECIFICATION 3.3.5, "4.16 KV [KILOVOLT] ESF [ENGINEERED SAFETY FEATURE] BUS LOSS OF POWER (LOP) INSTRUMENTATION" (EPID L-2021-LLA-0054)

Dear Ms. Gayheart:

The Nuclear Regulatory Commission (NRC, the Commission) has issued the enclosed Amendment No. 210 to Renewed Facility Operating License NPF-68 and Amendment No. 193 to Renewed Facility Operating License NPF-81 for the Vogtle Electric Generating Plant, Units 1 and 2, respectively. The amendments consist of changes to the License and technical specifications (TSs) for each unit in response to your application dated March 30, 2021, as supplemented by letter dated May 6, 2021.

The amendments revise TS 3.3.5, "4.16 kV [kilovolt] ESF [Engineered Safety Feature] ESF Loss of Power (LOP) Instrumentation," Surveillance Requirement 3.3.5.2 Allowable Values.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

/RA/

John G. Lamb, Senior Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-424 and 50-425

Enclosures:

1. Amendment No. 210 to NPF-68
2. Amendment No. 193 to NPF-81
3. Safety Evaluation

cc: Listserv



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NUCLEAR REGULATORY COMMISSION  
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SOUTHERN NUCLEAR OPERATING COMPANY, INC.

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA

CITY OF DALTON, GEORGIA

DOCKET NO. 50-424

VOGTLE ELECTRIC GENERATING PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 210  
Renewed License No. NPF-68

1. The Nuclear Regulatory Commission (NRC, the Commission) has found that:
  - A. The application for amendment to the Vogtle Electric Generating Plant, Unit 1 (the facility) Renewed Facility Operating License No. NPF-68 filed by the Southern Nuclear Operating Company, Inc. (the licensee), acting for itself, Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and City of Dalton, Georgia (the owners), dated March 30, 2021, and supplemented by letter dated May 6, 2021, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-68 is hereby amended to read as follows:

Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 210, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. Southern Nuclear shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to License No. NPF-68  
and the Technical Specifications

Date of Issuance: December 7, 2021



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

GEORGIA POWER COMPANY

OGLETHORPE POWER CORPORATION

MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA

CITY OF DALTON, GEORGIA

DOCKET NO. 50-425

VOGTLE ELECTRIC GENERATING PLANT, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 193  
Renewed License No. NPF-81

1. The Nuclear Regulatory Commission (NRC, the Commission) has found that:
  - A. The application for amendment to the Vogtle Electric Generating Plant, Unit 2 (the facility) Renewed Facility Operating License No. NPF-81 filed by the Southern Nuclear Operating Company, Inc. (the licensee), acting for itself, Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and City of Dalton, Georgia (the owners), dated March 30, 2021, and supplemented by letter dated May 6, 2021, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-81 is hereby amended to read as follows:

Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 193, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. Southern Nuclear shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to License No. NPF-81  
and the Technical Specifications

Date of Issuance: December 7, 2021

ATTACHMENT

VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2

TO LICENSE AMENDMENT NO. 210

RENEWED FACILITY OPERATING LICENSE NO. NPF-68

DOCKET NO. 50-424

AND

TO LICENSE AMENDMENT NO. 193

RENEWED FACILITY OPERATING LICENSE NO. NPF-81

DOCKET NO. 50-425

Replace the following pages of the Licenses and the Appendix A Technical Specifications (TSs) with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages

License

License No. NPF-68, page 4  
License No. NPF-81, page 3

TSs

3.3.5-2

Insert Pages

License

License No. NPF-68, page 4  
License No. NPF-81, page 3

TSs

3.3.5-2

(1) Maximum Power Level

Southern Nuclear is authorized to operate the facility at reactor core power levels not in excess of 3625.6 megawatts thermal (100 percent power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 210, and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. Southern Nuclear shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) Southern Nuclear Operating Company shall be capable of establishing containment hydrogen monitoring within 90 minutes of initiating safety injection following a loss of coolant accident.

(4) Deleted

(5) Deleted

(6) Deleted

(7) Deleted

(8) Deleted

(9) Deleted

(10) Mitigation Strategy License Condition

The licensee shall develop and maintain strategies for addressing large fires and explosions and that include the following key areas:

(a) Fire fighting response strategy with the following elements:

1. Pre-defined coordinated fire response strategy and guidance
2. Assessment of mutual aid fire fighting assets
3. Designated staging areas for equipment and materials
4. Command and control
5. Training and response personnel

(b) Operations to mitigate fuel damage considering the following:

1. Protection and use of personnel assets
2. Communications
3. Minimizing fire spread
4. Procedures for Implementing integrated fire response strategy
5. Identification of readily-available pre-staged equipment
6. Training on integrated fire response strategy

- (2) Georgia Power Company, Oglethorpe Power Corporation, Municipal Electric Authority of Georgia, and City of Dalton, Georgia, pursuant to the Act and 10 CFR Part 50, to possess but not operate the facility at the designated location in Burke County, Georgia, in accordance with the procedures and limitations set forth in this license;
- (3) Southern Nuclear, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;
- (4) Southern Nuclear, pursuant to the Act and 10 CFR Parts 30, 40, and 70 to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (5) Southern Nuclear, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;
- (6) Southern Nuclear, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility authorized herein.

C. This license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter 1 and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect, and is subject to the additional conditions specified or incorporated below.

(1) Maximum Power Level

Southern Nuclear is authorized to operate the facility at reactor core power levels not in excess of 3625.6 megawatts thermal (100 percent power) in accordance with the conditions specified herein.

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 193 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. Southern Nuclear shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

The Surveillance requirements (SRs) contained in the Appendix A Technical Specifications and listed below are not required to be performed immediately upon implementation of Amendment No. 74. The SRs listed below shall be



ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Actions and associated Completion Times not met in MODES 1, 2, 3, or 4.	D.1 Be in MODE 3.	6 hours
	<u>AND</u> D.2 Be in MODE 5.	36 hours
E. Required Action and associated Completion Time not met when the associated DG is required OPERABLE by LCO 3.8.2.	E.1 Enter applicable Condition(s) and Required Action(s) for the associated DG made inoperable by LOP DG start instrumentation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.5.1 Perform COT.	In accordance with the Surveillance Frequency Control Program
SR 3.3.5.2 Perform CHANNEL CALIBRATION with Nominal Trip Setpoint and Allowable Value as follows:  A. Loss of voltage Allowable Value $\geq 2958.2$ V with a time delay of $\leq 0.8$ second.  Loss of voltage Nominal Trip Setpoint 2975 V with a time delay of $\leq 0.8$ second.  B. Degraded voltage Allowable Value $\geq 3729.2$ V with a time delay of $\leq 20$ seconds.  Degraded voltage Nominal Trip Setpoint 3746 V with a time delay of $\leq 20$ seconds.	In accordance with the Surveillance Frequency Control Program

(continued)



UNITED STATES  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 210 TO RENEWED FACILITY OPERATING LICENSE NPF-68

AND

AMENDMENT NO. 193 TO RENEWED FACILITY OPERATING LICENSE NPF-81

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-424 AND 50-425

1.0 INTRODUCTION

By application dated March 30, and May 6, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML21089A388 and ML21126A231, respectively), Southern Nuclear Operating Company, Inc. (SNC, the licensee), requested revisions to the technical specifications (TSs) for the Vogtle Electric Generating Plant (Vogtle), Units 1 and 2.

The proposed amendments seek to revise the Allowable Values (AVs) for the Loss of Voltage (LOV) and Degraded Voltage (DV) relay voltage settings in TS 3.3.5, "4.16 kV [kilovolt] ESF [Engineered Safety Feature] Loss of Power (LOP) Instrumentation," Surveillance Requirement (SR) 3.3.5.2.

2.0 REGULATORY EVALUATION

2.1 Regulations

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical specifications," establishes regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36, TSs are required to include items in the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (LCOs); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls.

The regulation 10 CFR 50.36(c)(1)(ii)(A) requires, in part, "Where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting must be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. If, during operation, it is determined that the automatic safety system does not

function as required, the licensee shall take appropriate action, which may include shutting down the reactor.”

The regulation 10 CFR 50.36(c)(3) states that, "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met."

The regulation 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," specifically, Appendix A, "General Design Criteria [GDC] for Nuclear Power Plants," to 10 CFR Part 50, states in part that the principle design criteria establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety.

Criterion 13, "Instrumentation and Control," of Appendix A to 10 CFR 50, states, in part, that "Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

Criterion 17, "Electric Power Systems," of Appendix A to 10 CFR Part 50, states, in part, that "An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents."

Criterion 18, "Inspection and Testing of Electric Power Systems," of Appendix A to 10 CFR Part 50, states, in part, that electric power systems important to safety shall be designed to permit appropriate periodic inspection and testing of important areas and features such as wiring, insulation, connections, and switchboards, to assess the continuity of the systems and their components.

Criterion 20, "Protection System Functions," of Appendix A to 10 CFR Part 50 states that the protection system shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

### Guidance Documents

Regulatory Guide (RG) 1.105, Revision 4, "Setpoints for Safety-Related Instrumentation," February 2021 (ADAMS Accession No. ML20330A329), describes a method acceptable to the U.S. Nuclear Regulatory Commission (NRC) staff for use in complying with the NRC's regulations to ensure that a) setpoints for safety-related instrumentation are established to protect nuclear power plant safety and analytical limits, and b) the maintenance of instrument channels implementing these setpoints ensures they are functioning as required, consistent with

the plant technical specifications. RG 1.105, Revision 4, endorses the American National Standards Institute/International Society of Automation (ANSI/ISA) Standard 67.04.01-2018, "Setpoints for Nuclear Safety-Related Instrumentation."

The NRC RG 1.239, "Licensee Actions to Address Nonconservative Technical Specifications," November 2020 (ADAMS Accession No. ML20294A510), describes a method acceptable to the NRC staff for licensee actions to address nonconservative TSs. RG 1.239 endorses NEI 15-03, Revision 3, "Licensee Actions to Address Nonconservative Technical Specifications."

Regulatory Issue Summary (RIS) 2011-12, , "Adequacy of Station Electric Distribution System Voltages," Revision 1, dated December 29, 2011 (ADAMS Accession No. ML113050583). The RIS clarifies the NRC staff's technical positions on voltage studies necessary for Degraded Voltage Relay (DVR) (second level undervoltage protection) setting bases and transmission network/offsite/station electric power system design bases for meeting the regulatory requirements specified in GDC 17, "Electric Power Systems," of Appendix A to 10 CFR Part 50. The RIS states, in part, that "Licensee voltage calculations should provide the basis for their DVR settings, ensuring safety-related equipment is supplied with adequate voltage (dependent on equipment manufacturers design requirements), based on bounding conditions for the most limiting safety-related load (in terms of voltage) in the plant."

The RIS 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, 'Technical Specifications,' Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels," dated August 24, 2006 (ADAMS Accession No. ML051810077), discusses issues that could occur during testing of limiting safety system settings and, therefore, may have an adverse effect on equipment operability. The RIS also presents an approach found acceptable to the NRC staff for addressing these issues for use in licensing actions that require prior NRC approval.

## 2.2 System Design and Operation

For Vogtle, Units 1 and 2, a fully automatic protection system with appropriate redundant channels is provided to cope with transient events where insufficient time is available for manual corrective action. The ESF actuation system automatically initiates emergency core cooling and other safety functions by sensing accident conditions, using redundant analog channels measuring diverse variables. See pages E-1 and E-2 of the license amendment request (LAR) dated March 30, 2021, for the detailed description of the Vogtle system design and operation.

## 2.3 Description of the Proposed Changes

The current Surveillance Requirement (SR) 3.3.5.2 states, in part:

Perform CHANNEL CALIBRATION with Nominal Trip Setpoint and Allowable Value as follows:

A. Loss of voltage Allowable Value  $\geq 2912$  V [volt] V with a time delay of  $\leq 0.8$  second.

Loss of voltage Nominal Trip Setpoint 2975 V with a time delay of  $\leq 0.8$  second.

B. Degraded voltage Allowable Value  $\geq 3683$  V with a time delay of  $\leq 20$  seconds.

Degraded voltage Nominal Trip Setpoint 3746 V with a time delay of  $\leq 20$  seconds.

The SNC proposes to replace the existing AVs for the loss of voltage and degraded voltage setpoints with AVs calculated in accordance with the Vogtle Electric Generating Plant Setpoint Program. The licensee stated that the time delay does not change in either function.

The SNC proposed changing the AVs of SR 3.3.5.2 to:

- A. Loss of Allowable Value  $\geq 2958.2$  V with a time delay of  $\leq 0.8$  seconds.

Loss of voltage Nominal Trip Setpoint 2975 V with a time delay of  $\leq 0.8$  second.

- B. Degraded voltage Allowable Value  $\geq 3729.2$  V with a time delay of  $\leq 20$  seconds.

Degraded voltage Nominal Trip Setpoint 3746 V with a time delay of  $\leq 20$  seconds.

The SNC stated that the current SR 3.3.5.2 for channel calibration of the loss of voltage and the degraded voltage AV limits are equivalent to the Analytical Limits (ALs) for loss of voltage and degraded voltage, and should be more conservative than the ALs.

### 3.0 TECHNICAL EVALUATION

The NRC staff reviewed the licensee's regulatory and technical analyses in support of the proposed changes, as described in the license amendment request (LAR), and its attachments. RG 1.105, Revision 4, endorses the ANSI/ISA Standard 67.04.01-2018, "Setpoints for Nuclear Safety-Related Instrumentation." The NRC staff used this guide to establish the adequacy of the licensee's setpoint calculation methodologies and the related plant surveillance procedures. The NRC staff evaluated the proposed LAR using guidance in RG 1.105, Revision 4, and ANSI/ISA 67.04.01-2018 to verify (1) whether the proposed setpoints (AVs) for loss of voltage (LOV) and degraded voltage (DV) of the safety-related instrumentation are established within the safety limits; and (2) that the safety-related equipment is supplied with adequate voltage based on bounding conditions for the most limiting safety-related load of the plant.

As part of its evaluation, the NRC staff performed an independent confirmatory evaluation to verify:

- The licensee's setpoint calculation methodology assures that control and monitoring setpoints are established and maintained in a manner consistent with plant safety function requirements. The licensee's setpoint calculation methodology uses the square root of the sum of the squares (SRSS) as a means of combining normally distributed and independent uncertainty terms and uses algebraic summation as a means of combining uncertainty terms that are not random or not normally distributed, or are dependent.
- There are adequate margins between ALs and the proposed AVs.
- SNC's setpoint calculation values are adequate to assure, with a high confidence level, that required protective actions are initiated before the associated plant process parameters exceed the analytical limits.

### 3.1 Summary of Licensee Methodology

In its submittal dated March 20, 2021, the licensee stated that:

SNC has performed an analysis to determine the Allowable Value setpoint for SR 3.3.5.2 using the plant specific setpoint methodology. This methodology was submitted to the NRC (Reference 2 [Letter from SNC to NRC, dated August 12, 2011, NRC Request for Additional Information for License Amendment Request for Steam Generator Water Level High-High (P-14) Setpoint Change (ADAMS Accession No. ML11228A119)]) and reviewed by the NRC (Reference 3 [Letter from NRC to SNC, dated February 27, 2012, Issuance of Amendments Regarding Steam Generator Water Level High-High Technical Specification, Table 3.3.1-1 and Table 3.3.2-1 Setpoint Changes (ADAMS Accession No. ML12033A126)]).

The NRC staff is not relying on References 2 and 3 in this safety evaluation because the changes requested in Reference 2 are different from those proposed in the March 30, 2021, LAR. However, the licensee stated that its uncertainty methodology is based on the SRSS. The NRC staff verified that licensee used the SRSS for the independent uncertainty factors.

In its submittal dated March 30, 2021, SNC stated that the Combined Rack Calibration Accuracy (RCA) is based on the accuracy of the modules that make up the rack. The voltage to current (E/I) module and the analog to digital (A/D) module provide the uncertainties that are used to calculate the RCA. The licensee used the SRSS method to determine the RCA. In its supplement dated May 6, 2021, the licensee provided the part numbers of the E/I and A/D modules and associated data sheets (Attachments 1 and 2 of the supplement).

The NRC staff notes that the licensee's methods for combining uncertainties of the proposed AV for the LOV and DV relays in SR 3.3.5.2 A and SR 3.3.5.2 B are consistent with the guidance in Section 4.5.1, "Square-root-sum-of-squares (SRSS) method," of ANSI/ISA 67.04.01-2018 and Regulatory Position C.1 in RG 1.105 Revision 4, and would, therefore, provide reasonable assurance that the proposed setpoints are established and maintained in a manner consistent with plant safety function requirements.

### 3.2 NRC Evaluation of AVs for LOV and DV Relay Voltage Settings

In this safety evaluation report, the NRC clarifies following terms used in its independent evaluation of the licensee's request:

- Analytical Limit (AL) – Limit of a measure or calculated variable established by the safety analysis to ensure that a safety limit is not exceeded.
- Allowable Value (AV) – A limiting value that the trip setpoint may have when tested periodically, beyond which appropriate action shall be taken.
- Trip Setpoint – A predetermined value for actuation of the final setpoint device to initiate a protective action.

Additionally, Section 4.3, "Trip Setpoint" and Figure 1, "Relation between setpoint parameters" of ANSI/ISA 67.04.01-2018 identify allowances for offsetting the trip setpoint from the AL, and

for ensuring that the channel remains below the AV during periodic surveillances. The NRC also clarifies use of the following terms in this NRC safety evaluation:

- Trip Margin – an allowance provided between the trip setpoint and the analytical limit to ensure a trip before the AL is reached.
- Nominal Trip Setpoint (NTS) Margin ( $\text{Margin}_{\text{NTS}}$ ) - An allowance provided between the NTS and the AL (Region (A + B) in Figure 1 of ANSI/ISA 67.04.01-2018). The NRC staff noted that in the LAR, the licensee used the term “Desired Relay Dropout Voltage” for NTS.
- AV Margin ( $\text{Margin}_{\text{AV}}$ ) - The margin between the Maximum AV and the AL that is observable during TS surveillances where the channel may be determined inoperable (Region B in Figure 1 of ANSI/ISA 67.04.01-2018).

The NRC evaluated the proposed changes to verify whether the licensee’s proposed changes are consistent with RIS 2011-12 and RIS 2006-17 for establishing AVs, Nominal Setpoints, and As-Left and As-Found tolerances.

The NRC staff reviewed the proposed AVs for the LOV and DV relay settings associated with SR 3.3.5.2 A and SR 3.3.5.2 B and performed an independent verification to confirm whether there are adequate margins for instrument channel performance uncertainty between the ALs and the NTSs and associated AVs of the LOV and DV relays to continue to satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A).

The SNC proposed to change the AVs for the LOV and DV relay voltage settings associated with SR 2.3.5.2 A and SR 3.3.5.2 B as below:

	Existing AV	Proposed AV
SR 3.3.5.2.A (Loss of Voltage)	$\geq 2912$ Volts (V)	$\geq 2958.2$ V
SR 3.3.5.2.B (Degraded Voltage)	$\geq 3683$ V	$\geq 3729.2$ V

In its submittal dated March 30, 2021, the licensee stated:

The Allowable Value is determined by adding (or subtracting) the RCA of the device tested during the Channel Operational Test to the Nominal Trip Setpoint in the non-conservative direction (i.e., toward or closer to the Safety Analysis Limit) for the application.

The Nominal Trip Setpoint was previously calculated and is contained in SR 3.3.5.2. The Nominal Trip Setpoint is not being changed by this request. The calculation for the Allowable Value is shown below using the Nominal Trip Setpoint values from the TS.”

The voltage to current (E/I) module and the analog to digital (A/D) module provide the uncertainties that are used to calculate the RCA. The Square Root Sum of the Squares method was used to determine the RCA. This is acceptable because the E/I module and A/D module were supplied from separate vendors and are statistically independent.

The NRC staff reviewed the summary of the licensee RCA calculation provided in the LAR that supports the proposed AVs for the LOV and DV relay voltage settings associated with SR 3.3.5.2 A and SR 3.3.5.2 B.

SNC calculated the RCA and AVs for the LOV and DV relays using the following equations:

$$\text{RCA} = [\text{E/I module}^2 \% + \text{A/D module}^2 \% + \text{bistable}^2 \%]^{1/2}$$

Where:

E/I module = 0.25 – supplied by the module vendor, Dataforth

A/D module = 0.20 – supplied by the module vendor, ABB

Bistable = 0 - since the number of software bits utilized to implement its setpoints is such that its error is negligible compared to the rest of the channel

The licensee stated:  $\text{RCA} = [0.25^2\% + 0.20^2\% + 0\%]^{1/2} = 0.32\%$

The RCA calculation used the uncertainties that are provided by the E/I module and the A/D module. These modules were supplied by separate vendors and are statistically independent. In response to the NRC staff's request dated April 19, 2021 (ADAMS Accession No. ML21095A087), the licensee provided, in its letter dated May 6, 2021, the data sheet for the Dataforth E/I module, Part Number DCCA33-04C (Attachment 1 of the Supplement) and (2) the data sheet for ABB A/D module, Part Number AI620 (Attachment 2 of the Supplement). In its supplement, SNC also provided the winding ratio of the sensing potential transformer as 35:1.

NRC staff reviewed datasheets for the E/I and A/D modules and noted:

E/I Module: Accuracy:  $\pm 0.25\%$  / Input (root mean square (rms)): 0V – 150V

A/D Module: Analog input error (maximum error @ 25° C): 0.2%

With the above data, the NRC staff verified:

$$\text{RCA} = [(0.25\%)^2 + (0.20\%)^2 + 0\%]^{1/2} = 0.0032 = 0.32\%$$

The licensee calculated the AVs for the LOV and DV by equations below:

$$\begin{aligned} \text{TS AV for LOV} &\geq [\text{NTS} - (\text{RCA} \times \text{span voltage}_{\text{pri}})] \\ &\geq [2975 \text{ VAC} - (0.0032 \times 5250 \text{ VAC})] \\ &\geq \mathbf{2958.2 \text{ VAC}} \end{aligned}$$

$$\begin{aligned} \text{TS AV for DV} &\geq [\text{Nominal Trip Setpoint} - (\text{RCA} \times \text{span voltage}_{\text{pri}})] \\ &\geq [3746 \text{ VAC} - (0.0032 \times 5250 \text{ VAC})] \\ &\geq \mathbf{3729.2 \text{ VAC}} \end{aligned}$$

The NRC staff verified the span voltage<sub>pri</sub> from Dataforth datasheet (DCCA33-04C):

Input (rms): 0V – 150V

Span Voltage<sub>pri</sub>:  $|0V - (150 \times 35)|$  (absolute value) = 5250V



The NRC staff verified that the information in the LAR is consistent with the information in the datasheets for the models used by SNC (DCCA33-04C and AI620).

As-Found Tolerance (AFT) and As-Left Tolerance (ALT) values of LOV and DV Relays:

In the letter dated May 6, 2021, SNC established the fixed-magnitude, two-sided AFT and ALT about the NTS of the LOV and DV relays. The AFT and ALT values are the same and they are:

Term		120 Volts Side of Sensing Transformer	4160 Volts Side of Sensing Transformer*
LOV	AFT	± 0.30 Volts	± 10.5 Volts
	ALT	± 0.30 Volts	± 10.5 Volts
	NTS	85.0 Volts	2975 Volts
DV	AFT	± 0.30 Volts	± 10.5 Volts
	ALT	± 0.30 Volts	± 10.5 Volts
	NTS	107.03 Volts	3746 Volts

\* Using the sensing transformer ratio of 35:1

In the letter dated May 6, 2021, SNC stated that there are no physical bistable relays, and the relays are modeled in software. The licensee also stated that a harmonic filter is not needed because there are not any physical relay's opening and closing contacts and generating harmonics. The licensee further stated that there is an analog low pass prefilter and a digital low pass filter built into the A/D module (ABB AI620). In its letter dated May 6, 2021, the licensee also provided:

- Degraded Voltage:

Setpoint (pickup) = 107.03 V    Hi Limit = 107.33 V    Low Limit = 106.73 V  
 Reset (dropout) = 108.53 V    Hi Limit = 108.83 V    Low Limit = 108.23 V

- Loss of Voltage:

Setpoint (pickup) = 85.00 V    Hi Limit = 85.30 V    Low Limit = 84.70 V  
 Reset (dropout) = 86.50 V    Hi Limit = 86.80 V    Low Limit = 86.20 V

- The licensee clarified in its supplement dated May 6, 2021, that: "the Analytical Limit (AL) for Degraded Voltage is 3683 V and for LOP is 2912 V. The ALs have not changed in the calculation."

Based on the above, the NRC staff used the guidance in RG 1.105, Revision 4, to independently confirm whether there are adequate margins for instrument channel performance uncertainty between the AL and NTS (Margin<sub>NTS</sub>) and associated AV (Margin<sub>AV</sub>). Because the affected relays detect the loss or degradation of the 4.16 kV Class 1E bus in the event of a loss of voltage condition, the NRC staff only performed an evaluation of the Margin<sub>NTS</sub> and Margin<sub>AV</sub> of the DV and LOV relays in the lower level of their setpoints.

Margin<sub>NTS</sub> and Margin<sub>AV</sub> of the DV relays:

$$\begin{aligned} \text{Margin}_{\text{NTS}} (a) &= |\text{AL} - \text{NTS}| \text{ (absolute value)} \\ \text{Margin}_{\text{AV}} (b) &= |\text{AL} - \text{AV}| \text{ (absolute value)} \\ \text{Margin Ratio \%} &= (b/a) \times 100 \% \end{aligned}$$

Margin<sub>NTS</sub> and Margin<sub>AV</sub> of the LOV relays:

$$\begin{aligned} \text{Margin}_{\text{NTS}} (c) &= |\text{AL} - \text{NTS}| \text{ (absolute value)} \\ \text{Margin}_{\text{AV}} (d) &= |\text{AL} - \text{AV}| \text{ (absolute value)} \\ \text{Margin Ratio \%} &= (d/c) \times 100 \% \end{aligned}$$

The NRC staff's evaluation and confirmatory results are summarized in Figure 1 below.

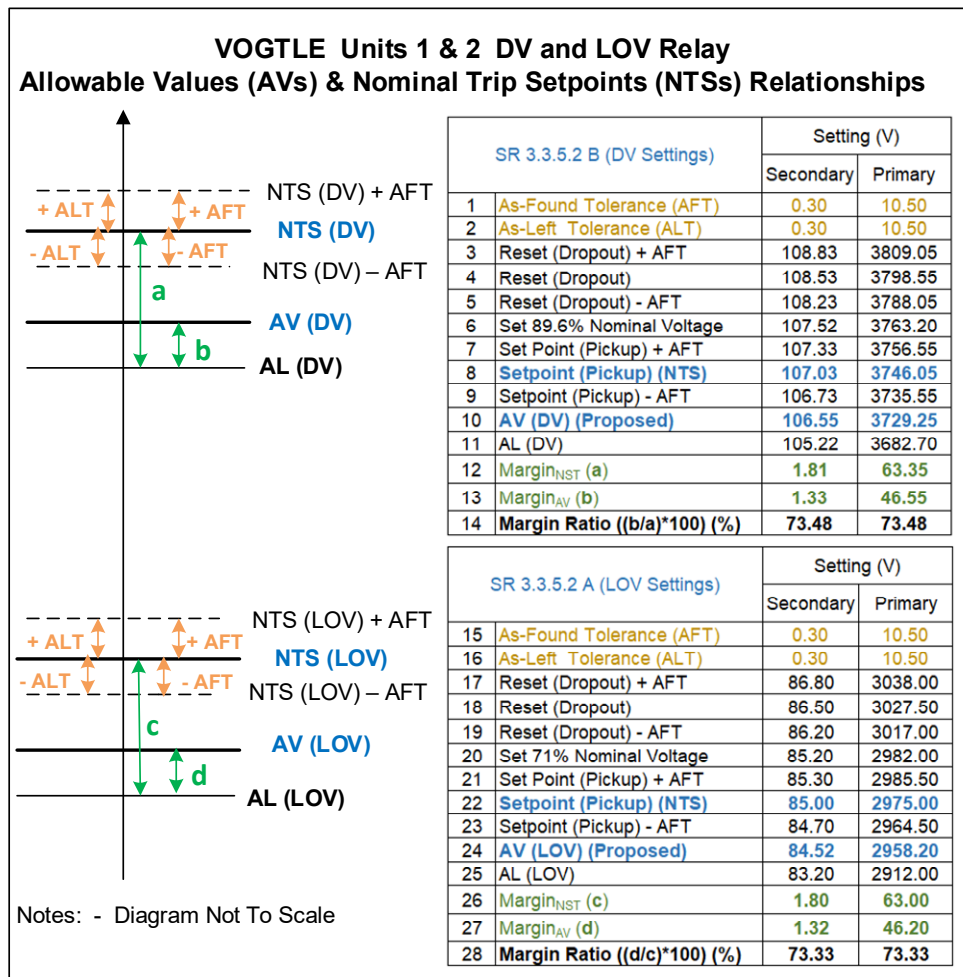


Figure 1: Vogtle Units 1 & 2 DV and LOV Relay AVs NTSs Relationships and Margins Calculations by NRC Staff

Based on its review as summarized in Figure 1 above, with respect to the proposed AVs for the DV and LOV relays in TS SRs 3.3.5.2 A and 3.3.5.2 B, the NRC staff has determined the following:

- The minimum Reset (Dropout) values of the DV and LOV (Rows 5 and 19) are greater than their maximum Setpoint (Pickup) values (Rows 7 and 21). Therefore, there is adequate separation between the pickup and dropout setpoints.
- The NTSs (Pickup) of DV and LOV inclusive of their AFTs (Rows 9 and 23) are greater than the AVs of DV and LOV (Rows 10 and 24), and therefore, would assure that the trip signals from the DV circuit and/or from LOV circuit would be initiated prior to exceeding their AV values.
- The undervoltage two-out-of-four logic is provided to allow load shedding and tripping of the incoming breaker. These devices are set to operate with a time delay (of  $\leq 0.8$  s for DV and  $\leq 20$ s for LOV (no change)) at the proposed minimum of 89.6-percent (for DV) and 71-percent (for LOV) of nominal voltage. These proposed settings are greater than the minimum settings in Chapter 7 of the Vogtle FSAR (88.5-percent (for DV) and 70-percent (for LOV)). Therefore, the proposed settings would be below the minimum expected voltage during the DG sequencing and would prevent the unwanted tripping and undervoltage induced damage to the safety-related loads.
- The ratio between the NTS and AV margins are greater than 73-percent (Rows 14 and 28) and are adequate. These margins ensure that the trip setpoints have been chosen to assure that a trip or safety actuation will occur well before the measured process reaches the Lower Analytical Limits (Minimum Equipment Acceptable Voltage). Therefore, the proposed AV settings support an automatic protective action before a safety limit is exceeded.

Based on the above, the NRC staff finds that the proposed DV and LOV relay settings (minimum AVs) for SR 3.3.5.2 A and SR 3.3.5.2 B in TS Section 3.3.5 maintain adequate AV margins, consistent with RG 1.105, and continue to satisfy the requirements of GDC 13. The NRC staff further finds the requirements of 10 CFR 50.36(c)(1)(ii)(A) and 10 CFR 50.36(c)(3) will be met, because automatic protective action will correct the abnormal situation before a safety limit is exceeded and the SR will assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met. Therefore, the proposed AVs are acceptable.

### 3.3 Evaluation of the Impact of the Proposed Change on Undervoltage Relays

According to the Vogtle Updated Final Safety Analysis Report (UFSAR), each Class 1E 4.16-kV bus is equipped with undervoltage relays for DG-start initiation and undervoltage annunciation. Two voltage sensing schemes for each Class 1E 4.16-kV bus are employed to initiate the logic signal. One scheme will detect a LOV, and the other will detect DV conditions. Upon detection of a LOV or DV on a Class 1E 4.16-kV bus, a logic signal is initiated to shed all loads, send signal to start EDG, and trip 4.16-kV preferred power supply (offsite source) breaker.

Logic is provided to allow load shedding and tripping of the incoming breaker on two-out-of-four undervoltage logic signals. These devices are set to operate with a time delay of 0.8 seconds at a minimum of 70-percent of nominal voltage, which is below the minimum expected voltage

during EDG sequencing. Additional undervoltage logic circuits are provided for each bus to detect DV conditions. These circuits are set to operate at a minimum of 88.5-percent of nominal voltage with a maximum time delay of 20 seconds. This setpoint is above the minimum motor starting voltage during normal operation. However, the time delay has been selected to prevent unwanted tripping and undervoltage induced damage to the safety-related loads.

In its submittal dated March 30, 2021, the licensee stated that SR 3.3.5.2 is the performance of a channel calibration. The NTS considers factors that may affect channel performance such as rack drift, etc. Therefore, the NTS (within the calibration tolerance) is the expected value for the channel calibration. Therefore, a channel with an actual Trip Setpoint value that is conservative with respect to the AV is considered Operable, but the channel should be reset to the NTS value (within the calibration tolerance) to allow for factors which may affect channel performance (such as rack drift) prior to the next surveillance.

The LOV and DV instruments provide signals to their respective sequencer to ensure an adequate ESF bus voltage is maintained and provide an anticipatory automatic start of the auxiliary feedwater pumps. A two-out-of-four logic combination for LOV or DV on an ESF bus will initiate sequencer circuits to start the emergency diesel generator (EDG), shed bus loads, and sequence loading of the EDG if required. The two-out-of-four logic on one ESF bus will also initiate sequencer circuits to start the motor-driven auxiliary feedwater pump associated with that bus. The loss-of-power DG-start instrumentation is required for the systems to function in any accident with a loss-of-offsite power.

In its submittal dated March 30, 2021, the licensee further stated, in part, that the proposed change does not involve a physical alteration of the plant (i.e., no new or different type of equipment will be installed) or a change in the methods governing normal plant operation. The proposed change only involves a modification to the TS SR 3.3.5.2 allowable values. Use of the calculated AVs ensures that automatic protective action will correct the abnormal situation before a safety limit is exceeded. Therefore, the EDGs started by these loss-of-power functions will continue to perform its design basis function should a loss of offsite power or degraded offsite power event occur with or without a concurrent accident. The proposed change also ensures that the 4.16-kV distribution system remains connected to the offsite power system when adequate offsite voltage is available.

Based on the above, the NRC staff notes that the proposed change does not physically modify the existing LOV and DV relays and their associated voltage sensing schemes. The proposed change modifies the AVs for the LOV and DV setpoints associated with SR 3.3.5.2 to provide the more conservative setpoints. The NRC staff finds that the proposed change is acceptable because it does not adversely impact the electrical power sources and distribution systems, which will continue to permit functioning of structures, systems, and components important to safety in compliance with GDC 17 and GDC 18.

### 3.4 Summary of NRC Staff Conclusion

As described in Section 3.1 of this safety evaluation, SNC used an acceptable SRSS combinatorial method to calculate the proposed settings. The NRC staff finds that this methodology provides a reasonable assurance that control and monitoring setpoints are established and maintained in a manner consistent with plant safety function requirements and consistent with RG 1.105, Revision 4.

Furthermore, as described in Section 3.2, the NRC staff performed independent evaluations of calculated margins and margin comparisons to confirm that required protective actions will be initiated before the associated plant process parameters exceed their analytical limits.

Additionally, the licensee's proposed "As-Left" and "As-Found" values associated with the setpoint changes were determined in a manner consistent with RIS 2006-17 in establishing the As-Left and As-Found tolerances. The NRC staff finds that the AVs for the DV and LOV relay settings of SR 3.3.5.2 A and SR 3.3.5.2 B in the TS Section 3.3.5 provided sufficient margins to continue to satisfy the requirements of 10 CFR 50.36(c)(1)(ii)(A), 10 CFR 50.36(c)(3), and 10 CFR 50, Appendix A, GDC 13. Therefore, the NRC staff finds that the proposed AVs are acceptable.

Therefore, the NRC finds the proposed TS change acceptable.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Georgia State official was notified on November 13, 2021. On November 15, 2021, the State official confirmed that the State of Georgia had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change the surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration published in the *Federal Register* on June 15, 2021 (86 FR 31744), and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Hang Vu, Khoi Nguyen, and Matt Hamm

Date: December 7, 2021

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2, ISSUANCE OF AMENDMENT NOS. 210 AND 193, REGARDING REVISION TO TECHNICAL SPECIFICATION 3.3.5, "4.16 KV [KILOVOLT] ESF [ENGINEERED SAFETY FEATURE] BUS LOSS OF POWER (LOP) INSTRUMENTATION" (EPID L-2021-LLA-0054) DATED DECEMBER 7, 2021

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