



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

September 18, 2013

Mr. C. R. Pierce  
Regulatory Affairs Director  
Southern Nuclear Operating Company, Inc.  
Post Office Box 1295, Bin - 038  
Birmingham, AL 35201-1295


SUBJECT: VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2 – ISSUANCE OF AMENDMENTS REGARDING NUCLEAR SERVICE COOLING WATER FAN OPERATION (TAC NOS. ME7105 AND ME7106)

Dear Mr. Pierce:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 170 to Renewed Facility Operating License NPF-68 and Amendment No. 152 to Renewed Facility Operating License NPF-81 for the Vogtle Electric Generating Plant (VEGP), Units 1 and 2, in response to your letters dated September 1, 2011, February 10, April 30, December 18, 2012, February 27, June 14, August 7 and August 30, 2013. The amendments revise VEGP Technical Specifications 3.7.9 by changing the criteria for nuclear service cooling water tower three- and four-fan operation and provides a 7-day Completion Time for one fan/spray cell being inoperable under certain conditions.

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

Sincerely,

  
Robert Martin, 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. 170 to NPF-68
2. Amendment No. 152 to NPF-81
3. Safety Evaluation

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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. 50-424

VOGTLE ELECTRIC GENERATING PLANT, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 170  
Renewed License No. NPF-68

1. The Nuclear Regulatory Commission (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 September 1, 2011, as supplemented on February 10, April 30, December 18, 2012, February 27, June 14, August 7 and August 30, 2013, 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.

Enclosure 1

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:

C. Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 170, 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 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert J. Pascarelli, 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: September 18, 2013



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. 152  
Renewed License No. NPF-81

1. The Nuclear Regulatory Commission (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 September 1, 2011, as supplemented on February 10, April 30, December 18, 2012 and February 27, June 14, August 7 and August 30, 2013, 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.

Enclosure 2

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:

C. Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 152, 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 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert J. Pascarelli, 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: September 18, 2013

ATTACHMENT

TO LICENSE AMENDMENT NO. 170

RENEWED FACILITY OPERATING LICENSE NO. NPF-68

DOCKET NO. 50-424

AND

TO LICENSE AMENDMENT NO. 152

RENEWED FACILITY OPERATING LICENSE NO. NPF-81

DOCKET NO. 50-425

Replace the following pages of the Licenses and the Appendix A Technical Specifications 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

3.7.9-1  
3.7.9-2  
3.7.9-3  
-

Insert Pages

License

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

TSs

3.7.9-1  
3.7.9-2  
3.7.9-3  
3.7.9-4

(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. 170 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 of 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 I 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. 152 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



3.7 PLANT SYSTEMS

3.7.9 Ultimate Heat Sink (UHS)

LCO 3.7.9 The UHS shall be OPERABLE. The fans/spray cells shall be as specified in Figure 3.7.9-1.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

| CONDITION  | REQUIRED ACTION   | COMPLETION TIME |
|--|---|-----------------|
| A. One or more Nuclear Service Cooling Water (NSCW) basins with water temperature and/or water level not within limits.                        | A.1 Restore water temperature(s) and water level(s) to within limits. | 72 hours        |
| B. One NSCW cooling tower with one required fan/spray cell inoperable when operating in four fan/spray cell required region of Figure 3.7.9-1. | B.1 Restore fan to OPERABLE status.                                   | 7 days          |
| C. One NSCW cooling tower with one or more required fans/spray cells inoperable for reasons other than Condition B.                            | C.1 Restore fan(s)/spray cell(s) to OPERABLE status.                  | 72 hours        |

(continued)

ACTIONS (continued)

| CONDITION   | REQUIRED ACTION  | COMPLETION TIME                                  |
|---|--|--|
| <p>D. One NSCW basin transfer pump inoperable.</p>  | <p>D.1 Restore the transfer pump to OPERABLE status.</p> <p><u>OR</u></p> <p>D.2.1 Implement an alternate method of basin transfer.</p> <p><u>AND</u></p> <p>D.2.2 Restore the transfer pump to OPERABLE status.</p> | <p>8 days</p><br><p>8 days</p><br><p>31 days</p> |
| <p>E. Required Action and associated Completion Time not met.</p> <p><u>OR</u></p> <p>UHS inoperable for reasons other than Conditions A, B, C, or D.</p> | <p>E.1 Be in MODE 3.</p> <p><u>AND</u></p> <p>E.2 Be in MODE 5.</p>  | <p>6 hours</p><br><p>36 hours</p>                |

SURVEILLANCE REQUIREMENTS

| SURVEILLANCE |   | FREQUENCY   |
|--------------|---|---|
| SR 3.7.9.1   | Verify water level of NSCW basin is $\geq 80.25$ ft.  | In accordance with the Surveillance Frequency Control Program |
| SR 3.7.9.2   | Verify water temperature of NSCW basin is $\leq 90^{\circ}\text{F}$ .   | In accordance with the Surveillance Frequency Control Program |
| SR 3.7.9.3   | Operate each required NSCW cooling tower fan for $\geq 15$ minutes.   | In accordance with the Surveillance Frequency Control Program |
| SR 3.7.9.4   | Verify NSCW basin transfer pump operation.  | In accordance with the Inservice Testing Program              |
| SR 3.7.9.5   | Verify ambient wet-bulb temperature is within the three fan/spray cell region of Figure 3.7.9-1 when one NSCW tower fan/spray cell is out-of-service and daily high temperature (dry-bulb) is forecasted to be $> 48^{\circ}\text{F}$ . | In accordance with the Surveillance Frequency Control Program |

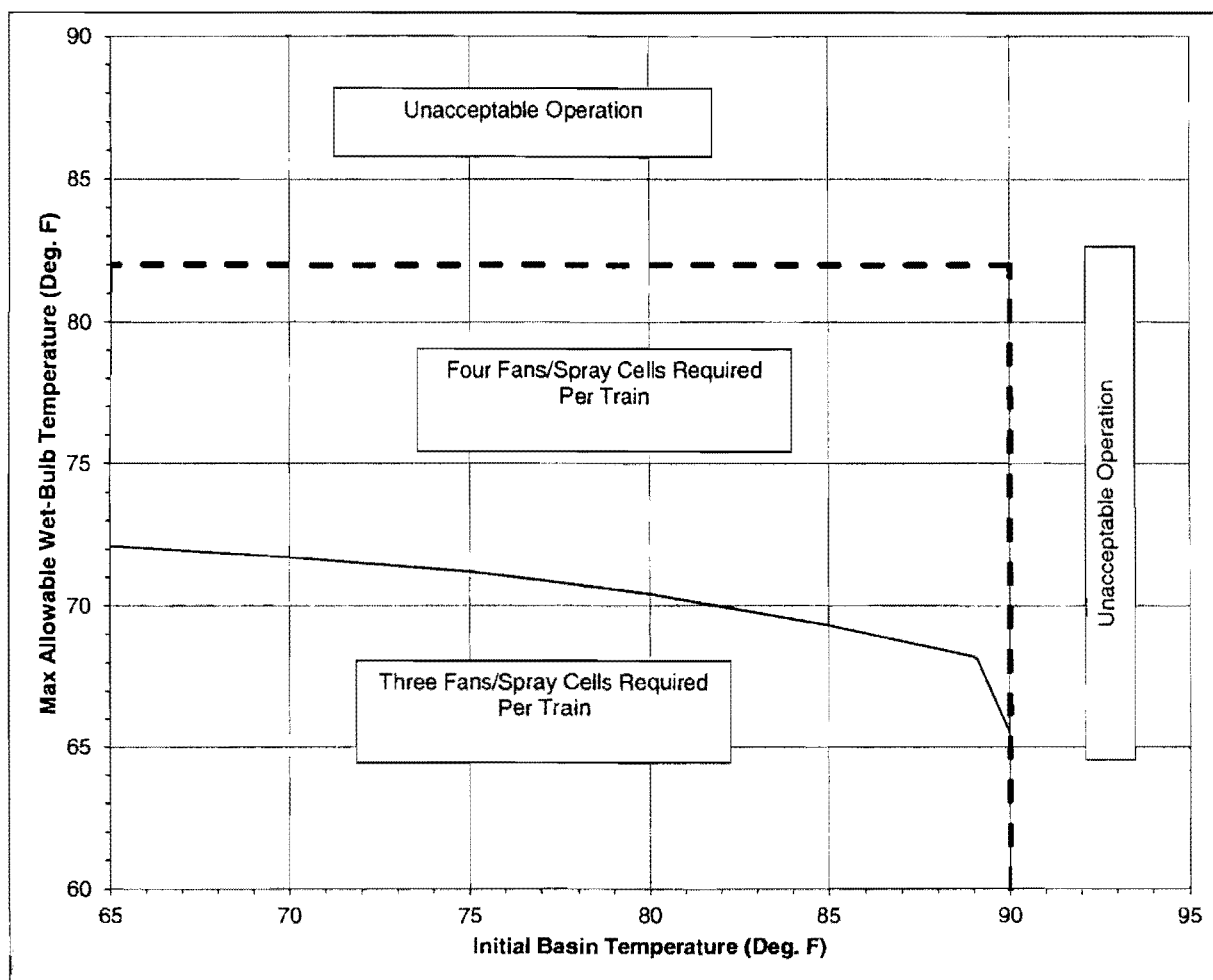


Figure 3.7.9-1  
Required Number of Fans/Spray Cells



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 170 TO RENEWED FACILITY OPERATING LICENSE NPF-68

AND

AMENDMENT NO. 152 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 September 1, 2011, as supplemented on February 10, April 30, December 18, 2012, February 27, June 14, August 7 and August 30, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML112450171, ML12045A285, ML121220296, ML12354A463, ML13059A502, ML13165A370, ML13220A160 and ML13246A179, respectively), Southern Nuclear Operating Company, Inc. (SNC, the licensee), submitted a license amendment request (LAR) regarding the Vogtle Electric Generating Plant (VEGP), Units 1 and 2. The amendments revise VEGP Technical Specifications (TSs) 3.7.9 by changing the criteria for nuclear service cooling water (NSCW) tower three- and four-fan operation and provides a 7-day Completion Time (CT) for one-fan/spray cell being inoperable under certain conditions.

The supplemental letters dated February 10, April 30, December 18, 2012, February 27, June 14, August 7 and August 30, 2013, provided additional information clarifying the LAR, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff's original proposed no significant hazards consideration as published in the *Federal Register* on November 1, 2011 (76 FR 67489).

2.0 REGULATORY EVALUATION

The TS Bases for TS 3.7.9 provides the purpose of the Ultimate Heat Sink (UHS) mechanical draft cooling towers. In part, the Bases state:

The UHS provides a heat sink for processing and operating heat from safety related components during a transient or accident, as well as during normal operation. This is done by utilizing the Nuclear Service Cooling Water (NSCW) System and the Component Cooling Water (CCW) System.

The UHS consists of the NSCW System mechanical draft towers. Two 100% capacity redundant NSCW towers are provided for each unit. One tower is associated with each train of the NSCW System. Each NSCW tower consists of a basin that contains the ultimate heat sink water supply and an upper structure that contains four individual fan spray cells where the heat loads are transferred to the atmosphere. Each spray cell contains one safety-related temperature controlled fan. Instrumentation is provided for monitoring basin level and water temperature. The tower basins each contain a safety-related transfer pump to permit the use of the combined storage capacity of the basins. The combined storage capacity of two tower basins provides greater than a 30 day cooling water supply assuming the worst combination of meteorological conditions and accident heat loads which maximize the tower heat load, basin temperature, and evaporative losses.

Each cooling tower is at maximum heat transfer capability with all four-fans/spray cells in operation. A cooling tower operates at a reduced capability when less than four-fans/spray cells are operating. The heat removal capability of the cooling towers is also affected by the ambient wet-bulb temperature since the heat transfer capability is based on evaporative cooling. The basin temperature is the temperature of the NSCW water that is being supplied to the plant to absorb heat from Systems, Structures, and Components (SSCs) that are important to safety during normal operation and during a design-basis accident (DBA) or transient. During the DBA/transient, the basin temperature should not exceed the maximum allowed cooling water temperature allowed for each serviced SSC.

In order to not exceed the maximum allowed NSCW supply temperature, the TS specifies the minimum allowed operable fans/spray cells per cooling tower based on initial basin temperature and wet-bulb temperature. The Updated Final Safety Analysis Report (UFSAR), Section 9.2.5.2.4, currently states that the maximum basin temperature during a DBA shall not exceed 95 °F except during three-fan cooldown operation where maximum basin temperature will exceed 95 °F by less than 3 °F for a short time duration of 35 hours or less. SNC's letter dated February 27, 2013, states that they performed engineering reviews under the design control requirements of NQA-1-1994 and determined that the maximum basin temperature can exceed 95 °F and bounds the new calculation analysis which limits the peak basin temperature to 97 °F during loss of offsite power (LOSP).

The following regulatory requirements and guidelines are applicable:

General Design Criterion 2—“*Design bases for protection against natural phenomena*” requires in part, that SSCs important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their safety functions.

General Design Criterion 44, “*Cooling water*,” requires in part, that a system to transfer heat from SSCs important to safety to an UHS shall be provided. The system safety function shall be to transfer the combined heat load of these SSCs under normal operating and accident conditions concurrent with a LOSP and a single failure.

Regulatory Guide (RG) 1.27 Revision 2, “Ultimate Heat Sink for Nuclear Power Plants,” describes an acceptable basis to the NRC staff that may be used to implement General Design Criterion 44.

Specifically, the UHS serving multiple units should be capable of providing sufficient cooling water to permit simultaneous safe shutdown and cool down of all units it serves and to maintain them in a safe shutdown condition. Also, in the event of an accident in 1 unit, the UHS should be able to dissipate the heat for that accident safely, to permit the concurrent safe shutdown and cooldown of the remaining unit, and to maintain all units in a safe shutdown condition. Sufficient conservatism should be provided to ensure that a 30-day supply of water is available and that the design basis temperatures of safety-related equipment are not exceeded.

Title 10 of the *Code of Federal Regulations* (10 CFR) 50.36, "Technical Specifications," requires in part, that each licensee's TS will include Limiting Conditions for Operation (LCO). The TS will be derived from the analyses and evaluation included in the safety analysis report and amendments thereto, submitted pursuant to 10 CFR 50.34. LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TS until the condition can be met. LCOs must be established for an operating restriction that is the initial condition of a DBA or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. LCOs must also be established for a SSC that is part of the primary success path and which functions to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

TS 3.7.9 specifies an LCO for the UHS Mechanical Draft Cooling Towers based on the number of operable fans and cells, the initial basin temperature, and ambient wet bulb temperature. LCO 3.7.9 currently states, "The UHS shall be OPERABLE. With ambient wet bulb temperature >63 °F, four fans and four spray cells per train shall be OPERABLE. With ambient wet bulb temperature ≤63 °F, three fans and four spray cells per trail shall be OPERABLE."

Final Safety Analysis Report (FSAR) Section 9.2.5.1.1 specifies "The UHS is designed so that a single failure coincident with a LOSP does not result in inadequate core cooling or prevent a safe shutdown under extreme meteorological conditions."

FSAR Section 9.2.5.2.4 specifies "During and following a tornado, offsite power is presumed lost, with a subsequent reactor trip. With the most limiting single failure (loss of one train), plus loss of 1 fan in the operable tower due to a tornado missile strike, the peak basin temperature during three-fan cool down operation will exceed the nominal design maximum of 95°F, reaching approximately 97°F for Unit 1 and 98°F for Unit 2, six to eight hours after RHR initiation, and remaining above 95°F for a total of 20 hours for Unit 1 and 35 hours for Unit 2 during cool down."

### 3.0 TECHNICAL EVALUATION

The licensee has proposed the following changes to TS 3.7.9, "Ultimate Heat Sink":

The LCO is revised to state, "The UHS shall be OPERABLE. The fans/spray cells shall be as specified in Figure 3.7.9-1." This proposed change is the result of revised engineering calculations. Associated with the revised LCO, surveillance SR 3.7.9.5 is to be changed to verify wet bulb temperature is within the three-fan/spray cell region of TS Figure 3.7.9-1 if 1 NSCW tower fan is out of service and the daily high dry bulb temperature is expected to be >48 °F.

The subject of the second change is to add a new Condition B that allows a 7-day CT if one-fan/spray cell is inoperable, only when operating in the four-fan/spray cell required region of proposed TS Figure 3.7.9-1. Other changes consist of alphanumeric changes, such as current TS Condition B being changed to Condition C, and other formatting changes required due to the changes discussed above.

The NRC staff performed a detailed review of the licensee's assumptions, design inputs and methodology and compared the results to design and licensing basis requirements. The licensee performed a design basis analysis [Calculation X4C1202S31] to determine the number of NSCW cooling tower fans that would be required to mitigate a DBA (LOCA with LOSP and single failure) at various ambient wet-bulb temperatures and NSCW initial basin temperatures. The design basis calculation accounts for one cooling tower to completely fail (due to LOSP with a single failure loss of a diesel generator). The design basis calculation determined that with ambient wet bulb temperatures up to the design 82 °F and initial basin temperature of 90 °F, one cooling tower with four operable fans/cells will prevent the basin temperature from exceeding the maximum allowed value of 95 °F during DBA mitigation. The design calculation also determined maximum wet bulb temperature as a function of initial basin temperature such that the maximum allowed basin temperature will not be exceeded when operating with one cooling tower having three operable fans/cells. The acceptance criterion for the analysis was to not exceed the NSCW design temperature of 95 °F in the tower basin during mitigation of the DBA.

The 95 °F design limit was established as the maximum design temperature for the cooling water to safety-related equipment used in the accident analysis for LOCA mitigation as specified in the UFSAR [Sections 9.2.5.2.4 and 9.2.5.2.5, and Table 9.2.1-1]. In the analysis the licensee determined the maximum wet bulb temperature allowed for a given initial basin temperature at the start of a DBA such that the maximum basin temperature will not exceed 95 °F during accident mitigation. The accident scenarios utilize either four-fans or three-fans in one tower to mitigate the DBA for variable wet bulb and initial basin water temperatures. Each accident scenario includes loss of one complete tower as the single failure and the heat input to the UHS from the DBA (LOCA and LOSP). Results of the analysis are stated in the Table below.

| Fans In Operation | Initial Basin Temperature °F | Maximum Allowable Wet Bulb °F |
|-------------------|------------------------------|-------------------------------|
| 4 fans            | ≤ 90                         | 86.6°F                        |
| 3 fans            | 90                           | 65.5                          |
|                   | 89                           | 68.7                          |
|                   | 88                           | 71.5                          |
|                   | 87-85                        | 73.6                          |
|                   | 80                           | 73.9                          |
|                   | 75                           | 74                            |
|                   | 70                           | 74.2                          |
|                   | 65                           | 74.4                          |

The LCO limits should also consider a tornado induced LOSP, since the cooling towers are not completely protected from tornado missiles. Portions of the cooling tower cells are not missile



protected. Due to the vulnerability of the cooling towers to tornado missiles, a loss of a cell of a cooling tower due to a tornado missile should be considered for a LOSP caused by a tornado. However, the licensee's amendment request did not include an evaluation of a tornado induced LOSP with a tornado missile strike. Therefore, in a request for additional information (RAI) dated January 11, 2012, the NRC staff asked the licensee to provide justification for their proposed LCO limit in both the three-fan and four-fan region considering a tornado induced LOSP with loss of a fan due to a tornado missile strike. In their response dated December 18, 2012, the licensee stated that it performed a new design basis calculation based on a LOSP and tornado missile strike and determined the associated maximum allowed ambient wet bulb temperature limits. The licensee design basis calculation accounts for one cooling tower to completely fail (due to LOSP with a single failure loss of a diesel generator) and an additional fan/cell to fail in the remaining operable cooling tower due to a tornado missile. The design basis calculation was performed when initially in the four-fan region of the LCO limit resulting in three-fans performing the accident mitigation due to missile strike. The calculation was also performed in the three-fan region resulting in two-fans performing the accident mitigation. In their initial response the new limits did not include the loss of a fan due to a missile strike until 4 hours into the LOSP mitigation analysis. Also, the licensee's response used a basin temperature limit of 97 °F instead of 95 °F. Therefore, in an RAI dated January 28, 2013, the NRC staff asked the licensee to explain the effects of the NSCW supply exceeding the design basis temperature of 95 °F, including the effect on the emergency diesel generators (EDGs). The NRC staff also asked the licensee to explain why the first 4 hours after a LOSP was not included in the analysis since the tornado missile strike should be accounted for at the start of the tornado induced loss of off-site power. In their response dated February 27, 2013, the licensee stated that it had performed a new evaluation for maximum NSCW cooling water temperature for the equipment cooled by NSCW during a LOSP. The licensee's evaluation concluded that increasing maximum allowed NSCW basin temperature up to 99 °F would not have a significant adverse effect on the equipment operating during a LOSP, including the diesel generators.

The licensee had Westinghouse evaluate the nuclear steam supply system and other Westinghouse supplied equipment. Westinghouse concluded in their evaluation that equipment supplied by Westinghouse which are in service following a LOSP are designed for a NSCW normal cooling water supply temperature of 105 °F. Based on Westinghouse's analysis and the licensee's analysis, the NRC staff concludes that the licensee's limit of 97 °F as the maximum NSCW temperature is sufficient for cooling NSCW cooled equipment operating during a LOSP.

However, in their letter dated February 27, 2013, the licensee provided an unsatisfactory response by not accounting for the first 4 hours after a LOSP for determining the basin temperature. They had concluded that basin temperature did not increase during the first 4 hours. That response was not satisfactory because the loss of a fan at the initiation of a tornado missile induced LOSP would result in a reduced capacity of the associated cooling tower. In their follow-up response dated June 14, 2013, the licensee's new analysis [Calculation X4C1202V70, Version 4], accounted for the heat profile during the first 4 hours and the loss of a fan at the start of the LOSP event for both the four-fan and three-fan region. The analysis accounted for a response to a tornado induced LOSP with a concurrent single failure [loss of redundant tower caused by loss of a diesel generator] and loss of one fan in the operable cooling tower due to a tornado missile strike. Results of the analysis are stated in the table below.

| Fans In Operation   | Initial Basin Temperature °F | Maximum Allowable Wet Bulb °F |
|---|------------------------------|-------------------------------|
| 4 fans initially,<br>3 fans after tornado<br>missile strike | ≤ 90                         | 82                            |
| 3 fans initially,<br>2 fans after tornado<br>missile strike | 90                           | 67.9                          |
|   | 85                           | 69.3                          |
|   | 80                           | 70.4                          |
|   | 75                           | 71.2                          |
|   | 70                           | 71.7                          |
|   | 65                           | 72.1                          |

Since the maximum initial basin temperature for a given wet bulb ambient temperature to be used in establishing the LCO must meet the acceptance criteria in both the DBA [LOCA with LOSP] and the tornado induced LOSP as shown in the tables above, the most limiting initial basin temperature should be used to establish TS LCO limits. Those limits are represented by the licensee’s Figure 3.7.9-1 in their June 14, 2013 letter. Figure 3.7.9-1 combines the results of the design basis calculations for DBA-LOCA and the design basis event (DBE) (tornado induced LOSP and tornado missile strike), i.e., the operating limits for LCO 3.7.9 and its Figure 3.7.9-1 are based on the cases for (a) the worst case LOCA and (b) a LOSP event in conjunction with tornado generated missiles. The combined curve with the most limiting values defines the required number of fans/spray cells for the LCO to prevent basin temperature from exceeding its limit for either a DBA-LOCA or tornado induced LOSP. The revisions in the proposed LCO meet the requirements of GDC 2 and GDC 44 and the guidelines of RG 1.27. In accordance with 10 CFR 50.36, LCO limits for temperature have been established for the UHS basin which supplies NSCW cooling to safety-related components that are essential to mitigate the DBA-LOCA and a tornado induced LOSP.

The NRC staff evaluated the LAR where the subject of the second change is to add a new Condition B that allows a 7-day CT if one fan/spray cell is inoperable, only when operating in the four-fan/spray cell required region of proposed TS Figure 3.7.9-1. The existing TS do not allow a required fan to be inoperable for more than 72 hours before action is required to commence shutdown. The subject of the LAR is to add a new Condition B that allows a seven-day CT if one fan/spray cell is inoperable, only when operating in the four-fan/spray cell required region of proposed TS Figure 3.7.9-1. The licensee has stated that repair of NSCW fans challenges the current 72-hour CT. Fan maintenance often requires staging and crane service possibly in inclement weather. Repair efforts in the past have challenged the current 72-hour CT. The licensee has taken steps to avoid unplanned maintenance by enhanced preventive maintenance including a) replacing gearbox oil and inspecting output shafts for backlash, b) replacing fan gearboxes based on runtime, c) installation of vibration monitoring equipment for early warning. The licensee has proposed compensatory measures to be in effect before Condition B is entered. The compensatory measures include:

- a) Verification that both NSCW trains and EDGs are operable and there is no scheduled work that could make this equipment inoperable. (RAI dated January 11, 2012, and

licensee response dated February 10, 2012). Both systems will be treated as protected equipment in accordance with plant procedures.

- b) Condition B will not be entered for planned maintenance when inclement weather is forecasted
- c) Auxiliary feed pumps and the switchyard will be treated as protected equipment in accordance with plant procedures

The NRC staff notes that when a fan is out of service when in new Condition B, a redundant train of NSCW and the redundant cooling tower with four-fans are available to mitigate any DBA. Although single failures are not normally postulated during a TS Condition, the most limiting single failure (i.e. EDG failure) causing the loss of the redundant cooling tower, would still allow at least three operable fan/cells to mitigate a DBA. The NRC staff submitted an RAI in a letter dated January 11, 2012, asking the licensee to evaluate the maximum basin temperature if only three operable fans/cells were available to mitigate a DBA. In a letter dated April 30, 2012, the licensee stated that a peak basin temperature of 99.9 °F would be reached if the redundant cooling tower was lost during the extended CT of Condition B. These circumstances do not pose undue risk, considering that additional failures are not normally assumed during a CT and that this temperature rise is not significant compared to the acceptability limits stated in the licensee's letter dated February 27, 2013. Additionally, the NSCW system, cooling tower, switchyard and EDGs will be protected per plant procedures. Based on the licensee implementing the proposed compensatory measures, the availability of a minimum of 1 cooling tower with three operable fans/cells (assuming a worst case single failure) during the extended CT (72 hours to 7 days) and a low probability of a DBA during the extended CT, and the safety benefit of avoiding cycling the plant by a shutdown and restart, the staff finds the addition of new Condition B with a 7-day CT to be acceptable.

#### 4.0 SUMMARY

The NRC staff has reviewed the licensee's evaluations of the required number of cooling tower fans and spray cells to keep the temperature of the cooling tower basins below acceptable limits during mitigation of DBE. The events include a 1) LOCA with LOSP and accompanying single failure and 2) tornado induced LOSP with accompanying single failure and tornado missile damage.

The required numbers of fans/spray cells are a function of initial basin temperature and the maximum allowable ambient wet bulb temperature and are specified in Figure 3.7.9-1. The staff finds the limits specified in the new Figure 3.7.9-1 to be acceptable. The staff has also reviewed the licensee's proposal to extend the CT of one inoperable fan from 72-hours to 7-days when operating in the four-fan region of new Figure 3.7.9-1. Based on the licensee's compensatory actions specified in the technical evaluation above, the low probability of a DBA during the extended CT, and the moderate increase in basin temperature, the staff finds the licensee's proposed increase in CT identified in new Condition B to be acceptable.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. 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, and there has been no public comment on such finding (76 FR 67489, November 1, 2011). 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 Contributor: G. Purciarello

Date of issuance: September 18, 2013

September 18, 2013

Mr. C. R. Pierce  
Regulatory Affairs Director  
Southern Nuclear Operating Company, Inc.  
Post Office Box 1295, Bin - 038  
Birmingham, AL 35201-1295

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2 – ISSUANCE OF AMENDMENTS REGARDING NUCLEAR SERVICE COOLING WATER FAN OPERATION (TAC NOS. ME7105 AND ME7106)

Dear Mr. Pierce:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 170 to Renewed Facility Operating License NPF-68 and Amendment No. 152 to Renewed Facility Operating License NPF-81 for the Vogtle Electric Generating Plant (VEGP), Units 1 and 2, in response to your letters dated September 1, 2011, February 10, April 30, December 18, 2012, February 27, June 14, August 7 and August 30, 2013. The amendments revise VEGP Technical Specifications 3.7.9 by changing the criteria for nuclear service cooling water tower three- and four-fan operation and provides a 7-day Completion Time for one fan/spray cell being inoperable under certain conditions.

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

Sincerely,

*/RA/*

Robert Martin, 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. 170 to NPF-68
2. Amendment No. 152 to NPF-81
3. Safety Evaluation

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**ADAMS Accession No.: ML13231A054 \* via memo dated August 14, 2013**

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