B. H. Whitley
Director
Regulatory Affairs

Southern Nuclear
Operating Company, Inc.
42 Inverness Center Parkway
Birmingham, AL 35242

SOUTHERN COMPANY

July 25 2016

Docket Nos.: 52-025
52-026

ND-16-0984
10 CFR 50.90

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Request for License Amendment and Exemption:
Automatic Depressurization System (ADS) Stage 2, 3 & 4
Valve Flow Area Changes and Clarifications (LAR-16-012)

Ladies and Gentlemen:

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC) requests an amendment to the combined licenses for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (License Numbers NPF-91 and NPF-92, respectively). The requested amendment proposes to depart from approved AP1000 Design Control Document (DCD) Tier 2 information (as incorporated into the Updated Final Safety Analysis Report (UFSAR) as plant-specific DCD information), and also involves changes to the Combined License (COL) Appendix C (and corresponding plant-specific Tier 1 information). This submittal requests approval of the license amendment necessary to implement these changes.

The requested amendment proposes changes to a plant-specific Tier 1 (and COL Appendix C) table and UFSAR tables to clarify the flow area for the Automatic Depressurization System (ADS) fourth stage squib valves and to reduce the minimum effective flow area for the second and third stage ADS control valves.

Enclosure 1 provides the description, technical evaluation, regulatory evaluation (including the Significant Hazards Consideration determination) and environmental considerations for the proposed changes. Enclosure 2 provides the background and supporting basis for the requested exemption. Enclosure 3 provides markups depicting the requested changes to the licensing basis documents requiring NRC staff approval.

In order to support the Vogtle Units 3 and 4 ITAAC schedule, SNC requests NRC staff review and approval of the license amendment by September 20, 2016. Approval by this date will allow sufficient time to implement licensing basis changes prior to closure of affected ITAAC activities. SNC expects to implement this proposed amendment (through incorporation into the licensing basis documents; e.g., the UFSAR) within 30 days of approval of the requested changes. South Carolina Electric & Gas Company (SCE&G) has stated that the current requested approval date for Virgil C. Summer Nuclear Station (VCSNS) Unit 2 is March 17, 2017.

This letter contains no regulatory commitments.

In accordance with 10 CFR 50.91, SNC is notifying the State of Georgia of this LAR by transmitting a copy of this letter and enclosures to the designated State Official.

Should you have any questions, please contact Mrs. Amy C. Chamberlain at (205) 992-6361.

Mr. B. H. Whitley states that he is the Regulatory Affairs Director of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

B. H. Whitley

BHW/ACC/ljs

Sworn to and subscribed before me this 25th *day of* July, *2016*

Notary Public: Debra J. Burnett

My commission expires: Dec. 4, 2018

Enclosures:

1) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Request for License Amendment Regarding Automatic Depressurization System (ADS) Stage 2, 3 & 4 Valve Flow Area Changes and Clarifications (LAR-16-012)

2) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Exemption Request: Automatic Depressurization System (ADS) Stage 2, 3 & 4 Valve Flow Area Changes and Clarifications (LAR-16-012)

3) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Proposed Changes to Licensing Basis Documents (LAR-16-012)

cc:

Southern Nuclear Operating Company / Georgia Power Company

Mr. S. E. Kuczynski (w/o enclosures)
Mr. M. D. Rauckhorst
Mr. D. G. Bost (w/o enclosures)
Mr. M. D. Meier (w/o enclosures)
Mr. D. H. Jones (w/o enclosures)
Ms. K. D. Fili (w/o enclosures)
Mr. D. L. McKinney (w/o enclosures)
Mr. T.W. Yelverton (w/o enclosures)
Mr. B. H. Whitley
Mr. C. R. Pierce
Mr. D. L. Fulton
Mr. M. J. Yox
Mr. J. C. Haswell
Mr. T. R. Takats
Mr. W. A. Sparkman
Mr. J. P. Redd
Document Services RTYPE: VND.LI.L00
File AR.01.02.06

Nuclear Regulatory Commission

Ms. C. Haney (w/o enclosures)
Mr. S. Lee (w/o enclosures)
Mr. L. Burkhart (w/o enclosures)
Ms. J. Dixon-Herrity (w/o enclosures)
Mr. P. Kallan
Mr. C. Patel
Mr. W. C. Gleaves
Mr. B. M. Bavol
Ms. R. Reyes
Ms. M. A. Sutton
Mr. M. E. Ernstes
Mr. G. Khouri
Mr. J. D. Fuller
Ms. S. Temple
Ms. J. Uhle
Mr. T.E. Chandler
Ms. P. Braxton
Mr. T. Brimfield
Mr. M. Kowal
Mr. A. Lerch

State of Georgia

Mr. R. Dunn

Oglethorpe Power Corporation
Mr. M. W. Price
Mr. K. T. Haynes
Ms. A. Whaley

Municipal Electric Authority of Georgia
Mr. J. E. Fuller
Mr. S. M. Jackson

Dalton Utilities
Mr. T. Bundros

WECTEC
Ms. K. Stoner (w/o enclosures)
Mr. C. A. Castell

Westinghouse Electric Company, LLC
Mr. R. Easterling (w/o enclosures)
Mr. J. W. Crenshaw (w/o enclosures)
Mr. C. D. Churchman (w/o enclosures)
Mr. L. Woodcock
Mr. P. A. Russ
Mr. A. F. Dohse
Mr. M. Y. Shaqqo

Other
Mr. J. E. Hesler, Bechtel Power Corporation
Ms. L. A. Matis, Tetra Tech NUS, Inc.
Dr. W. R. Jacobs, Jr., Ph.D., GDS Associates, Inc.
Mr. S. Roetger, Georgia Public Service Commission
Ms. S. W. Kernizan, Georgia Public Service Commission
Mr. K. C. Greene, Troutman Sanders
Mr. S. Blanton, Balch Bingham
Mr. R. Grumbir, APOG
Mr. N. R. Kellenberger, South Carolina Electric & Gas Company
Mr. D. Kersey, South Carolina Electric & Gas Company
Mr. B. Kitchen, Duke Energy
Mr. S. Franzone, Florida Power & Light

Southern Nuclear Operating Company

ND-16-0984

Enclosure 1

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Request for License Amendment Regarding Automatic Depressurization System (ADS) Stage 2, 3 & 4 Valve Flow Area Changes and Clarifications (LAR-16-012)

(This Enclosure consists of 21 pages, including this cover page.)

Table of Contents

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC), the licensee for Vogtle Electric Generating Plant (VEGP) Units 3 and 4, requests an amendment to Combined License (COL) Numbers NPF-91 and NPF-92, for VEGP Units 3 and 4, respectively.

1. Summary Description

This license amendment request (LAR) proposes changes to clarify the flow area for the Automatic Depressurization System (ADS) fourth stage squib valves and to reduce the minimum effective flow area for the second and third stage ADS control valves.

The requested amendment involves changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (PS-DCD) Tier 2 licensing basis information in Tables 14.3-2 and 15.6.5-10. The proposed changes to the licensing basis also involve changes to the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) in COL Appendix C and associated PS-DCD Tier 1 information in Table 2.1.2-4.

SNC requests approval of the license amendment necessary to implement the proposed changes to the Tier 2 information and the involved ITAAC. SNC requests NRC staff approval of the license amendment by September 20, 2016, to support completion of ADS Stage 4 flow area inspection. Approval by this date will allow sufficient time to implement licensing basis changes prior to closure of affected ITAAC activities.

2. Detailed Description

As described in UFSAR Subsections 5.4.6 and 6.3.2.2.8.5, the ADS valves are part of the reactor coolant system (RCS) and interface with the passive core cooling system (PXS). Twenty valves are divided into four depressurization stages. These stages connect to the RCS at three different locations. Opening of the ADS valves is required for the PXS to function as required to provide emergency core cooling following postulated accident conditions.

2.1 Second and Third Stage ADS Control Valves Minimum Effective Flow Areas

The first, second, and third stage ADS control valves and isolation valves are included as part of the pressurizer safety and relief valve module, and are connected to nozzles on top of the pressurizer. The second and third stage ADS control valves are four 8-inch normally closed, dc powered, motor-operator globe valves (two for each stage) arranged in four lines in series with four normally closed, dc powered, motor-operator gate isolation valves. The first, second, and third stage ADS control valves and isolation valves actuate at discrete core makeup tank (CMT) levels, as either tank's level decreases during injection or from spilling out a broken injection line. The second and third stage ADS control valves and isolation valves actuate based upon a timed delay after actuation of the preceding stage. This opening sequence provides a controlled depressurization of the RCS. The valve opening sequence prevents simultaneous opening of more than one stage, to allow sequential opening of the valves. The second and third stage ADS control valves are designed to open relatively slowly. During the actuation of each stage, the isolation valve is sequenced open before the control valve. Therefore, there is some time delay between stage actuation and control valve actuation.

Flow capacity testing was performed to determine the test valve C_v in accordance with ANSI/ISA-S75.02-1996 for a sample valve for the 8-inch globe valves selected for

procurement as the second and third stage ADS control valves. This test resulted in an as-manufactured flow area of 19.5 in^2 at 85% to 100% full open stroke, which does not meet the minimum effective flow area of 21 in^2 specified in the valve data sheet.

As described in COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4, the Design Commitment for ITAAC Item 8.d) is that the RCS provides automatic depressurization during design basis events. The Inspections, Tests, Analyses, and Acceptance Criteria for ITAAC Item 8.d)iv) require type tests and analysis to determine the minimum effective flow area through each first, second, and third stage ADS control valve, with the minimum effective flow area through each second and third stage ADS control valve verified to be ≥ 21 in^2.

To resolve these concerns, and based on the 8-inch globe valve test program results, the use of a 19 in^2 minimum effective flow area is proposed. Therefore, UFSAR Tables 14.3-2 and 15.6.5-10, and the associated Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) are proposed to be changed to reduce the minimum effective flow area through each second and third stage ADS control valve from ≥ 21 in^2 to ≥ 19 in^2. Assuming a minimum effective flow area of ≥ 19 in^2 provides the necessary flow conditions required for the automatic depressurization design function in the small-break loss of coolant accident (LOCA) analysis which is the most limiting design basis analysis for changes in the second and third stage ADS flow area as further described in the Section 3 Technical Evaluation below.

2.2 Fourth Stage ADS Squib Valves As-Manufactured and Minimum Effective Flow Areas

The fourth stage ADS squib valves connect to the hot leg of each reactor coolant loop. The fourth stage ADS squib valves are four 14-inch squib valves arranged in four lines in series with four normally open, dc powered, motor-operator gate isolation valves. The fourth stage ADS squib valves are interlocked so that they cannot be opened until RCS pressure has been substantially reduced.

In February 2012, an NRC inspection team performed a review of manufacturing records for a sample of the 14-inch squib valve flow components (shear caps) selected for the prototype fourth stage ADS squib valves (Reference 1). During this inspection, the NRC inspection team verified that the sample as-manufactured shear caps met the design specification for a minimum inside diameter of 9.240 inches with a tolerance of +0.000/-0.002 inches. This results in a nominal as-manufactured flow area of 67.055 in^2 and a minimum as-manufactured flow area of 67.026 in^2, greater than the 67 in^2 specified in the Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iii). However, the NRC inspection team questioned what the final minimum effective flow area would be after the valve opened, and how much material could protrude into the internal valve flow path. The NRC inspection team examined several post-test shear caps from the 14-inch squib valve prototype testing program. The flow areas of the valves were observed to have reduced slightly due the shearing action as the valve opened, leaving a small lip on the upper edge of the opening. The NRC inspection team initiated Technical Assistance Request No. AP-GG-M-005 to resolve this issue, stating that this NRC review will be followed up during the ITAAC closure process.

In December 2013, an NRC inspection team also performed an inspection during 14-inch squib valve functional testing for the selected fourth stage ADS squib valves conducted in

accordance with ASME QME-1-2007 (Reference 2). This test included actuation, and then multiple flow measurements for a sample valve using AP1000 design basis pressure, temperature, and flow parameters. The minimum flow determined during the initial valve actuation and flow testing was 211.4 lbm/sec, which demonstrates that the valve is capable of performing its safety-related design function of a minimum flow of ≥ 188.3 lbm/sec with approximately 12% margin (211.4 lbm/sec minimum test flow versus ≥ 188.3 lbm/sec minimum design flow with inlet fluid temperature = 382°F (+0/-10°F), inlet fluid pressure = 185.3 psig (+0/-10 psig), and valve differential pressure verified as ≤ 185.3 psid). An additional five flow tests were performed using a 14-inch upstream gate valve to initiate flow through the open squib valve, resulting in an average flow of 211.5 lbm/sec. Therefore, the flow testing confirmed that the sample valve with an as-manufactured flow area ≥ 67 in^2 provided a minimum effective flow area that provided adequate flow with margin. Based on the test results and observations, the NRC inspectors found that the preliminary flow test results indicated that the allowed flow met the acceptance criteria at the system temperature and pressure specified in the vendor's test procedure and the Westinghouse qualification test plan. During post-test examination, the NRC inspection team requested measurements of the final minimum effective flow area of the tested 14-inch squib valve. The vendor performed a calculation of the area of the approximate ellipse of the post-test shear cap flow area, and found that the measured valve flow area was slightly less than 67 in^2 (approximately 66.86 in^2). Based on this observation, the NRC inspection report concluded that further analysis was needed to determine whether the 67 in^2 flow area requirement for the fourth stage ADS squib valves specified in the Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) ITAAC Item 8.d)iii) was satisfied.

As described in COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4, the Design Commitment for ITAAC Item 8.d) is that the RCS provides automatic depressurization during design basis events. The Inspections, Tests, Analyses, and Acceptance Criteria for ITAAC Item 8.d)iii) require inspections of each fourth stage ADS squib valve to determine the flow area through each valve, with the minimum flow area through each fourth stage ADS squib valve verified to be ≥ 67 in^2.

To resolve these concerns, and based on the 14-inch squib valve test program results, the use of a 67 in^2 as-manufactured flow area, and a 66 in^2 minimum effective flow area, are proposed. Therefore, UFSAR Tables 14.3-2 and 15.6.5-10, and the associated Inspections, Tests, Analyses, and Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4, ITAAC Item 8.d)iii) are proposed to be revised to clarify that the inspection conducted for each fourth stage ADS squib valve is to determine the as-manufactured flow area through each valve, and that the as-manufactured flow area through each fourth stage ADS squib valve is ≥ 67 in^2. Use of an as-manufactured flow area of ≥ 67 in^2 has been demonstrated by testing to result in a minimum effective flow area after valve actuation of ≥ 66 in^2, which provides the necessary flow conditions required for the automatic depressurization design function as further described in the Section 3 Technical Evaluation below.

Licensing Basis Change Descriptions

The following licensing basis changes are proposed:

1. The Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) is revised to reduce the minimum effective flow area through each second and third stage ADS control valve from ≥ 21 in^2 to ≥ 19 in^2.
2. The Inspections, Tests, Analyses, and Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iii) are revised to clarify that the inspection conducted for each fourth stage ADS squib valve is to determine the as-manufactured flow area through each valve, and that the as-manufactured flow area through each fourth stage ADS squib valve is ≥ 67 in^2.
3. UFSAR Table 14.3-2 line for "Reference" column entry "Table 15.6.5-10" is revised as follows:
   a) The Design Feature description "ADS Valve Flow Areas (in^2)" is changed to "ADS Valve Minimum Effective Flow Areas (in^2)."
   b) The Values for the second and third stage ADS control valves for the renamed "ADS Valve Minimum Effective Flow Areas (in^2)" Design Feature are changed from ≥ 21 to ≥ 19.
   c) The Values for the fourth stage ADS squib valves for the renamed "ADS Valve Minimum Effective Flow Areas (in^2)" Design Feature are changed from ≥ 67 to ≥ 66, and a note is added stating, "The ADS Stage 4A Valve and ADS Stage 4B Valve minimum effective flow areas of ≥ 66 in^2 are assumed in the small-break LOCA analyses to account for potential deformation during actuation that may reduce the effective flow area to less than the required as-manufactured flow area of ≥ 67 in^2."
4. UFSAR Table 15.6.5-10 is revised as follows:
   a) The title is changed from "AP1000 ADS Parameters" to "ADS Parameters Used in Small-Break LOCA Analyses."
   b) The column description "Minimum Valve Flow Area (for each path, in^2)" is changed to "ADS Valve Minimum Effective Flow Area (for each path, in^2)" and Note 4 is removed from the column entries.
   c) The values for the second and third stage ADS control valves in the renamed "ADS Valve Minimum Effective Flow Area (for each path, in^2)" column are changed from 21 to 19.
   d) The values for the fourth stage ADS squib valves in the renamed "ADS Valve Minimum Effective Flow Area (for each path, in^2)" column are changed from 67 to 66.

3. Technical Evaluation

During controlled depressurization via the ADS, the accumulators and CMTs maintain RCS inventory. Once the RCS depressurizes, injection from the in-containment refueling water storage tank (IRWST) maintains long-term core cooling. For continued injection from the IRWST, the RCS must remain depressurized. Design maximum resistance values for the IRWST delivery lines are used to model this condition conservatively.

As described in UFSAR Subsection 15.6.5.4B.2.1, the NOTRUMP computer code is used in the analysis of small breaks in the RCS. The small-break LOCA analyses are the most limiting design basis analysis for changes in the second, third and fourth stage ADS flow area for reasons described in the following paragraphs. In NOTRUMP, the RCS is nodalized into volumes interconnected by flow paths. The transient behavior of the system is determined from the governing conservation equations of mass, energy, and momentum applied throughout the system. A steady-state input deck is set up to comply, where appropriate, with the standard AP1000 small-break LOCA Evaluation Model methodology. One of the major features of the modeling is based on ADS actuation signals generated on low CMT levels and the ADS timer delays. The first, second, and third stage ADS control valve and fourth stage ADS squib valve design features assumed in the small-break LOCA analysis are provided in UFSAR Table 15.6.5-10. Active single failures of the passive safeguards systems are considered. The limiting failure is one out of four fourth stage ADS squib valves failing to open on demand, the failure that most severely affects depressurization capability. The safety design approach is to depressurize the RCS to the containment pressure in an orderly fashion such that the large reservoir of water stored in the IRWST is available for core cooling. The mass inventory plots provided for the breaks show the minimum inventory condition generally occurs at the start of IRWST injection. Penalizing the depressurization is the most conservative approach in postulating the single failure for such breaks.

As described in UFSAR Subsection 15.6.5.4B.3.1, the small-break LOCA safety design approach is to provide for a controlled depressurization of the primary system if the break cannot be terminated, or if the nonsafety-related charging system is postulated to be lost or cannot maintain acceptable plant conditions. The CMT level activates primary system depressurization. The CMT provides makeup to help compensate for the postulated break in the RCS. As the CMT level drops, the first through fourth stages of the ADS valves are ramped open in sequence. The first, second, and third stage ADS control valve and fourth stage ADS squib valve design features assumed in the small-break LOCA analysis are provided in UFSAR Table 15.6.5-10. The RCS depressurizes due to the break and opening of the ADS valves, while subcooled water from the CMTs and accumulators enters the reactor vessel downcomer to maintain system inventory and keep the core covered. Design basis maximum values of PXS resistances are applied to obtain a conservative prediction of system behavior during the small-break LOCA events.

As described in UFSAR Table 15.6.5-10, analysis of small breaks in the RCS assumes that both first stage ADS control valves open at a CMT level of 67.5% after a time delay of 32 seconds, both second stage ADS control valves open an additional 48 seconds later, and then both third stage ADS control valves open an additional 120 seconds later. The minimum valve flow area for each first stage ADS control valve is assumed as 4.6 in^2, with the valves fully opening in ≤ 40 seconds. The minimum valve flow area for each second and third stage ADS control valve is assumed as 21 in^2, with the valves fully opening in ≤ 100 seconds. The first fourth stage ADS squib valve (one of the two Stage 4A valves, assuming a single failure) opens at a CMT level of

20% coincident with a time delay of 128 seconds after the actuation of the third stage ADS control valves. The second set of fourth stage ADS squib valves (both of the Stage 4B valves) is then assumed to open 60 seconds after the actuation of the first fourth stage ADS squib valve. The minimum valve flow area for each fourth stage ADS squib valve is 67 in^2, with the valves fully opening in ≤ 4 seconds, which includes "arm-fire" processing delay and the assumed valve opening time.

As described in UFSAR Table 14.3-2, the first, second, and third stage ADS control valve and fourth stage ADS squib valve design features assumed in the small-break LOCA analysis are provided in UFSAR Table 15.6.5-10, and include a valve flow area of ≥ 4.6 in^2 for the first stage ADS control valves, ≥ 21 in^2 for the second and third stage ADS control valves, and ≥ 67 in^2 for the fourth stage ADS squib valves.

3.1 Second and Third Stage ADS Control Valves Minimum Effective Flow Areas

The second and third stage ADS control valves are motor-operated valves. They are capable of as-installed testing to verify the actual minimum flow through each valve, which then can be used to validate that they achieve the required minimum effective flow area. Assuming a minimum effective flow area of ≥ 19 in^2 provides the necessary flow conditions required for the automatic depressurization design function in the small-break LOCA analysis as further described below. Therefore, the Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) is proposed to be revised to reduce the minimum effective flow area through each second and third stage ADS control valve from ≥ 21 in^2 to ≥ 19 in^2.

3.2 Fourth Stage ADS Squib Valves As-Manufactured and Minimum Effective Flow Areas

The fourth stage ADS squib valves have a unique requirement compared to first, second, and third stage ADS control valves, because the fourth stage ADS squib valves are 14-inch squib valves that can only be actuated (opened) once before requiring internal refurbishment. Therefore, verification of the manufactured dimension for the shear caps using a minimum inside diameter of 9.240 inches with a tolerance of +0.000/-0.002 inches for the fourth stage ADS squib valves is the only method that can be used to verify that the minimum effective flow area after actuation is ≥ 66 in^2. This smaller minimum effective flow area is reduced from the as-manufactured flow area to account for identified potential deformation of the squib valve internals during actuation. The use of an assumed minimum effective flow area of 66 in^2 in the safety analyses is a bounding value, and is consistent with the measurements of the final minimum effective flow area (approximately 66.84 in^2) of the tested 14-inch squib valves obtained in December 2013 following functional testing conducted in accordance with ASME QME-1-2007. The flow testing of the selected fourth stage ADS squib valves conducted in December 2013 in accordance with ASME QME-1-2007 confirmed that the valves with an as-manufactured flow area ≥ 67 in^2 provided a minimum effective flow area that provided adequate flow of ≥ 188.3 lbm/sec with approximately 12% margin (211.4 lbm/sec minimum test flow versus ≥ 188.3 lbm/sec minimum design flow with inlet fluid temperature = 382°F (+0/-10°F), inlet fluid pressure = 185.3 psig (+0/-10 psig), and valve differential pressure verified as ≤ 185.3 psid). This test included actuation and flow measurements of sample valves using AP1000 design basis flow parameters. Therefore, the Inspections, Tests, Analyses, and Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table

2.1.2-4 ITAAC Item 8.d)iii) are proposed to be revised to clarify that the inspection conducted for each fourth stage ADS squib valve is to determine the as-manufactured flow area through each valve, and that the as-manufactured flow area through each fourth stage ADS squib valve is ≥ 67 in^2.

3.3 Impact on LOCA Safety Analyses

The second and third stage ADS control valves, and the fourth stage ADS squib valves, are important in the small-break LOCA safety analysis, because the opening of these valves allows the RCS to depressurize and allows IRWST injection. A sensitivity analysis was performed on the most recent limiting small-break LOCA safety analysis case to estimate the effect of the proposed changes. This limiting small-break LOCA safety analysis base case is based on the AP1000 Core Reference Report (WCAP-17524-P-A), Revision 1, which received NRC approval on February 19, 2015 (ML15015A571). Incorporation of the new analysis of record consistent with the generic WCAP-17524-P-A, Revision 1, safety analyses has been requested in Southern Nuclear Operating Company Vogtle Electric Generating Plant Units 3 and 4, Request for License Amendment: Core Reference Report Incorporation (LAR-16-001), dated January 29, 2016 (ML16029A476).

The sensitivity analysis determined that these reductions in second and third stage ADS control valves and fourth stage ADS squib valve minimum effective flow areas have a relatively minor effect on the small-break LOCA safety analysis results. The proposed changes slightly decrease the flow rate through the second and third stage ADS control valves resulting in a slight reduction in the rate of RCS depressurization during this period. The proposed changes to the fourth stage ADS squib valves minimum effective flow area has a minimal impact on flow rate through the fourth stage ADS squib valves and resulting RCS depressurization. The proposed changes result in a slightly longer core uncovery and a slight increase in the resulting fuel rod heat-up. In addition, slight shifts in the timing of accumulator injection, CMT injection, and IRWST injection are observed in the updated calculations. The updated calculations result in an approximately 13°F peak cladding temperature (PCT) increase with the proposed reduction in the second and third stage ADS control valves and fourth stage ADS squib valve minimum effective flow areas in the small-break LOCA safety analyses, which along with the other changes to PXS operation including timing do not cause a challenge to the 10 CFR 50.46 acceptance criteria, including the following:

1. The changes, including the approximate 13°F PCT increase, do not result in the calculated maximum fuel element cladding temperature exceeding 2200°F. The current licensing basis includes an analysis of record PCT of 663.5°F for the impacted small-break LOCA safety analysis. The most recent 10 CFR 50.46 PCT assessment as documented in the NRC-approved AP1000 Core Reference Report (WCAP-17524-P-A), Revision 1, shows a generic AP1000 analysis of record PCT of 695.5°F for the impacted small-break LOCA safety analysis. Therefore, including an additional approximate 13°F PCT increase for both the current licensing basis PCT of 663.5°F, and for the most recent and more conservative 10 CFR 50.46 PCT assessment of 695.5°F, analysis continues to show substantial margin to the 2200°F limit. Future updates to the generic AP1000 analysis of record described in WCAP-17524-P-A, Revision 1, and to the site-specific analysis of record as proposed in Southern Nuclear Operating Company Vogtle Electric Generating Plant Units 3 and 4, Request for License Amendment: Core Reference Report

Incorporation (LAR-16-001), will be addressed in the subsequent required 10 CFR 50.46 reports.

2. The changes do not result in the calculated total oxidation of the cladding at any point exceeding 0.17 times the total cladding thickness before oxidation.
3. The changes do not result in the calculated total amount of hydrogen generated from the chemical reaction of the cladding with water or steam exceeding 0.01 times the hypothetical amount that would be generated if all the metal in the cladding cylinders surrounding the fuel, excluding the cladding surrounding the plenum volume, were to react.
4. The changes do not result in changes in core geometry such that the core remains amenable to cooling.
5. The changes do not result in the calculated core temperature not being maintained at an acceptably low value after any successful initiation operation of the PXS, and does not adversely affect decay heat being removed for the extended period of time required by the long-lived radioactivity remaining in the core.

The new calculated base case shows a slightly higher PCT. The maximum local oxidation remains negligible relative to the 17% limit. Core wide oxidation remains at 0.0%. These results and the values confirm that the 10 CFR 50.46 acceptance criteria items 1 through 3 continue to be met. No fuel rod burst that would challenge coolable geometry occurs resulting in acceptance criteria item 4 continuing to be met. The updated analysis continues to show that the PXS successfully provides long term heat removal via IRWST injection and fourth stage ADS discharge resulting in acceptance criteria 5 being met within the scope of this analysis. Longer duration core cooling is demonstrated as part of the separate long-term core cooling (LTCC) safety analysis.

The impact of the reduction in the second and third stage ADS control valves and fourth stage ADS squib valve minimum effective flow areas was also qualitatively evaluated for the large-break LOCA and LTCC safety analyses. The opening of the second and third stage ADS control valves are not explicitly modeled in the large-break LOCA and LTCC evaluation models, although the opening of the fourth stage ADS squib valves are explicitly modeled. The large-break LOCA transient analysis is terminated long before a CMT level of 20% occurs, which means that the fourth stage ADS squib valves are not actuated for large-break LOCA. With respect to LTCC, the reduction in the fourth stage ADS squib valve minimum effective flow area results in less than 1% difference in local flow area. Therefore, the reduction in the fourth stage ADS squib valve minimum effective flow area is judged insignificant for the LTCC analysis. It is concluded that the reductions in the minimum effective flow areas for the second and third stage ADS control valves and fourth stage ADS squib valves have a negligible effect on the large-break LOCA and LTCC safety analyses results. The limiting transient for PCT is the Best Estimate large-break LOCA. The most recent 10 CFR 50.46 PCT assessment for the Best Estimate large-break LOCA as documented in the NRC-approved AP1000 Core Reference Report (WCAP-17524-P-A), Revision 1, shows an analysis of record PCT of 1970°F for the impacted large-break LOCA safety analysis. Because the proposed changes do not result in an increase in PCT for the large-break LOCA safety analysis, there remains a substantial margin to the 2200°F limit, and the changes do not cause a challenge to the 10 CFR 50.46 acceptance criteria.

3.4 Impact on Containment Safety Analysis

The bounding containment safety analysis is not affected by these proposed changes, as short-term LOCA mass and energy releases are predicted for the first ten seconds of the blowdown from a postulated double-ended guillotine break of the largest non-leak-before-break high energy line in each compartment inside containment. Therefore, these reductions in the minimum effective flow areas for the second and third stage ADS control valves and fourth stage ADS squib valves do not adversely affect the containment safety analysis results.

3.5 Impact on Non-LOCA Safety Analyses

The safety analyses for non-LOCA transients and events are not adversely affected by these proposed changes, with the possible exception of the safety analysis of the inadvertent operation of the ADS described in UFSAR Subsection 15.6.1. However, for this safety analysis, multiple failures and or errors are assumed which actuate both first stage ADS paths. Although the second and third stage ADS control valves have higher maximum effective flow areas versus the first stage ADS control valves (26 in^2 versus 7 in^2), the opening time of the first stage ADS control valves is faster. This results in the most severe RCS depressurization due to ADS operation with the reactor at power. ADS control valve maximum effective flow areas and minimum opening times are used to maximize the mass and energy rate released by ADS to the IRWST and to enhance CMT draining (conservative for fourth stage ADS actuation). Actuation of the fourth stage ADS squib valves does not occur since the CMTs reach a minimum level above the fourth stage ADS actuation set point. The results of the transient analysis provide input to the corresponding containment safety analysis for this event, including first, second, and third stage ADS mass flow rate and enthalpy to the IRWST using maximum effective flow areas, and PRHR heat exchanger heat transfer to the IRWST, which is also not adversely affected by these changes. As described in UFSAR Subsection 15.6.1, the minimum departure from nucleate boiling ratio (DNBR) occurs shortly after the control rods begin to insert, before the initiation of the Stage 2 ADS. The changes proposed do not impact the timing of the event prior to control rod insertion and therefore there is no increase to DNBR for this event. Therefore, these reductions in the minimum effective flow areas for the second and third stage ADS control valves and fourth stage ADS squib valves do not adversely affect the non-LOCA safety analyses results.

3.6 Impact on IRWST Pressurization and Hydrodynamic Loads

As described in UFSAR Subsections 3.6.1.2.1 and 3.8.3.4.2, the pressurization and hydrodynamic loads for the IRWST are based on the maximum discharge through the first, second, and third stage ADS control valves. Therefore, the reductions in the minimum effective flow areas for the second and third stage ADS control valves are acceptable, because the pressurization and hydrodynamic loading evaluations use the maximum instead of minimum effective flow areas.

3.7 Impact on Loss of Normal Residual Heat Removal System (RNS) During Shutdown Safety Analysis

During shutdown modes, initiating events such as the loss of the nonsafety-related RNS are postulated. Such events require CMT actuation and IRWST injection, and involve ADS actuation. UFSAR Subsection 19E.4.8.2 provides the safety analysis for a loss of RNS in Mode 4 with the RCS intact. Because the Mode 4 plant conditions assumed for the analysis

are more limiting than Mode 5 conditions and the assumed equipment availability is representative of the more restrictive Mode 5 equipment, this analysis is also applicable for a loss of RNS cooling in Mode 5 when the RCS is intact. During the analyzed transient, all of the first, second, and third stage ADS control valves are assumed to open at the applicable CMT levels and time delays. Even though all of the fourth stage ADS squib valves are available in Mode 4, the Technical Specifications permit one of the fourth stage ADS squib valves to be out of service in Mode 5 when the RCS is intact. Thus, it is assumed that only three of the fourth stage ADS squib valves are available for operation to bound the equipment availability in Mode 5. UFSAR Subsection 19E.4.8.3 provides an additional analysis for a loss of RNS in Mode 5 with the RCS open. The analysis is performed with only the equipment required in the Technical Specifications to be operable. As a result, only two of the fourth stage ADS squib valves are available. However, one of the available fourth stage ADS squib valves is assumed to fail to open on demand as the single failure in both cases, consistent with the single failure assumption used for the small-break LOCA analyses. These safety analysis cases demonstrate that the core stack mixture level (i.e., RCS water inventory in the core region) is maintained above the elevation of the top of the core active fuel throughout the transient thus preventing fuel rod heat-up. Thus, it is concluded that the consequences of a loss of RNS in Modes 4 and 5 with the RCS intact are acceptable.

An evaluation of the flow area reductions was performed and demonstrates that these reductions in second and third stage ADS control valve and fourth stage ADS squib valve minimum effective flow areas have a minor effect on the loss of RNS during shutdown analyses as described above. For the second and third stage ADS control valves, the reduction in minimum effective flow area slightly reduces the depressurization capacity resulting in changes to the timeframes these ADS flow paths are subject to choked flow and slightly elevated RCS pressure at various stages of the transients. The reduction in flow area for the fourth stage ADS squib valves also have a minor impact on the depressurization rate, slightly extending the depressurization period.

Due to the minor change in stage four ADS depressurization, the timing of IRWST injection is not significantly extended resulting in a similar duration of any gap in injection flow between the CMT and IRWST for the Mode 4 and Mode 5 RCS intact scenario, and only small shifts in timing for the Mode 5 RCS open scenario. However, a substantial liquid inventory remains available for each scenario to be delivered to the reactor vessel prior to core uncovery. The RCS inventory is therefore adequate to accommodate the potential delay in IRWST injection caused by the reduced ADS valve flow areas, even though the margin to core uncovery may be reduced during the gap in injection flow between the CMT and IRWST. These small changes in margin do not result in core uncovery or fuel rod heat-up for each scenario. The magnitude of the flow area changes are sufficiently small that the changes in depressurization characteristics and timeframes do not challenge the ability to maintain core cooling for a loss of RNS event initiating during Modes 4 or 5. The reactor vessel continues to maintain adequate two-phase mixture inventory to maintain core cooling such that no fuel rod heat-up occurs Therefore, the consequences of a loss of RNS cooling event remain acceptable.

3.8 Evaluation of Other Impacts

The UFSAR Table 14.3-2 change of the Design Feature description to "ADS Valve Minimum Effective Flow Areas (in^2)" is a clarification recognizing that these values are the "minimum effective flow areas" used in the small-break LOCA analyses.

The UFSAR Table 15.6.5-10 change of the title to "ADS Parameters Used in Small-Break LOCA Analyses" is a clarification that these parameters are only applicable to the small-break LOCA analyses as further described in UFSAR Subsections 15.6.5.4B.2.1 and 15.6.5.4B.3.1.

The UFSAR Table 15.6.5-10 change of the column description to "ADS Valve Minimum Effective Flow Area (for each path, in^2)" is a clarification recognizing that these values are the "minimum effective flow areas" used in the small-break LOCA analyses.

The proposed changes to the requirements of COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) for the second and third stage ADS control valves and COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iii) for the fourth stage ADS squib valves continue to meet the same regulatory acceptance criteria, codes, and industry standards specified in the UFSAR. The physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR are not changed. The proposed changes comply with the requirements of 10 CFR 50 Appendix A, General Design Criteria (GDC) 2, 4, 35, 36, and 37 as stated in the UFSAR.

The proposed changes do not require a change to procedures or method of control that adversely affects the performance of the RCS or PXS safety-related or nonsafety-related design functions as described in the UFSAR. The physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR are not changed, and thus there are no changes to procedures or method of control required to address the proposed changes to the licensing basis. The proposed changes maintain the design functions of the second and third stage ADS control valves and fourth stage ADS squib valves of allowing the RCS to depressurize and allowing IRWST injection following a design basis accident.

An impact review determined these proposed changes do not affect or require any change to the AP1000 Probabilistic Risk Assessment (PRA) presented in UFSAR Chapter 19, including the Fire PRA, results and insights (e.g., core damage frequency and large release frequency). The proposed changes maintain the design functions of the second and third stage ADS control valves and fourth stage ADS squib valves of allowing the RCS to depressurize and allowing IRWST injection following a design basis accident. The physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR are not changed, and thus there are no changes to the AP1000 PRA required to address the proposed changes to the licensing basis. No new postulated failures of the second and third stage ADS control valves and fourth stage ADS squib valves are required in the PRA model. Therefore, there are no changes required to initiating event frequencies and system logic models of the PRA, including the Seismic Margins Analysis. The existing PRA risk significance investment protection determination for the second and third stage ADS control valves and fourth stage ADS squib valves is not affected.

There are no radiation zone changes or radiological access control changes required because of these proposed changes. The physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR are not changed, and

thus there are no changes required to the radiation protection design features described in UFSAR Section 12.3.

There are no fire area changes required because of these proposed changes. The physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR are not changed, and thus there are no changes required to the fire protection analysis described in UFSAR Appendix 9A.

There is no change to the risk-significant designation of SSCs within the Design Reliability Assurance Program as described in UFSAR Table 17.4-1, as the physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR are not changed.

The proposed changes do not affect the containment, control, channeling, monitoring, processing or releasing of radioactive and non-radioactive materials. No effluent release path is affected. The types and quantities of expected effluents are not changed. Therefore, radioactive or non-radioactive material effluents are not affected.

The proposed changes do not affect plant radiation zones, controls under 10 CFR 20, and expected amounts and types of radioactive materials, as the physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR are not changed. Therefore, individual and cumulative radiation exposures do not change.

The proposed changes do not affect the results of the aircraft impact assessment described in UFSAR Subsection 19F.4.

3.9 Summary

The proposed changes revise UFSAR information, which involve changes to the Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) for the minimum effective flow area through each second and third stage ADS control valve, and to the Inspections, Tests, Analyses, and Acceptance Criteria for COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iii) for the as-manufactured flow area for each fourth stage ADS squib valve. The proposed changes provide the necessary information to verify that the second and third stage ADS control valves and fourth stage ADS squib valves are constructed in accordance with the design certification as verified by COL Appendix C (and plant-specific DCD Tier 1) ITAAC.

The proposed changes maintain the required design function of the second and third stage ADS control valves and fourth stage ADS squib valves of allowing the RCS to depressurize, and allowing IRWST injection, following a design basis accident. Therefore, the previously evaluated and approved RCS and PXS safety-related and nonsafety-related design functions described in the UFSAR, and the results and consequences of the small-break LOCA safety analysis, large-break LOCA and long-term core cooling safety analyses, containment safety analysis, non-LOCA safety analyses, evaluation of IRWST pressurization and hydrodynamic loads, and loss of RNS during shutdown safety analysis described in the UFSAR, are not adversely affected by these proposed changes to COL Appendix C (and plant-specific DCD Tier 1) Subsection 2.1.2.

Although there are COL Appendix C (and corresponding plant-specific DCD Tier 1) changes, the resulting reduction in standardization caused by these changes does not cause a decrease in safety.

The proposed changes do not adversely affect any safety-related equipment or function, design function, radioactive material barrier or safety analysis.

4. Regulatory Evaluation

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 52.98(f) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a Combined License (COL). These activities involve a change to COL Appendix C Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) information, with corresponding changes to the associated plant-specific Design Control Document (DCD) Tier 1 information. Therefore, NRC approval is required prior to making the plant-specific proposed changes in this license amendment request.

10 CFR 52, Appendix D, Section VIII.B.5.a allows an applicant or licensee who references this appendix to depart from Tier 2 information, without prior NRC approval, unless the proposed departure involves a change to or departure from Tier 1 information, Tier 2* information, or the Technical Specifications, or requires a license amendment under paragraphs B.5.b or B.5.c of the section. These activities for the second and third stage automatic depressurization system (ADS) control valves and fourth stage ADS squib valves, which include changes to Updated Final Safety Analysis Report (UFSAR) Table 14.3-2 and 15.6.5-10, involve a revision to COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) and ITAAC Item 8.d)iii) information. Therefore, NRC approval is required for the Tier 2 and involved Tier 1 departures.

10 CFR Part 50, Appendix A, General Design Criterion (GDC) 2 requires that structures, systems and components important to safety be designed to withstand the effects of natural phenomena, such as earthquakes. The proposed changes for the second and third stage ADS control valves and fourth stage ADS squib valves, which involve a revision to COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) and ITAAC Item 8.d)iii) information, do not change the physical design and the existing seismic Category I design requirements for the second and third stage ADS control valves and fourth stage ADS squib valves. These activities do not involve physical modifications or addition of systems, structures, and components, and do not affect the existing seismic design requirements. Therefore, these activities comply with the requirements of GDC 2.

10 CFR Part 50, Appendix A, GDC 4 requires that systems structures and components can withstand the dynamic effects associated with missiles, pipe whipping, and discharging fluids, excluding dynamic effects associated with pipe ruptures, the probability of which is extremely low under conditions consistent with the design basis for the piping. The proposed changes for the second and third stage ADS control valves and fourth stage ADS squib valves, which involve a revision to COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) and ITAAC Item 8.d)iii) information, maintain the physical design capability of the second and third stage ADS control valves and fourth stage ADS squib valves to withstand dynamic effects associated with missiles, pipe whipping, and discharging fluids as required by this criterion. These activities do not change the requirements for anchoring safety-related

components and supports to seismic Category I structures. Therefore, these activities comply with the requirements of GDC 4.

10 CFR Part 50, Appendix A, GDC 35 requires that a system to provide abundant emergency core cooling be provided. The system safety function shall be to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts. The proposed changes for the second and third stage ADS control valves and fourth stage ADS squib valves, which involve a revision to COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) and ITAAC Item 8.d)iii) information, maintain the physical design capability of the second and third stage ADS control valves and fourth stage ADS squib valves to perform the safety-related design functions of the passive core cooling system (PXS). Assuming a minimum effective flow area of ≥ 19 in^2 for the second and third stage ADS control valves, and ≥ 66 in^2 for the fourth stage ADS squib valves, is shown to provide the necessary flow conditions required for the automatic depressurization design function of allowing the reactor coolant system (RCS) to depressurize and allowing in-containment refueling water storage tank (IRWST) injection following a design basis accident. Therefore, these activities comply with the requirements of GDC 35.

10 CFR Part 50, Appendix A, GDC 36 requires that the emergency core cooling system be designed to permit appropriate periodic inspection of important components, such as spray rings in the reactor pressure vessel, water injection nozzles, and piping, to assure the integrity and capability of the system. The proposed changes for the second and third stage ADS control valves and fourth stage ADS squib valves, which involve a revision to COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) and ITAAC Item 8.d)iii) information, maintain the capability to inspect the affected second and third stage ADS control valves and fourth stage ADS squib valves in compliance with regulatory requirements. Therefore, these activities comply with the requirements of GDC 36.

10 CFR Part 50, Appendix A, GDC 37 requires that the emergency core cooling system be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leaktight integrity of its components, (2) the operability and performance of the active components of the system, and (3) the operability of the system as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation, including operation of applicable portions of the protection system, the transfer between normal and emergency power sources, and the operation of the associated cooling water system. The proposed changes for the second and third stage ADS control valves and fourth stage ADS squib valves, which involve a revision to COL Appendix C (and plant-specific DCD Tier 1) Table 2.1.2-4 ITAAC Item 8.d)iv) and ITAAC Item 8.d)iii) information, maintain the capability to test the affected second and third stage ADS control valves and fourth stage ADS squib valves in compliance with regulatory requirements. Therefore, these activities comply with the requirements of GDC 37.

4.2 Precedent

No precedent is identified.

4.3 Significant Hazards Consideration Determination

The proposed changes revise the Combined License (COL) concerning the Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) for the second and third stage automatic depressurization system (ADS) control valves and the fourth stage ADS squib valves. The requested amendment requires changes to Updated Final Safety Analysis Report (UFSAR) Tier 2 information, which involve changes to 1) the Acceptance Criteria for COL Appendix C Table 2.1.2-4 ITAAC Item 8.d)iv) for the minimum effective flow area through each second and third stage ADS control valve, and 2) the Inspections, Tests, Analyses, and Acceptance Criteria for COL Appendix C Table 2.1.2-4 ITAAC Item 8.d)iii) for the as-manufactured flow area for each fourth stage ADS squib valve, with corresponding changes to the associated plant-specific Design Control Document (DCD) Tier 1 information. The proposed changes provide the necessary information to verify that the second and third stage ADS control valves and fourth stage ADS squib valves are constructed in accordance with the design certification as verified by COL Appendix C (and plant-specific DCD Tier 1) ITAAC. For the second and third stage ADS control valves, the minimum effective flow areas are reduced in the safety analyses to conform to the manufactured dimensions of the procured valves. In addition, a smaller minimum effective flow area is used in the safety analyses for the fourth stage ADS squib valves to account for identified potential deformation of the squib valve internals during actuation.

The proposed changes maintain the previously evaluated and approved reactor coolant system (RCS) and passive core cooling system (PXS) safety-related and nonsafety-related design functions described in the UFSAR. This includes the design functions of the second and third stage ADS control valves and fourth stage ADS squib valves of allowing the RCS to depressurize, and allowing in-containment refueling water storage tank (IRWST) injection, following a design basis accident. The results and consequences of the small-break loss-of-coolant accident (LOCA), and long-term core cooling (LTCC) safety analyses, large-break LOCA safety analysis, containment safety analyses, non-LOCA safety analyses, evaluation of IRWST pressurization and hydrodynamic loads, and loss of normal residual heat removal system (RNS) during shutdown safety analysis described in the UFSAR, are shown to not be adversely affected by these proposed changes.

An evaluation to determine whether or not a significant hazards consideration is involved with the proposed amendment was completed by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

4.3.1 Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed changes do not adversely affect the operation of any systems or equipment that initiate an analyzed accident or alter any structures, systems, and components (SSC) accident initiator or initiating sequence of events. The proposed changes do not adversely affect the physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as

described in the UFSAR. Therefore, the operation of the second and third stage ADS control valves and fourth stage ADS squib valves is not adversely affected. Inadvertent operation or failure of the second and third stage ADS control valves and fourth stage ADS squib valves are considered as accident initiators or part of an initiating sequence of events for an accident previously evaluated. However, the proposed changes do not adversely affect the probability of inadvertent operation or failure, nor the consequences of such accident precursor sequences. Therefore, the probabilities of the accidents previously evaluated in the UFSAR are not affected.

The proposed changes do not adversely affect the ability of the second and third stage ADS control valves and fourth stage ADS squib valves to perform their design functions. The designs of the second and third stage ADS control valves and fourth stage ADS squib valves continue to meet the same regulatory acceptance criteria, codes, and standards as required by the UFSAR. In addition, the proposed changes maintain the capabilities of the second and third stage ADS control valves and fourth stage ADS squib valves to mitigate the consequences of an accident and to meet the applicable regulatory acceptance criteria. The proposed changes do not adversely affect the prevention and mitigation of other abnormal events, e.g., anticipated operational occurrences, earthquakes, floods and turbine missiles, or their safety or design analyses. Therefore, the consequences of the accidents evaluated in the UFSAR are not affected

Therefore, the proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

4.3.2 Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The proposed changes do not affect the operation of any systems or equipment that may initiate a new or different kind of accident, or alter any SSC such that a new accident initiator or initiating sequence of events is created. The proposed changes do not adversely affect the physical design and operation of the second and third stage ADS control valves and fourth stage ADS squib valves, including as-installed inspections, testing, and maintenance requirements, as described in the UFSAR. Therefore, the operation of the second and third stage ADS control valves and fourth stage ADS squib valves is not adversely affected. These proposed changes do not adversely affect any other SSC design functions or methods of operation in a manner that results in a new failure mode, malfunction, or sequence of events that affect safety-related or nonsafety-related equipment. Therefore, this activity does not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that results in significant fuel cladding failures.

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

4.3.3 Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

The proposed changes maintain existing safety margins. The proposed changes maintain the capabilities of the second and third stage ADS control valves and fourth stage ADS squib valves to perform their design functions. The proposed changes maintain existing safety margin through continued application of the existing requirements of the UFSAR, while updating the acceptance criteria for verifying the design features necessary to confirm the second and third stage ADS control valves and fourth stage ADS squib valves perform the design functions required to meet the existing safety margins in the safety analyses. Therefore, the proposed changes satisfy the same design functions in accordance with the same codes and standards as stated in the UFSAR. These changes do not adversely affect any design code, function, design analysis, safety analysis input or result, or design/safety margin.

No safety analysis or design basis acceptance limit/criterion is challenged or exceeded by the proposed changes, and no margin of safety is reduced. Therefore, the requested amendment does not involve a significant reduction in a margin of safety.

Based on the above, it is concluded that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public. Pursuant to 10 CFR 50.92, the requested change does not involve a Significant Hazards Consideration.

5. Environmental Considerations

The details of the proposed changes are provided in Sections 2 and 3 of this licensing amendment request.

The requested amendment requires changes to Updated Final Safety Analysis Report (UFSAR) Tier 2 information, which involve changes to 1) the Acceptance Criteria for Combined License (COL) Appendix C Table 2.1.2-4 Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Item 8.d)iv) for type tests and analysis for the second and third stage automatic depressurization system (ADS) control valves to determine the minimum effective flow area through each valve,

and 2) the Inspections, Tests, Analyses, and Acceptance Criteria for COL Appendix C Table 2.1.2-4 ITAAC Item 8.d)iii) for inspections of the fourth stage ADS squib valves to determine the flow area through each valve, with corresponding changes to the associated plant-specific Design Control Document (DCD) Tier 1 information. The proposed changes provide the necessary information to verify that the second and third stage ADS control valves and fourth stage ADS squib valves are constructed in accordance with the design certification as verified by COL Appendix C (and plant-specific DCD Tier 1) ITAAC. For the second and third stage ADS control valves, the minimum effective flow areas are reduced in the safety analyses to conform to the manufactured dimensions of the procured valves. In addition, a smaller minimum effective flow area is used in the safety analyses for the fourth stage ADS squib valves to account for identified potential deformation of the squib valve internals during actuation.

A review has determined that the anticipated effects on facility construction and operation following implementation of the requested amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9), in that:

(i) *There is no significant hazards consideration.*

As documented in Section 4.3, Significant Hazards Consideration Determination, of this license amendment request, an evaluation was completed to determine whether or not a significant hazards consideration is involved by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment." The Significant Hazards Consideration determined that (1) the requested amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) the requested amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) the requested amendment does not involve a significant reduction in a margin of safety. Therefore, it is concluded that the requested amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

(ii) *There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite.*

The proposed changes are unrelated to any aspect of plant construction or operation that would introduce any change to effluent types (e.g., effluents containing chemicals or biocides, sanitary system effluents, and other effluents), or affect any plant radiological or non-radiological effluent release quantities. Furthermore, the proposed changes do not affect any effluent release path or diminish the design functions or operational features that are credited with controlling the release of effluents during plant operation. Therefore, it is concluded that the requested amendment does not involve a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite.

(iii) *There is no significant increase in individual or cumulative occupational radiation exposure.*

The proposed changes do not adversely affect walls, floors, or other structures that provide shielding. Plant radiation zones are not affected, and there are no changes to the controls required under 10 CFR Part 20 that preclude a significant increase in

occupational radiation exposure. Therefore, the requested amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

Based on the above review of the requested amendment, it has been determined that anticipated construction and operational effects of the requested amendment do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the requested amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment of the proposed amendment is not required.

6. References

1. NRC Inspection Report No. 99900080/2012-201 and Notice of Nonconformance, dated June 6, 2012, ADAMS Accession No. ML12158A154

2. Nuclear Regulatory Commission Vendor Inspection of Wyle Laboratories Report No. 99900905/2013-201, dated January 22, 2014, ADAMS Accession No. ML14016A447

Southern Nuclear Operating Company

ND-16-0984

Enclosure 2

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Exemption Request:

Automatic Depressurization System (ADS) Stage 2, 3 & 4

Valve Flow Area Changes and Clarifications

(LAR-16-012)

(This Enclosure consists of 8 pages, including this cover page.)

1.0 PURPOSE

Southern Nuclear Operating Company (the Licensee) requests a permanent exemption from the provisions of 10 CFR 52, Appendix D, Section III.B, *Design Certification Rule for the AP1000 Design, Scope and Contents*, to allow a departure from elements of the certification information in Tier 1 of the generic AP1000 Design Control Document (DCD). The regulation, 10 CFR 52, Appendix D, Section III.B, requires an applicant or licensee referencing Appendix D to 10 CFR Part 52 to incorporate by reference and comply with the requirements of Appendix D, including certified information in DCD Tier 1. The Tier 1 information for which a plant-specific departure and exemption is being requested includes changes to tables to clarify the flow area for the Automatic Depressurization System (ADS) fourth stage squib valves and to reduce the minimum effective flow area for the second and third stage ADS control valves.

This request for exemption provides the technical and regulatory basis to demonstrate that 10 CFR 52.63, §52.7, and §50.12 requirements are met and will apply the requirements of 10 CFR 52, Appendix D, Section VIII.A.4 to allow departures from generic Tier 1 information due to the proposed revisions to Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) Table 2.1.2-4 ITAAC Item 8.d)iv) for the minimum effective flow area through each second and third stage ADS control valve, and to the Inspections, Tests, Analyses, and Acceptance Criteria for plant-specific DCD Tier 1 Table 2.1.2-4 ITAAC Item 8.d)iii) for the as-manufactured flow area for each fourth stage ADS squib valve.

2.0 BACKGROUND

The Licensee is the holder of Combined License Nos. NPF-91 and NPF-92, which authorize construction and operation of two Westinghouse Electric Company AP1000 nuclear plants, named Vogtle Electric Generating Plant (VEGP) Units 3 and 4, respectively.

Flow capacity testing of the second and third stage ADS control valve identified an as-manufactured flow area less than the required minimum effective flow area of 21 in^2 currently specified in the ITAAC. However, a minimum effective flow area of ≥ 19 in^2 provides the necessary flow conditions required for the automatic depressurization design function in the small-break loss of coolant accident (LOCA). Therefore, the Acceptance Criteria for plant-specific DCD Tier 1 Table 2.1.2-4 ITAAC Item 8.d)iv) is proposed to be revised to reduce the minimum effective flow area through each second and third stage ADS control valve from ≥ 21 in^2 to ≥ 19 in^2.

NRC inspection (References 1 & 2) of the fourth stage ADS squib valves identified a potential deformation of the squib valve internals during actuation. Flow testing determined an as-manufactured flow area of ≥ 67 in^2 provided a minimum effective flow area after actuation that provided adequate flow to meet the required design flow rate of ≥ 188.3 lbm/sec. The fourth stage ADS squib valves are 14-inch squib valves that can only be actuated (opened) once before requiring internal refurbishment. Therefore, verification of the manufactured dimension for the shear caps is the only method that can be used to verify that the minimum effective flow area after actuation is ≥ 66 in^2, the value used in the small-break LOCA analysis. Therefore, the Acceptance Criteria for plant-specific DCD Tier

1 Table 2.1.2-4 ITAAC Item 8.d)iii) is proposed to be revised to clarify the inspection is of the "as-manufactured" flow area.

3.0 TECHNICAL JUSTIFICATION OF ACCEPTABILITY

During controlled depressurization via the ADS, the accumulators and core makeup tanks (CMTs) maintain reactor coolant system (RCS) inventory. Once the RCS depressurizes, injection from the in-containment refueling water storage tank (IRWST) maintains long-term core cooling. For continued injection from the IRWST, the RCS must remain depressurized.

As described in UFSAR Subsection 15.6.5.4B.3.1, the small-break LOCA safety design approach is to provide for a controlled depressurization of the primary system if the break cannot be terminated, or if the nonsafety-related charging system is postulated to be lost or cannot maintain acceptable plant conditions. The CMT level activates primary system depressurization. The CMT provides makeup to help compensate for the postulated break in the RCS. As the CMT level drops, the first through fourth stages of the ADS valves are ramped open in sequence. The first, second, and third stage ADS control valve and fourth stage ADS squib valve design features assumed in the small-break LOCA analysis are provided in UFSAR Table 15.6.5-10. The RCS depressurizes due to the break and opening of the ADS valves, while subcooled water from the CMTs and accumulators enters the reactor vessel downcomer to maintain system inventory and keep the core covered. Design basis maximum values of passive core cooling system (PXS) resistances are applied to obtain a conservative prediction of system behavior during the small-break LOCA events. The small-break LOCA analyses are the most limiting design basis analysis for changes in the second, third and fourth stage ADS flow area.

3.1 Second and Third Stage ADS Control Valves Minimum Effective Flow Areas

The second and third stage ADS control valves are motor-operated valves. They are capable of as-installed testing to verify the actual minimum flow through each valve, which then can be used to validate that they achieve the required minimum effective flow area. Assuming a minimum effective flow area of ≥ 19 in^2 provides the necessary flow conditions required for the automatic depressurization design function in the small-break LOCA analysis as further described below. Therefore, the Acceptance Criteria for plant-specific DCD Tier 1 Table 2.1.2-4 ITAAC Item 8.d)iv) is proposed to be revised to reduce the minimum effective flow area through each second and third stage ADS control valve from ≥ 21 in^2 to ≥ 19 in^2.

3.2 Fourth Stage ADS Squib Valves As-Manufactured and Minimum Effective Flow Areas

The fourth stage ADS squib valves have a unique requirement compared to first, second, and third stage ADS control valves, because the fourth stage ADS squib valves are 14-inch squib valves that can only be actuated (opened) once before requiring internal refurbishment. Therefore, verification of the manufactured dimension for the shear caps using a minimum inside diameter of 9.240 inches with a tolerance of +0.000/-0.002 inches for the fourth stage ADS squib valves is the only method that can be used to verify that the minimum effective flow area after actuation is ≥ 66 in^2. This smaller minimum effective flow area is reduced from the as-manufactured flow area to account for identified potential deformation of the squib valve internals during actuation. The use

of an assumed minimum effective flow area of 66 in^2 in the safety analyses is a bounding value, and is consistent with the measurements of the final minimum effective flow area (approximately 66.84 in^2) of the tested 14-inch squib valves obtained in December 2013 following functional testing conducted in accordance with ASME QME-1-2007. The flow testing of the selected fourth stage ADS squib valves conducted in December 2013 in accordance with ASME QME-1-2007 confirmed that the valves with an as-manufactured flow area ≥ 67 in^2 provided a minimum effective flow area that provided adequate flow of ≥ 188.3 lbm/sec with approximately 12% margin (211.4 lbm/sec minimum test flow versus ≥ 188.3 lbm/sec minimum design flow with inlet fluid temperature = 382°F (+0/-10°F), inlet fluid pressure = 185.3 psig (+0/-10 psig), and valve differential pressure verified as ≤ 185.3 psid). This test included actuation and flow measurements of sample valves using AP1000 design basis flow parameters. Therefore, the Inspections, Tests, Analyses, and Acceptance Criteria for plant-specific DCD Tier 1 Table 2.1.2-4 ITAAC Item 8.d)iii) are proposed to be revised to clarify that the inspection conducted for each fourth stage ADS squib valve is to determine the as-manufactured flow area through each valve, and that the as-manufactured flow area through each fourth stage ADS squib valve is ≥ 67 in^2.

Detailed technical justification supporting this request for exemption is provided in Section 3 of the associated License Amendment Request in Enclosure 1 of this letter.

4.0 JUSTIFICATION OF EXEMPTION

10 CFR Part 52, Appendix D, Section VIII.A.4 and 10 CFR 52.63(b)(1) govern the issuance of exemptions from elements of the certified design information for AP1000 nuclear power plants. Since SNC has identified changes to the Tier 1 information as discussed in Enclosure 1 of the accompanying License Amendment Request, an exemption from the certified design information in Tier 1 is needed.

10 CFR Part 52, Appendix D, and 10 CFR 50.12, §52.7, and §52.63 state that the NRC may grant exemptions from the requirements of the regulations provided six conditions are met: 1) the exemption is authorized by law [§50.12(a)(1)]; 2) the exemption will not present an undue risk to the health and safety of the public [§50.12(a)(1)]; 3) the exemption is consistent with the common defense and security [§50.12(a)(1)]; 4) special circumstances are present [§50.12(a)(2)]; 5) the special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption [§52.63(b)(1)]; and 6) the design change will not result in a significant decrease in the level of safety [Part 52, App. D, VIII.A.4].

The requested exemption satisfies the criteria for granting specific exemptions, as described below.

1. **This exemption is authorized by law**

   The NRC has authority under 10 CFR 52.63, §52.7, and §50.12 to grant exemptions from the requirements of NRC regulations. Specifically, 10 CFR 50.12 and §52.7 state that the NRC may grant exemptions from the requirements of 10 CFR Part 52 upon a proper showing. No law exists that would preclude the changes covered by this exemption request. Additionally, granting of the proposed exemption does not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations.

   Accordingly, this requested exemption is "authorized by law," as required by 10 CFR 50.12(a)(1).

2. **This exemption will not present an undue risk to the health and safety of the public**

   The proposed exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would allow changes to elements of the plant-specific Tier 1 DCD to depart from the AP1000 certified (Tier 1) design information. The plant-specific DCD Tier 1 will continue to reflect the approved licensing basis for VEGP Units 3 and 4, and will maintain a consistent level of detail with that which is currently provided elsewhere in Tier 1 of the DCD. Therefore, the affected plant-specific DCD Tier 1 ITAAC will continue to serve its required purpose.

   Clarification of the as-manufactured flow area for the ADS fourth stage squib valves and the reduction of the minimum effective flow area for the second and third stage ADS control valves, does not represent any adverse impact to the design function of the valves or the systems, structures and components therein and will continue to protect the health and safety of the public in the same manner. The revised flow areas do not introduce any new industrial, chemical, or radiological hazards that would represent a public health or safety risk, nor do they modify or remove any design or operational controls or safeguards intended to mitigate any existing on-site hazards. Furthermore, the proposed changes would not allow for a new fission product release path, result in a new fission product barrier failure mode, or create a new sequence of events that would result in fuel cladding failures. Accordingly, these changes do not present an undue risk from any existing or proposed equipment or systems.

   Therefore, the requested exemption from 10 CFR 52, Appendix D, Section III.B would not present an undue risk to the health and safety of the public.

3. **The exemption is consistent with the common defense and security**

   The requested exemption from the requirements of 10 CFR 52, Appendix D, Section III.B would allow the licensee to depart from elements of the plant specific DCD Tier 1 design information. The proposed exemption does not alter the design, function, or operation of any structures or plant equipment that is necessary to maintain a safe and secure status of the plant. The proposed exemption has no impact on plant security or safeguards procedures.

   Therefore, the requested exemption is consistent with the common defense and security.

4. **Special circumstances are present**

   10 CFR 50.12(a)(2) lists six "special circumstances" for which an exemption may be granted. Pursuant to the regulation, it is necessary for one of these special circumstances to be present in order for the NRC to consider granting an exemption request. The requested exemption meets the special circumstances of 10 CFR 50.12(a)(2)(ii). That subsection

defines special circumstances as when "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

The rule under consideration in this request for exemption is 10 CFR 52, Appendix D, Section III.B, which requires that a licensee referencing the AP1000 Design Certification Rule (10 CFR Part 52, Appendix D) shall incorporate by reference and comply with the requirements of Appendix D, including Tier 1 information. The VEGP Units 3 and 4 COLs reference the AP1000 Design Certification Rule and incorporate by reference the requirements of 10 CFR Part 52, Appendix D, including Tier 1 information. The underlying purpose of Appendix D, Section III.B is to describe and define the scope and contents of the AP1000 design certification, and to require compliance with the design certification information in Appendix D.

The proposed exemption would clarify the flow area for the ADS fourth stage squib valves and reduce the minimum effective flow area for the second and third stage ADS control valves.

The proposed revisions to the flow areas of the ADS Stage 2, 3, and 4 valves, discussed in Section 2, maintain the required design function of the second and third stage ADS control valves and fourth stage ADS squib valves of allowing the RCS to depressurize, and allowing IRWST injection, following a design basis accident. Therefore, the previously evaluated and approved RCS and PXS safety-related and nonsafety-related design functions described in the UFSAR, and the results and consequences of the small-break LOCA safety analysis, large-break LOCA, and long-term core cooling safety analyses, containment safety analysis, non-LOCA safety analyses, evaluation of IRWST pressurization and hydrodynamic loads, and loss of normal residual heating removal system (RNS) during shutdown safety analysis described in the UFSAR, are not adversely affected by these proposed changes. This change does not impact the ability of any structures, systems, or components to perform their functions or negatively impact safety. Accordingly, this exemption from the certification information will enable the Licensee to safely construct and operate the AP1000 facility consistent with the design certified by the NRC in 10 CFR 52, Appendix D.

Therefore, special circumstances are present, because application of the current generic certified design information in Tier 1 as required by 10 CFR Part 52, Appendix D, Section III.B, in the particular circumstances discussed in this request is not necessary to achieve the underlying purpose of the rule.

5. **The special circumstances outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.**

Based on the nature of the changes to the plant-specific Tier 1 information and the understanding that these changes support the design function of the ADS Stage 2, 3, and 4 valves, it is expected that this exemption may be requested by other AP1000 licensees and applicants. However, a review of the reduction in standardization resulting from the departure from the standard DCD determined that even if other AP1000 licensees and applicants do not request this same departure, the special circumstances will continue to outweigh any decrease in safety from the reduction in standardization because the key design functions of the structures associated with this request will continue to be maintained. Furthermore, the justification provided in the license amendment request and this exemption request and the associated mark-ups demonstrate that there is a limited change from the

standard information provided in the generic AP1000 DCD, which is offset by the special circumstances identified above.

Therefore, the special circumstances associated with the requested exemption outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption.

6. **The design change will not result in a significant decrease in the level of safety.**

The exemption revises the plant-specific DCD Tier 1 information by clarifying the flow area for the ADS fourth stage squib valves and reducing the minimum effective flow area for the second and third stage ADS control valves as discussed in Section 2.0. The changes to the flow areas do not change the design requirements of the ADS Stage 2, 3, and 4 valves. Because these functions continue to be met, there is no reduction in the level of safety.

5.0 RISK ASSESSMENT

A risk assessment was not determined to be applicable to address the acceptability of this proposal.

6.0 PRECEDENT EXEMPTIONS

None

7.0 ENVIRONMENTAL CONSIDERATION

The Licensee requests a departure from elements of the certified information in Tier 1 of the generic AP1000 DCD. The Licensee has determined that the proposed departure would require a permanent exemption from the requirements of 10 CFR 52, Appendix D, Section III.B, *Design Certification Rule for the AP1000 Design, Scope and Contents,* with respect to installation or use of facility components located within the restricted area, as defined in 10 CFR Part 20, or which changes an inspection or a surveillance requirement; however, the Licensee evaluation of the proposed exemption has determined that the proposed exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9).

Based on the above review of the proposed exemption, the Licensee has determined that the proposed activity does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed exemption meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental impact statement or environmental assessment of the proposed exemption is not required.

Specific details of the environmental considerations supporting this request for exemption are provided in Section 5 of the associated License Amendment Request provided in Enclosure 1 of this letter.

8.0 CONCLUSION

The proposed changes to clarify the as-manufactured flow area for the ADS fourth stage squib valves and to reduce the minimum effective flow area for the second and third stage ADS control valves are necessary to verify that the second and third stage ADS control valves and fourth stage ADS squib valves are constructed in accordance with the design certification as verified by plant-specific DCD Tier 1 ITAAC. The exemption request meets the requirements of 10 CFR 52.63, *Finality of design certifications*, 10 CFR 52.7, *Specific exemptions*, 10 CFR 50.12, *Specific exemptions*, and 10 CFR 52 Appendix D, *Design Certification Rule for the AP1000*. Specifically, the exemption request meets the criteria of 10 CFR 50.12(a)(1) in that the request is authorized by law, presents no undue risk to public health and safety, and is consistent with the common defense and security. Furthermore, approval of this request does not result in a significant decrease in the level of safety, satisfies the underlying purpose of the AP1000 Design Certification Rule, and does not present a significant decrease in safety as a result of a reduction in standardization.

9.0 REFERENCES

1. NRC Inspection Report No. 99900080/2012-201 and Notice of Nonconformance, dated June 6, 2012, ADAMS Accession No. ML12158A154

2. Nuclear Regulatory Commission Vendor Inspection of Wyle Laboratories Report No. 99900905/2013-201, dated January 22, 2014, ADAMS Accession No. ML14016A447

Southern Nuclear Operating Company

ND-16-0984

Enclosure 3

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Proposed Changes to Licensing Basis Documents

(LAR-16-012)

Note: Insertions Denoted by Blue Underline and Deletions by Red Strikethrough
Omitted text is identified by three asterisks (* * *)

(This Enclosure consists of 4 pages, including this cover page.)

Revise COL Appendix C Table 2.1.2-4 and corresponding Plant-Specific Tier 1 Table 2.1.2-4 to clarify the flow area for the ADS fourth stage squib valves and to reduce the minimum effective flow area for the second and third stage ADS control valves, as shown below:

Table 2.1.2-4 (cont.)
Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
* * *	* * *	* * *
8.d) The RCS provides automatic depressurization during design basis events.	* * *	* * *
	iii) Inspections of each fourth-stage ADS valve will be conducted to determine the **as-manufactured** flow area through each valve.	iii) The **as-manufactured** flow area through each fourth-stage ADS valve is $\geq$ 67 in^2.
	iv) Type tests and analysis will be performed to determine the effective flow area through each stage 1,2,3 ADS valve.	iv) A report exists and concludes that the effective flow area through each stage 1 ADS valve $\geq$ 4.6 in^2 and each stage 2,3 ADS valve is $\geq$ ~~21~~ **19** in^2.
	* * *	* * *

Revise UFSAR (plant-specific DCD) Table 14.3-2, "Design Basis Accident Analysis", to clarify and reduce the minimum effective flow area for the second and third stage ADS control valves and the ADS fourth stage squib valves, as shown below:

Reference	Design Feature	Value
* * * * * *	* * *	* * *
Table 15.6.5-10	ADS Valve **Minimum Effective** Flow Areas (in^2) – ADS Stage 1 Control Valve – ADS Stage 2 Control Valve – ADS Stage 3 Control Valve – ADS Stage 4A Valve – ADS Stage 4B Valve	 ≥ 4.6 ≥ ~~21~~**19** ≥ ~~21~~**19** ≥ ~~67~~**66** ≥ ~~67~~**66**
* * * * * *	* * *	* * *

Note:
The valve closure times reflect the design basis of the AP1000. The applicable Chapter 15 accidents were evaluated for these design basis valve closure times. The results of this evaluation have concluded that there is a small impact on the Chapter 15 analysis and the conclusions remain valid.

The ADS Stage 4A Valve and ADS Stage 4B Valve minimum effective flow areas of ≥ 66 in^2 are assumed in the small-break LOCA analyses to account for potential deformation during actuation that may reduce the effective flow area to less than the required as-manufactured flow area of ≥ 67 in^2.

Revise UFSAR (plant-specific DCD) Table 15.6.5-10, "AP1000 ADS Parameters", to rename the table, and to clarify and reduce the minimum effective flow area for the second and third stage ADS control valves and the ADS fourth stage squib valves, as shown below:

Table 15.6.5-10
~~AP1000~~ ADS Parameters Used in Small-Break LOCA Analyses(1)

Actuation Signal (percentage of core makeup tank level)		Actuation Time (seconds)	ADS Valve Minimum Effective ~~Valve~~ Flow Area (for each path, in²)	Maximum Valve Flow Area (for each path, in²)	Number of Paths	Valve Opening Time (seconds)
Stage 1 — Control Low 1	67.5	32 after CMT-Low 1	4.6~~(4)~~	7(4)	2 out of 2	≤ 40
Stage 2 — Control		48 after Stage 1	~~21(4)~~19	26(4)	2 out of 2	≤ 100
Stage 3 — Control		120 after Stage 2	~~21(4)~~19	26(4)	2 out of 2	≤ 100
Stage 4A	20	128 after Stage 3(2)	~~67~~66	NA	1 out of 2	≤ 4(3)
Stage 4B		60 after Stage 4A	~~67~~66	NA	2 out of 2	≤ 4(3)

Notes:
1. The valve stroke times reflect the design basis of the AP1000. The applicable Chapter 15 accidents were evaluated for the design basis valve stroke times. The results of this evaluation have shown that there is a small impact on the analysis and the conclusions remain valid. The output provided for the analyses is representative of the transient phenomenon.
2. The interlock requires coincidence of CMT Low-2 level as well as 128 seconds after the Stage 3 actuation signal is generated.
3. This includes "arm-fire" processing delay and the assumed valve opening time.
4. The areas listed above for the ADS Stage 1/2/3 valves are an effective flow area.