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U.S. Nuclear Regulatory Commission
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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Request for License Amendment:
Pressurizer Surge Line Testing (LAR-16-011)

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 (COLs) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (License Numbers NPF-91 and NPF-92, respectively). The requested amendment requires changes to the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the incorporated plant-specific Design Control Document (DCD) Tier 2 information and a COL License Condition which references one of the proposed changes.

The proposed changes to the UFSAR eliminate pressurizer spray line monitoring during pressurizer surge line first plant only testing. In addition, these proposed changes correct inconsistencies in testing purpose, testing duration, and the ability to leave equipment in place following the data collection period. These changes involve material which is specifically referenced in Section 2.D.(2) of the COLs. This submittal requests approval of the license amendment necessary to implement these changes.

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 markups depicting the requested changes to the licensing basis documents requiring NRC staff approval.

This letter contains no regulatory commitments.

SNC requests NRC staff approval of the license amendment by June 23, 2017 to support planning and execution of pressurizer surge line testing. South Carolina Electric & Gas Company (SCE&G) has stated that their current need date is the same for this activity for Virgil C. Summer Nuclear Station (VCSNS) Units 2 and 3. SNC expects to implement this proposed amendment within the VEGP Units 3 and 4 licensing basis documents within 30 days of approval of the requested changes.

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 Mr. Corey Thomas at (205) 992-5221.

Mr. Brian 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/BCT/ljs



Sworn to and subscribed before me this 31st day of August, 2016

Notary Public Lisa Myrick Spears

My commission expires: June 18, 2019

- Enclosures:
- 1) Vogtle Electric Generating Plant (VEGP) Units 3 and 4: Request for License Amendment: Pressurizer Surge Line Testing (LAR-16-011)
 - 2) Vogtle Electric Generating Plant (VEGP) Units 3 and 4: Proposed Changes to the Licensing Basis Documents (LAR-16-011)

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Southern Nuclear Operating Company
Vogtle Electric Generating Plant (VEGP) Units 3 and 4

ND-16-0921

Enclosure 1

Request for License Amendment:
Pressurizer Surge Line Testing
(LAR-16-011)

(This Enclosure consists of 17 pages, including this cover page.)

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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

The proposed changes revise the Combined License (COL) concerning the details of the reactor coolant system (RCS), and specifically the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only. The requirement to install, monitor, and verify operation of temperature sensors on the pressurizer spray line is proposed to be removed from the pressurizer surge line testing suite for monitoring thermal stratification and thermal cycling for the first plant as described in Updated Final Safety Analysis Report (UFSAR) Subsection 14.2.9.1.7 Item (d), and required by Combined License (COL) Section 2.D.(2)(a)2. Note that the UFSAR descriptions of pressurizer spray line testing are contained within the larger collection of pressurizer surge line testing descriptions. In addition, inconsistencies in regards to testing purpose, testing duration, and ability to leave equipment in place following the data collection period are resolved in UFSAR Subsection 14.2.9.2.22. UFSAR Subsection 3.9.3.1.2 text as referenced by UFSAR Subsection 3.9.8.5, and as described in UFSAR Subsection 14.2.5, does not require installation of temperature sensors for monitoring of the pressurizer spray line as part of the commitments to pressurizer surge line monitoring to address NRC Bulletin 88-11: *Pressurizer Surge Line Thermal Stratification*. The requested amendment requires changes to the licensing basis documents in the form of departures from the plant-specific Design Control Document (DCD) Tier 2 information (as incorporated into the UFSAR and detailed in Section 2), and involves changes associated with Combined License Conditions. This enclosure requests approval of the license amendment necessary to implement these changes.

2. Detailed Description

Overview

Subsection 14.2.9.1.7 Item (d) in Revision 19 of the AP1000 DCD Tier 2, which is referenced in COL Section 2.D.(2)(a)2, requires installation of temperature sensors on the pressurizer surge line and pressurizer spray line for monitoring thermal stratification and thermal cycling during power operation for the first plant during hot functional testing and during the first fuel cycle. However, as stated in UFSAR Subsection 3.9.3.1.2, the pressurizer spray line is not susceptible to thermal stratification, cycling or striping as discussed in NRC Bulletin 88-08: *Thermal Stresses in Piping Connected to Reactor Coolant Systems*. Therefore, as the phenomena addressed by NRC Bulletin 88-08 and NRC Bulletin 88-11 is not applicable to the pressurizer spray line, the requirement to install, monitor, and verify operation of temperature sensors on the pressurizer spray line is removed from the pressurizer surge line testing for monitoring thermal stratification and thermal cycling for the first plant as described in UFSAR Subsection 14.2.9.1.7 Item (d) and required by COL Section 2.D.(2)(a)2. This proposed change does not apply to the permanently installed pressurizer spray line temperature instrumentation (RCS-TIA-181, RCS-TIA-182, and RCS-TIA-183), which are still used for normal plant operations.

UFSAR Subsection 14.2.9.2.22 also requires installation of temperature sensors on the pressurizer spray line. However, UFSAR Subsection 3.9.3.1.2 text as referenced by UFSAR Subsection 3.9.8.5, and as described in UFSAR Subsection 14.2.5, does not require installation of temperature sensors for monitoring of the pressurizer spray line as part of the commitments to pressurizer surge line monitoring to address NRC Bulletin 88-11. The proposed changes will correct inconsistencies that exist in UFSAR Subsection 14.2.9.2.22.

Licensing Basis Change Descriptions

The following lists the proposed licensing basis changes:

Combined License Condition 2.D.(2)(a)2 is revised to specify the first plant test as identified in AP1000 DCD, Rev. 19, Section 14.2.9.1.7 Item (d), "as revised by Amendment No. ###." Note that the actual amendment number will need to be added at the time of issuance of the amendment.

1. The UFSAR is revised as follows:

- a) Subsection 14.2.9.1.7 Item (d) is revised to delete the requirement to install temperature sensors on the pressurizer spray line.
- b) UFSAR Subsection 14.2.9.2.22 is revised to delete the requirement to install temperature sensors on the pressurizer spray line in the Purpose section, and to verify operation of these temporary temperature sensors in Item a) in the General Test Methods and Acceptance Criteria section.
- c) UFSAR Subsection 14.2.9.2.22 is additionally revised to resolve the following inconsistencies that modify a test contained in COL Section 2.D.(2)(a)2:
 - The term "Reactor Coolant System" is replaced with "pressurizer surge line" in the Purpose and General Test Methods and Acceptance Criteria sections. The pressurizer surge line thermal stratification monitoring first plant only test is applicable only to the pressurizer surge line. The remainder of the RCS is monitored for thermal effects, dynamic effects and vibration (TEDEV) and for thermal stratification per UFSAR Subsections 3.9.3 and 14.2.9.1.7 Items (a) through (c). This change clarifies the intended scope of the pressurizer surge line monitoring program stated in UFSAR Subsections 3.9.3, 14.2.5, and 14.2.9.1.7 Item (d).
 - The term "and thermal stratification" is added in the Purpose section after "piping displacement" to clarify the purpose of the pressurizer surge line thermal stratification monitoring first plant only test as discussed in UFSAR Subsections 3.9.3, 14.2.5, and 14.2.9.1.7 Item (d). The original issue identified in NRC Bulletin 88-11 was stress cracking in the surge line due to thermal stratification.

- The term “for baseline data” is deleted in the Purpose section to clarify that the data obtained is evaluated during hot functional testing, power ascension testing and during the first fuel cycle. There is no requirement or intention to extend the pressurizer surge line thermal stratification monitoring first plant only test past the first fuel cycle. The data is not considered “baseline” in that it will not be used in comparison to any future data obtained. The raw data is evaluated based on acceptable piping stress limits and ASME Code requirements and will be used to develop plant operating strategies to limit developed piping stresses in the first and subsequent AP1000 plants, as applicable.
- The specified monitoring points in Item c) of the General Test Methods and Acceptance Criteria section are revised to reflect the correct plant parameters required to be recorded in support of the pressurizer surge line thermal stratification monitoring first plant only test. These include the following:
 - Pressurizer surge line temperatures are added, as this is the primary data required for the pressurizer surge line thermal stratification monitoring first plant only test.
 - Reactor Coolant System charging flow rate is added, as it is needed to obtain net RCS inventory.
 - Charging line to auxiliary spray flow (valve position for auxiliary spray on) is added, as it is needed to identify spray source/status for transient monitoring.
 - Passive core cooling system – passive residual heat removal flow rate is deleted, as it is not needed to obtain net RCS inventory.
- The valve leakage testing described in Item d) of the General Test Methods and Acceptance Criteria section is deleted, as it is not applicable to the pressurizer surge line thermal stratification monitoring first plant only test. There are no valves on the pressurizer surge line, and the pressurizer spray valve bypass flow precludes conditions for thermal stratification in the spray line as addressed in the AP1000 response to NRC Bulletin 88-08.
- Item e) of the General Test Methods and Acceptance Criteria section is revised as Item d) to clarify that the transducers and associated hardware may be removed after the completion of testing, but not required to be removed after completion of hot functional testing as implied by the current wording. Removal of temporary instrumentation is not necessary as the sensors and instrumentation are designed to remain throughout power operation during the first fuel cycle at a minimum. As identified in UFSAR Subsections 3.9.3 and 14.2.5, the pressurizer surge line thermal stratification monitoring first plant only test records temperature criteria distributions and thermal displacements of the surge line piping during hot functional tests and during the first fuel cycle.
- Item f) of the General Test Methods and Acceptance Criteria section is deleted, as it is redundant to Item a).

3. Technical Evaluation

As described in UFSAR Subsections 5.1.1 and 5.4.3.3, the pressurizer surge line and each loop spray line connected with the RCS are instrumented with resistance temperature detectors (RTDs) attached to the pipe.

There are three nonsafety-related temperature detectors located on the RCS pressurizer surge line. These instruments monitor the pressurizer surge line fluid temperature during normal plant operations in order to detect thermal stratification in the surge line. Two of the temperature detectors are located on a moderately sloped run approximately midway between the RCS hot leg and the pressurizer. One detector is located on the bottom of the pipe and the other detector on the top. The third detector is located on the pressurizer surge line as close to the pressurizer nozzle as possible. This detector is used to monitor cold insurges to the pressurizer during transient operations. The temperature is monitored at the three locations using strap-on resistance temperature detectors. Temperature indication is provided in the main control room. One low temperature alarm is provided to alert the operator of thermal stratification in the surge line. This alarm is associated with the detector on the bottom of the pipe. During heatup and cooldown operations, a differential temperature alarm indicates significant thermal stratification using the difference between the temperatures measured at the top and bottom of the pipe.

The RCS incorporates three nonsafety-related temperature channels in the pressurizer spray lines to monitor the pressurizer spray line fluid temperature during normal plant operations in order to detect insufficient continuous pressurizer spray flow. One detector is installed in each spray line from the cold legs and one is located in the common line close to the pressurizer. These surface-mounted resistance temperature detectors supply signals for indication of pressurizer spray line fluid temperature and low temperature alarm in the main control room. A decrease in spray line fluid temperature and actuation of the low temperature alarm warns the operator of low temperature in the spray line. Alarm conditions indicate that the manual spray bypass throttle valves are not set to provide sufficient flow in the spray lines, and that the spray bypass flow should be increased. This maintains the minimum spray line temperature within the bounds of the assumptions used in the fatigue analyses of the spray line and pressurizer spray nozzle.

As described in UFSAR Subsection 3.9.3.1.2, thermal stratification, cycling and striping are phenomena that have resulted in pipe cracking at nuclear power plants. As a result of these incidents, the United States Nuclear Regulatory Commission has issued several bulletins, including NRC Bulletin 88-08, Thermal Stresses in Piping Connected to Reactor Coolant Systems, and NRC Bulletin 88-11, Pressurizer Surge Line Thermal Stratification.

Thermal stratification may occur in piping when flow rates are low and adequate mixing of hot and cold fluid layers does not occur. Thermal cycling due to stratification may occur because of leaking valves or plant operation. Thermal striping is a cyclic mechanism caused by instabilities in the hot-cold fluid interface in stratified fluid during relatively steady flow conditions. The design of piping and component nozzles in the AP1000 includes provisions to minimize the potential for and the effects of thermal stratification and cycling. Piping and component supports are designed and evaluated for the thermal expansion of the piping resulting from potential stratification modes. The evaluation includes consideration of the information on thermal cycling and thermal stratification included in NRC Bulletins 79-13, 88-08, and 88-11, and other applicable design standards.

NRC Bulletin 88-08, Supplement 1, Supplement 2, and Supplement 3 were issued following the discovery of cracks in unisolable piping at several nuclear power plants. These cracks were attributed to unanalyzed thermal stresses resulting from isolation valve leakage.

The purpose of NRC Bulletin 88-08 was a request to review systems connected to the RCS to determine whether unisolable sections of piping connected to the RCS can be subjected to stresses from temperature stratification or temperature oscillations that could be induced by leaking valves and that were not evaluated in the design analysis of the piping. The bulletin requested that unisolable portions of the RCS be reviewed for thermal stratification, cycling and striping. The requested review concluded that the pressurizer spray lines from the cold legs to the pressurizer are not susceptible to these phenomena.

NRC Bulletin 88-11 was issued after Portland General Electric Company experienced difficulties in setting whip restraint gap sizes on the pressurizer surge line at the Trojan plant. The cold gaps were adjusted to design settings several times and were found to be out of specification after each operating cycle. The gap changes were caused by plastic deformation in the surge line piping resulting from excessive thermal loadings. The thermal loadings were determined to be caused by thermal stratification based on monitoring and analysis. Several similar incidents were subsequently discovered in other surge lines, and an industry-wide program to evaluate this phenomenon was undertaken by the various PWR owners groups.

The purpose of NRC Bulletin 88-11 was a request to establish and implement a program to confirm pressurizer surge line integrity in view of the occurrence of thermal stratification, and to require informing the NRC staff of the actions taken to resolve this issue. The actions requested in the bulletin are discussed below, and the manner in which AP1000 addresses the actions, if required, for surge line stratification:

1. Before issuance of the low power license, applicants are requested to demonstrate that the pressurizer surge line meets the applicable design codes and other FSAR and regulatory commitments for the licensed life of the plant. This may be accomplished by performing a plant specific or generic bounding analysis. The analysis should include consideration of thermal stratification and thermal striping to ensure that fatigue and stresses are in compliance with applicable code limits. The analysis and hot functional testing should verify that piping thermal deflections result in no adverse consequences, such as contacting the pipe whip restraints. If analysis or test results show Code noncompliance, conduct of all actions specified below is requested.
- AP1000 Conformance: Analysis of the AP1000 surge line considers thermal stratification and thermal striping, and demonstrates that the surge line meets applicable code requirements for the licensed life of the plant. Hot functional testing requirements for the AP1000 ensure that piping thermal deflections result in no adverse consequences.

2. Applicants are requested to either monitor the surge line for the effects of thermal stratification, beginning with hot functional testing, or obtain data through collective efforts to assess the extent of thermal stratification, thermal striping and piping displacements.
 - AP1000 Conformance: As part of the Westinghouse Owners Group program on surge line thermal stratification, Westinghouse collected surge line physical design and plant operational data for all domestic Westinghouse PWRs. In addition, Westinghouse collected surge line monitoring data from approximately 30 plants. This experience was used in the development of the AP1000 thermal stratification loadings. Monitoring will be performed during hot functional testing and during the first cycle of the first AP1000 plant. This Combined License item is identified in UFSAR Subsection 3.9.8.5. Subsequent monitoring of the AP1000 surge line is not required.

A monitoring program is implemented as discussed in UFSAR Subsection 3.9.8.5 at the first AP1000 to record temperature distributions and thermal displacements of the surge line piping, as well as pertinent plant parameters such as pressurizer temperature and level, hot leg temperature, and reactor coolant pump status. Monitoring is performed during hot functional testing and during the first fuel cycle. The resulting monitoring data is evaluated to show that it is within the bounds of the analytical temperature distributions and displacements.

As described in UFSAR Subsection 3.9.3.1.2 text, subsequent AP1000 plants (after the first AP1000 plant) confirm that the heatup and cooldown procedures are consistent with the pertinent attributes of the first AP1000 plant surge line monitoring. In addition, changes to the heatup and cooldown procedures consider the potential impact on stress and fatigue analyses consistent with the concerns of NRC Bulletin 88-11. The pressurizer surge line monitoring activities include the following methodology and requirements:

Monitoring Method

The pressurizer surge line pipe wall is instrumented with externally mounted temperature and displacement sensors. The data from this instrumentation is supplemented by plant computer data from related process and control parameters.

Locations Monitored

In addition to the existing permanent plant temperature instrumentation, temperature and displacement monitoring instruments are included at critical locations on the surge line. The additional locations utilized for monitoring during the hot functional testing and the first fuel cycle (see UFSAR Subsection 14.2.9.2.22) are selected based on the capability to provide effective monitoring.

As described in UFSAR Subsection 14.2.9.1.7, the purpose of the expansion, vibration and dynamic effects testing is to verify that the safety-related, high energy piping and components are properly installed and supported. This ensures that expected movement due to thermal expansion during normal heatup and cooldown, as a result of transients; thermal stratification and thermal cycling; as well as vibrations caused by steady-state or dynamic effects do not result in excessive stress or fatigue to safety-related plant systems and equipment, as described in UFSAR Section 3.9.

As described in UFSAR Subsection 14.2.9.1.7 Item (d), temperature sensors are installed on the pressurizer surge line and pressurizer spray line for monitoring thermal stratification and thermal cycling during power operation. Testing is performed to verify proper operation of these sensors.

As described in COL Section 2.D.(2)(a)2, a design-specific pre-operational test for Pressurizer Surge Line Stratification Evaluation (first plant test as identified in AP1000 DCD, Rev. 19, Section 14.2.9.1.7 Item (d)) is required.

As described in UFSAR Subsection 14.2.9.2.22, the purpose of the pressurizer surge line testing is: a) to obtain data to verify the proper operation of temperature sensors installed on the pressurizer surge line and pressurizer spray line, and b) to obtain RCS piping displacement measurements for baseline data, as described in UFSAR Subsections 3.9.3, 14.2.5, and 14.2.9.1.7 Item (d).

The performance of the RCS is observed and recorded during a series of individual tests that characterize the various modes of system operation. This testing verifies that the temperature sensors operate as described in UFSAR Subsection 3.9.3 and in appropriate design specifications. This includes:

- Verifying the proper operation of temperature sensors installed on the pressurizer surge line and pressurizer spray line; and
- Recording pressurizer spray temperature at specified intervals throughout hot functional testing of the RCS system, including during the drawing and collapsing of the bubble in the pressurizer;

The proposed changes do not adversely affect the design functions of the RCS and the pressurizer surge line and pressurizer spray lines described above. The proposed changes are acceptable as they address the commitments to pressurizer surge line monitoring to address NRC Bulletin 88-11. The removal of requirements for installing temporary temperature monitoring instrumentation on the pressurizer spray line does not change the existing design and testing requirements described in other areas of the UFSAR necessary to monitor temperatures using permanent instrumentation and to verify continued integrity of the pressurizer spray lines. The change to COL Section 2.D.(2)(a)2 and departure from the AP1000 DCD, Rev. 19, Section 14.2.9.1.7 Item (d) requirement to install temporary temperature instrumentation on the pressurizer spray line is consistent with these changes.

Additional changes are proposed to the parameter retention requirements of UFSAR Section 14.2.9.2.22 Item c) in support of pressurizer surge line testing to address NRC Bulletin 88-11. These changes add a) Pressurizer surge line temperatures, b) Reactor Coolant System charging flow rate, and c) charging line to auxiliary spray flow (valve position for auxiliary spray on) to the list of parameters retained during first plant pressurizer surge line testing, and remove the requirement to retain the passive core cooling system – passive residual heat removal flow rate parameter. The added parameters permit detection of thermal stratification in the surge line, allow calculation of the net RCS inventory and permit identification of spray source and status for transient monitoring, respectively. The deleted parameter was intended to provide net RCS inventory information, and is no longer required with the addition of the RCS charging flow rate parameter. These changes do not change the existing design and testing requirements described in other areas of the UFSAR necessary to monitor temperatures using permanent instrumentation and to verify the continued integrity of the pressurizer surge lines. The proposed changes are acceptable as they do not adversely affect the design functions of the RCS and the pressurizer surge lines as described above, and address NRC Bulletin 88-11 commitments.

A change is proposed to remove UFSAR Section 14.2.9.2.22 Item d), which requires monitoring of the pressurizer spray and surge lines valves for leakage. The pressurizer surge line does not have any valves, and the pressurizer spray valve has a bypass flow feature which precludes conditions for thermal stratification in the spray line as addressed in the AP1000 response to NRC Bulletin 88-08. This change is acceptable as it does not adversely affect the design functions of the RCS and pressurizer surge and spray lines as described above, is not required to address NRC Bulletin 88-11 related concerns, and is consistent with the AP1000 response to NRC Bulletin 88-08.

An impact review determined that 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 do not result in any permanent design change to the RCS, including the pressurizer surge line and pressurizer spray lines. The proposed changes remove the requirement to install temporary instrumentation on the pressurizer spray line to collect thermal stratification data during first plant only testing. Additional proposed changes to first plant only testing regarding parameter retention requirements and removal of the pressurizer spray and surge line valve leakage testing requirement similarly do not permanently change the RCS design. Therefore, there are no changes to the existing failures of the RCS included in the PRA model, and no new postulated failures of the RCS are required in the PRA model. Therefore, there are no changes required to initiating event frequencies and system logic models of the PRA. The existing PRA risk significance investment protection determination for the RCS is not affected. The systems, structures, and components (SSCs) affected by these proposed changes, the pressurizer surge line and pressurizer spray lines, are not identified as risk-significant within the scope of the Design Reliability Assurance Program (D-RAP) in UFSAR Table 17.4-1.

There are no fire area changes required because of these proposed changes. No combustible materials are added by the proposed changes, and no fire area boundaries are changed. The affected RCS SSCs are not modified such that fire barriers, including walls, floors, or other structures, and fire dampers for the associated ventilation systems, are changed.

There are no radiation zone changes required because of these proposed changes. The affected RCS SSCs are not modified such that new or different amounts and types of radioactive materials are introduced, and no radiation zone boundaries, including walls, floors, or other structures that provide shielding features, are changed. The proposed change to remove the requirement to install temporary instrumentation on the pressurizer spray line to collect thermal stratification data during first plant only testing, and additional proposed changes to first plant only testing for parameter retention requirements and removal of the pressurizer spray and surge line valve leakage testing requirement do not adversely affect the radiological protection features of the RCS pressurizer spray lines. In fact, the removal of the requirement will prevent occupational radiation exposure by not requiring eventual maintenance or removal of the temporary pressurizer spray line instrumentation. Therefore, there are no changes to the controls required under 10 CFR 20; these 10 CFR 20 controls preclude a significant increase in occupational radiation exposure.

The proposed changes do not affect the containment, control, channeling, monitoring, processing or release of radioactive and non-radioactive materials. The proposed change to remove the requirement to install temporary instrumentation on the pressurizer spray line to collect thermal stratification data during first plant only testing, and additional proposed changes to first plant only testing for parameter retention requirements and removal of the pressurizer spray and surge line valve leakage testing requirement do not adversely affect the containment and control of radioactive and non-radioactive materials inside containment, and do not adversely affect the containment boundary. The proposed changes do not adversely affect the design functions of the RCS to prevent the unmonitored release of airborne radioactivity to the atmosphere or adjacent plant areas, as there is no adverse impact to the capability of the pressurizer surge line and pressurizer spray lines to maintain the required reactor coolant pressure boundary. Therefore, no effluent release path is affected. In addition, the types and quantities of expected effluents are not changed by the proposed changes. Therefore, radioactive or non-radioactive material effluents are not affected.

Summary

The proposed changes would revise UFSAR information, and associated COL information, concerning details of the RCS. Proposed changes impact the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only. The proposed changes do not adversely affect the design functions of the RCS, including the pressurizer surge line and the pressurizer spray lines.

The proposed changes also address removal of a requirement that is not necessary for the safe operation of the plant. These proposed changes are acceptable because the design functions of the RCS, including the pressurizer surge line and pressurizer spray lines, as an effective reactor coolant pressure boundary continue to be met.

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 COL, including any modification to, addition to, or deletion from the inspections, tests, analyses, or related acceptance criteria contained in the license. The proposed changes involve a change to COL Section 2.D.(2)(a)2. Therefore, NRC approval is required prior to making the plant-specific proposed changes in this license amendment request. The proposed changes to UFSAR Subsection 14.2.9.1.7 Item (d) and related changes to UFSAR Subsection 14.2.9.2.22 modify a test contained in COL Section 2.D.(2)(a)2. Therefore, NRC approval is also required for the Tier 2 departures.

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. The proposed changes to UFSAR Subsection 14.2.9.1.7 Item (d) and UFSAR Subsection 14.2.9.2.22 do not require NRC approval per Section VIII.B.5.a, B.5.b, or B.5.c. However, NRC approval is required for the Tier 2 departures per 10 CFR 52.98(f) as described above.

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 change to remove the requirement to install temporary instrumentation on the pressurizer spray line during the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only does not impact the existing seismic design requirements for the RCS, including seismic Category I requirements. The proposed change does not involve physical modifications or addition of systems, structures, and components, and does not impact the existing seismic design requirements. Therefore, the proposed changes 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 change to remove the requirement to install temporary instrumentation on the pressurizer spray line during the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only proposed changes to parameter retention requirements, and proposed change to remove the pressurizer spray and surge line valve leakage requirement do not impact the existing design requirements for the RCS. The proposed changes do not involve physical modifications or addition of systems, structures, and components, and do not impact the existing capability of the RCS to withstand dynamic effects associated with missiles, pipe whipping, and discharging fluids as required by this criterion. Therefore, the proposed changes comply with the requirements of GDC 4.

10 CFR Part 50, Appendix A, GDC 14 requires that the reactor coolant pressure boundary be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture. The proposed change to remove the requirement to install temporary instrumentation on the pressurizer spray line during the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only, proposed changes to parameter retention requirements, and proposed change to remove the pressurizer spray and surge line valve leakage requirement do not impact the existing design requirements for the RCS. The proposed change does not involve physical modifications or addition of systems, structures, and components, and does not impact the existing capability of the pressurizer surge line and pressurizer spray lines to perform the required reactor coolant pressure boundary functions. Therefore, the proposed changes comply with the requirements of GDC 14.

10 CFR Part 50, Appendix A, GDC 15 requires that the reactor coolant system and associated auxiliary, control, and protection systems shall be designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences. The proposed change to remove the requirement to install temporary instrumentation on the pressurizer spray line during the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only, proposed changes to parameter retention requirements, and proposed change to remove the pressurizer spray and surge line valve leakage requirement do not impact the existing design requirements for the RCS. The proposed change does not involve physical modifications or addition of systems, structures, and components, does not impact the existing capability of the pressurizer surge line and pressurizer spray lines to perform the required reactor coolant pressure boundary functions, and does not impact the existing auxiliary, control, and protection systems. The proposed changes do not impact permanent plant instrumentation necessary for monitoring and control of the RCS. Therefore, the proposed changes comply with the requirements of GDC 15.

4.2 Precedent

No precedent is identified.

4.3 Significant Hazards Consideration Determination

The proposed changes would revise the Combined License (COL) in regards to details of the reactor coolant system (RCS), including the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only and removal of the requirement to perform similar monitoring of the pressurizer spray line for the first plant. The requested amendment requires changes to Updated Final Safety Analysis Report (UFSAR) Tier 2 information, which involve changes to a COL license condition.

An evaluation to determine whether a significant hazards consideration is involved with the requested 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 design functions of the RCS include providing an effective reactor coolant pressure boundary. The proposed changes for removing the requirement to install temporary instrumentation on the pressurizer spray line during the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only, proposed changes to parameter retention requirements, and proposed change to remove the pressurizer spray and surge line valve leakage requirement do not impact the existing design requirements for the RCS. These changes are acceptable as they are consistent with the commitments made for the pressurizer surge line monitoring program for the first plant only, and do not adversely affect the capability of the pressurizer surge line and pressurizer spray lines to perform the required reactor coolant pressure boundary design functions.

These proposed changes to the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only, proposed changes to parameter retention requirements, and proposed change to remove the pressurizer spray and surge line valve leakage requirement as described in the current licensing basis do not have an adverse effect on any of the design functions of the systems. The proposed changes do not affect the support, design, or operation of mechanical and fluid systems required to mitigate the consequences of an accident. There is no change to plant systems or the response of systems to postulated accident conditions. There is no change to the predicted radioactive releases due to postulated accident conditions. The plant response to previously evaluated accidents or external events is not adversely affected, nor do the proposed changes create any new accident precursors.

Therefore, the requested 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 for removing the requirement to install temporary instrumentation on the pressurizer spray line during the monitoring of the pressurizer surge line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only, proposed changes to parameter retention requirements, and proposed change to remove the pressurizer spray and surge line valve leakage requirement as described in the current licensing basis maintain the required design functions, and are consistent with other Updated Final Safety Analysis Report (UFSAR) information. The proposed changes do not adversely affect the design requirements for the RCS, including the pressurizer surge line and pressurizer spray lines. The proposed changes do not adversely affect the design function, support, design, or operation of mechanical and fluid systems. The proposed changes do not result in a new failure mechanism or introduce any new accident precursors. No design function described in the UFSAR is adversely affected by the proposed changes.

Therefore, the requested 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

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 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.

4.4 Conclusions

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.

5. Environmental Considerations

The requested amendment revises the details of the reactor coolant system, including the monitoring of the pressurizer surge line and pressurizer spray line for thermal stratification and thermal cycling during hot functional testing and during the first fuel cycle for the first plant only, as described in the Updated Final Safety Analysis Report and a related Combined License (COL) License Condition.

A review has determined that the requested amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR Part 20, or would change an inspection or surveillance requirement. However, facility construction and operation following implementation of the requested amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in 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), 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 release off site

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; these 10 CFR 20 controls 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.

ND-16-0921

Enclosure 1

Request for License Amendment: Pressurizer Surge Line Testing (LAR-16-011)

Based on the above review of the requested amendment, it has been determined that anticipated construction and operational impacts 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), no environmental impact statement or environmental assessment need be prepared in connection with the requested amendment.

6. References

None

Southern Nuclear Operating Company
Vogtle Electric Generating Plant (VEGP) Units 3 and 4

ND-16-0921

Enclosure 2

Proposed Changes to the Licensing Basis Documents
(LAR-16-011)

Note:

Added text is shown as Blue Underline

Deleted text is shown as ~~Red Strikethrough~~

Omitted text is shown as three asterisks (* * *)

(This Enclosure consists of 3 pages, including this cover page.)

Combined License Section 2.D.(2), Pre-operational Testing - Revise information related to the pressurizer surge line test referenced in the location shown below.

(Note: actual amendment number to be provided at the time of amendment issuance.)

(a) SNC shall perform the design-specific pre-operational tests identified below:

...

2. Pressurizer Surge Line Stratification Evaluation (first plant test as identified in AP1000 DCD, Rev. 19, Section 14.2.9.1.7 Item (d) [as revised by Amendment No. ###](#));

UFSAR Subsection 14.2.9.1.7, Expansion, Vibration and Dynamic Effects Testing - Revise information in the General Test Method and Acceptance Criteria, Item d) in the location shown below.

- d) As described in Subsection 3.9.3, temperature sensors are installed on the pressurizer surge line ~~and pressurizer spray line~~ for monitoring thermal stratification and thermal cycling during power operation. Testing is performed to verify proper operation of these sensors. **Note that this verification is required only for the first plant.**

UFSAR Subsection 14.2.9.2.22, Pressurizer Surge Line Testing (First Plant Only) - Revise information in the Purpose discussion in the locations shown below.

The purpose of the pressurizer surge line testing is: a) to obtain data to verify the proper operation of temperature sensors installed on the pressurizer surge line ~~and pressurizer spray line~~, and b) to obtain ~~Reactor Coolant System~~ pressurizer surge line piping displacement and thermal stratification measurements ~~for baseline data~~, as described in Subsections 3.9.3, 14.2.5, and 14.2.9.1.7 Item (d).

UFSAR Subsection 14.2.9.2.22, Pressurizer Surge Line Testing (First Plant Only) - Revise information in the General Test Methods and Acceptance Criteria discussion in the locations shown below.

The performance of the ~~Reactor Coolant System~~ [pressurizer surge line](#) is observed and recorded during a series of individual tests that characterize the various modes of system operation. This testing verifies that the temperature sensors operate as described in Subsection 3.9.3 and in appropriate design specifications.

- a) Verify the proper operation of temperature sensors installed on the pressurizer surge line ~~and pressurizer spray line.~~
- b) Record sensor data at specified intervals throughout hot functional testing of the RCS system, including during the drawing and collapsing of the bubble in the pressurizer.
- c) Retain the following plant parameters time history for the same data recording period:
 - Hot leg temperature
 - Reactor Coolant System pressure
 - Reactor coolant pump status
 - Pressurizer level
 - Pressurizer temperature (liquid and steam)
 - [Pressurizer surge line temperatures](#)
 - Pressurizer spray temperature
 - [Reactor Coolant System charging flow rate](#)
 - Pressurizer spray and auxiliary spray flow
 - [Charging line to auxiliary spray flow \(valve position for auxiliary spray on\)](#)
 - Normal residual heat removal system flow rate
 - ~~Passive core cooling system—passive residual heat removal flow rate.~~
- d) ~~Monitor pressurizer surge line and pressurizer spray line for valve leakage.~~
- e) ~~Remove t~~he transducers and associated hardware [may be removed](#) after the completion of testing.
- f) ~~Proper operation of the temperature sensors in the pressurizer surge and spray lines is verified.~~