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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:
Chemical Addition with Reactor Coolant Pumps Not in Operation (LAR-17-019)

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 Combined Licenses (COLs) for Vogtle Electric Generating Plant (VEGP) Units 3 and 4 (License Nos. 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 Plant-Specific Design Control Document (DCD) Tier 2 information and involves changes to the VEGP Units 3 and 4 COL Appendix A, Technical Specifications. Because the proposed changes impact the Technical Specifications, this activity has been determined to require prior NRC approval.

The proposed changes revise plant-specific Tier 2 information concerning changes to the administrative controls for unborated water flow paths to the reactor coolant system that are required to support chemical additions during periods when the reactor coolant pumps are not in operation. These controls are also addressed in proposed changes to COL Appendix A, Technical Specifications.

Enclosure 1 provides the description, technical evaluation, regulatory evaluation (including the Significant Hazards Consideration Determination), and environmental considerations for the proposed changes in the License Amendment Request (LAR).

Enclosure 2 provides the proposed changes to the licensing basis documents.

Enclosure 3 provides conforming Technical Specification Bases changes for information only.

This letter contains no regulatory commitments. This letter has been reviewed and confirmed to not contain security-related information.

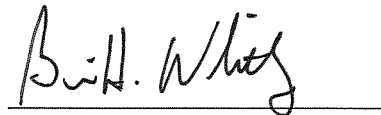
SNC requests NRC staff review and approval of the license amendment no later than December 1, 2017. Approval by this date will allow sufficient time to implement licensing basis changes necessary to support procedure development in relation to conducting the necessary operator training to support plant operations. SNC expects to implement the proposed amendment within thirty days of approval. South Carolina Electric & Gas Company (SCE&G) has stated that the current requested approval date for the expected parallel LAR for Virgil C. Summer Nuclear Station (VCSNS) Unit 2 is February 6, 2018.

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.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 31st of May 2017.

Respectfully submitted,



Brian H. Whitley
Regulatory Affairs Director
Southern Nuclear Operating Company

BHW/BCT/ljs

- Enclosures: 1) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Request for License Amendment: Chemical Addition with Reactor Coolant Pumps Not in Operation (LAR-17-019)
- 2) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Proposed Changes to the Licensing Basis Documents (LAR-17-019)
- 3) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Conforming Technical Specification Bases Changes (LAR-17-019) – (For Information Only)

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ND-17-0894

Enclosure 1

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Request for License Amendment:

Chemical Addition with Reactor Coolant Pumps Not in Operation

(LAR-17-019)

(Enclosure 1 consists of 15 pages, including this cover page)

ND-17-0894

Enclosure 1

Request for License Amendment: Chemical Addition with Reactor Coolant Pumps Not in Operation (LAR-17-019)

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

1. SUMMARY DESCRIPTION

The proposed changes support the addition of chemicals necessary to achieve proper RCS water quality by allowing an unborated water source through the chemical mixing tank to be unisolated for ≤ 1 hour for chemical addition to the pressurizer to be performed with reactor coolant pumps (RCPs) not in operation. In order to perform chemical addition to the pressurizer without the mixing provided by forced reactor coolant system (RCS) flow, administrative controls are established such that coolant introduced into the RCS is at a boron concentration greater than or equal to that required to meet the shutdown margin (SDM) boron concentration.

The proposed changes require revision to the UFSAR in the form of departures from the plant-specific Design Control Document (DCD) Tier 2 information, and involved changes to COL Appendix A, Technical Specifications as discussed in the detailed description of these changes provided in Section 2. This enclosure requests approval of the license amendment necessary to implement these changes.

2. DETAILED DESCRIPTION

As discussed in UFSAR Subsections 5.2.3.2.1 and 9.3.6.1.2.4, during reactor startup from the cold condition, hydrazine is used to scavenge dissolved oxygen. During this time when hydrazine is desired to be added to the RCS pressurizer, RCPs are not in operation and per Technical Specifications, all unborated water sources are required to be isolated to prevent boron dilution events. This limitation precludes the desired chemical addition.

In order to achieve chemistry requirements for heating the pressurizer, which is necessary for RCP startup, changes are required to COL Appendix A, Technical Specification 3.4.8. Currently, this Technical Specification requires that at least one RCP be operating with a total flow through the core of at least 3,000 gpm in MODES 3, 4 and 5 whenever the plant control system is incapable of rod withdrawal, all rods are fully inserted and unborated water sources are not isolated from the RCS. Limiting Condition for Operation (LCO) 3.4.8 Note 1 is revised to allow an unborated water source through the chemical mixing tank to be unisolated for ≤ 1 hour under administrative control to support chemical addition to the pressurizer when RCPs are not in operation. This chemical addition requires the use of unborated water to flush chemicals into the chemical and volume control system (CVS) makeup pump suction where they are mixed with borated water. This change supports the addition of chemicals necessary to achieve proper RCS water quality including, but not limited to, the addition of hydrazine prior to RCP startup while continuing to assure the required SDM is maintained.

Additionally, UFSAR Subsection 15.4.6.1 is revised to present the appropriate controls supporting the limited allowance for unisolating the specific unborated water source through the chemical mixing tank for injection to the pressurizer when RCPs are not in operation. UFSAR Subsections 15.4.6.2.2, 15.4.6.2.3, and 15.4.6.2.4 are revised to provide a reference point to the exception identified in the proposed changes to UFSAR Subsection

15.4.6.1 regarding unisolation of the unborated water source used during chemical addition to the pressurizer when RCPs are not in operation.

Current LCO 3.4.8 Note 1 is also revised consistent with the existing Technical Specification Bases for this Note by adding the clarification that “for the purpose of testing” all RCPs may be removed from operation for ≤ 1 hour per 8 hour period. An “OR” is provided to separate this portion of Note 1 from the new text which permits the chemical addition to the pressurizer.

Proposed Licensing Basis Changes

The following changes to COL Appendix A, Technical Specifications are proposed:

- Revise LCO 3.4.8 Note 1 to add an additional condition as follows:

With no RCPs in operation, an unborated water source through the chemical mixing tank may be unisolated under administrative controls for ≤ 1 hour for the purpose of chemical addition to the pressurizer.
- Additionally, text is added to clarify that the first portion of existing Note 1 is applicable “for the purpose of testing”.
- Add “OR” to separate the two portions of Note 1 for clarity.

The following changes to UFSAR information are proposed:

- UFSAR Subsection 15.4.6.1 revised to include the following paragraph:

The Technical Specifications contain exceptions which allow all RCPs to be removed from operation in Modes 3, 4, and 5 for a limited duration while performing required tests or while an unborated water source flow path through the chemical mixing tank to the pressurizer is unisolated under administrative controls. This is acceptable provided no operations are permitted that would add coolant to the RCS that has an insufficient boron concentration to meet the required shutdown margin, and the core outlet temperature remains sufficiently subcooled. With respect to chemical additions, the system design includes a flow orifice which limits flow from the chemical mixing tank to 2 gpm and allows combining the chemical addition solution with flow from the boric acid storage tank to the suction of the CVS makeup pumps. Administrative controls include dedicated control room and local operators to secure the unborated water source flow path after completion of the chemical addition or if flow rates indicate the potential for inadequately borated blended flow. Procedural controls also require the chemical addition flow path to be directed to the pressurizer for the short duration allowed for this exception. This limits the flow rate and duration of an unisolated unborated water flow path during this evolution.
- UFSAR Subsection 15.4.6.2.2 is revised to include reference to the exception for chemical addition: “(subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)”
- UFSAR Subsection 15.4.6.2.3 is revised to include reference to the exception for chemical addition: “(subject to the limited exception discussed in UFSAR Subsection 15.4.6.1).”

- UFSAR Subsection 15.4.6.2.4 is revised to include reference to the exception for chemical addition: "(subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)."

Additionally, conforming Technical Specification Bases changes are provided in Enclosure 3 for information only.

3. TECHNICAL EVALUATION

The RCS uses RCPs to transfer water from the reactor vessel to the steam generators. The RCS maintains the reactor coolant pressure boundary and maintains a uniform chemical concentration in the reactor coolant. The RCS also performs process monitoring, provides automatic depressurization of the system, and provides reactor vessel head emergency letdown and venting. The RCS pressurizer provides a point in the RCS where liquid and vapor are maintained in equilibrium under saturated conditions for pressure control of the reactor coolant system during steady-state operations and transients.

As described in UFSAR Subsection 9.3.6, the CVS provides purification, RCS inventory control, chemical shim and chemical control, oxygen control, RCS filling and pressure testing, borated makeup to auxiliary equipment and pressurizer auxiliary spray. Safety functions of the CVS include isolation of CVS lines penetrating containment, terminating RCS boron dilution, isolating CVS makeup on a steam generator or pressurizer high level signal, and preservation of the RCS pressure boundary.

As discussed in UFSAR Subsections 5.2.3.2.1 and 9.3.6.1.2.4, during reactor startup from the cold condition, hydrazine is used to scavenge dissolved oxygen. During this time when chemicals are desired to be added, RCPs are not in operation and all unborated water sources are required to be isolated to prevent inadvertent boron dilution events. This restriction is presented in UFSAR Subsections 15.4.6.2.2, 15.4.6.2.3, and 15.4.6.2.4 (described further below), and implemented in the requirements of Technical Specification 3.4.8.

Therefore, changes are proposed to Technical Specification LCO 3.4.8 Note 1 to allow an unborated water source through the chemical mixing tank to the pressurizer to be unisolated under administrative controls for ≤ 1 hour in order to achieve proper RCS water quality as required to support RCP startup. The administrative controls imposed prevent an inadvertent boron dilution event from occurring.

This Note is also proposed to be changed to clarify that the existing condition of removing RCPs from operation is for the purpose of testing. The intent of the change to the existing Note is consistent with the existing Technical Specification Bases which describe the reason RCPs are not in operation (i.e., for testing activities).

The changes to LCO 3.4.8 Note 1 permit an unborated water source through the chemical mixing tank for the purpose of chemical addition to the pressurizer to be unisolated under administrative controls for ≤ 1 hour when RCPs are not in operation provided the following existing requirements are met:

- a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and
- b. Core outlet temperature is maintained at least 10°F below saturation temperature.

Administrative controls implemented during chemical addition are based upon strict adherence to written procedures that enforce the proposed Technical Specification restrictions. Administrative controls consist of a dedicated operator stationed at the chemical mixing tank valve controls in constant communication with a dedicated operator in the control room who continuously monitors the boric acid flow rate and total makeup flow rate during the evolution. The 1 hour time limit minimizes the time this exception is allowed, yet provides sufficient time for operators to establish the LCO 3.4.8 Note 1a (i.e., ensure the coolant to be introduced to the pressurizer is at a boron concentration not less than that required to meet SDM requirements) and 1b (i.e., that Core outlet temperature is maintained at least 10°F below saturation temperature) requirements with the intent of performing chemical addition to the pressurizer. Unisolated unborated water sources are promptly re-isolated following the completion of the evolution, which consists of closing the chemical mixing tank inlet and outlet valves.

The LCO 3.4.8 Note 1 limitations provide continued margin to maintain core subcritical operations during shutdown. The SDM required by Technical Specifications LCO 3.1.1 will be maintained by restricting additions to the reactor coolant to boron concentrations greater than or equal to that required to meet the SDM boron concentration. The proposed changes provide the flexibility necessary for continued safe reactor operations, while also limiting the potential for positive reactivity addition.

The means for prohibiting an inadvertent boron dilution event during a chemical addition to the pressurizer rely upon administrative controls. Operators prevent an inadvertent boron dilution by injecting coolant into the RCS with a boron concentration that adheres to procedural guidance and does not violate the SDM boron concentration requirements of LCO 3.4.8 Note 1a described above. When RCPs are not in operation, chemical additions must be mixed with flow from the boric acid storage tank (BAST) as a CVS blended flow makeup operation, which provides natural mixing of the two sources. Requiring the resulting RCS makeup boron concentration to be greater than or equal to SDM concentration safeguards against chemical additions that would dilute the RCS boron concentration, thereby maintaining the margin to criticality. RCS additions, with coolant at boron concentrations less than necessary to maintain the required SDM, are prohibited because a uniform concentration distribution throughout the RCS cannot be assured without RCP operation. This provides acceptable margin to maintaining subcritical operation.

Additionally, unisolating unborated water sources under administrative control when RCPs are not in operation requires, per LCO 3.4.8, Note 1b that core outlet temperature be maintained at least 10°F below saturation temperature, so that no vapor bubble may form and possibly cause natural circulation flow obstruction.

The CVS is designed with features in place to support the prevention of an inadvertent boron dilution event. CVS blended makeup valve (CVS-PL-V115) is aligned to take suction only from the BAST with CVS-PL-V136A/B isolating flow from the demineralized water supply (refer to UFSAR Figure 9.3.6-1). Chemical addition to the pressurizer is performed by using demineralized water system (DWS) flow to discharge the contents of the chemical mixing tank, CVS-MT-03, (i.e., unborated water and associated chemical) to the boric acid blending tee via CVS-PL-V126. It is then mixed with boric acid from the BAST and the blended flow is directed to the CVS makeup pump suction for injection to the pressurizer. An orifice, CVS-PY-R04, in the chemical mixing tank inlet line, permits chemicals to be flushed to the CVS makeup pump suction with a maximum unborated water flow rate of 2 gpm. This orifice is an existing CVS design component. Minimum CVS makeup pump flow

is required to be greater than 20 gpm per the CVS system specification. Based on this requirement, the makeup delivered to the pressurizer will be a blend of 2 gpm of unborated water from the chemical mixing tank (0 ppm boron) and 18 gpm of boric acid (4375 ppm boron) via the blended makeup valve (CVS-PL-V115). This blend has a final concentration of 3938 ppm boron, which is significantly higher than the boron concentrations needed to satisfy SDM requirements. The boric acid flow rate is monitored in the control room via CVS-JE-FIC115 and the total makeup flow rate is monitored in the control room via CVS-JE-FIC157A/B. A minimum blended flow of 3 gpm from the BAST and 2 gpm from the chemical mixing tank would provide the required concentration to meet SDM requirements; therefore, the required 20 gpm blended makeup flowrate is conservative. With the control system maintaining ≥ 20 gpm total flow from available suction sources, any significant flow reduction from the BAST would lead to a low suction pressure trip of the CVS makeup pump, which terminates any potential addition less than the planned boron concentration. However, this feature is not provided as a credited mitigation feature. Therefore, the existing design features and operation of the CVS support the proper operation of the system when the RCPs are not in operation and an unborated flow path is unisolated.

The procedure for adding chemicals involves use of the chemical mixing tank as the sole source of unborated water, which will then be blended with flow from the BAST as described above. All other unborated water sources will remain isolated. Additional precautions implemented prior to commencing the chemical addition to the pressurizer include verifying that the boron concentration within the CVS piping, which will be flushed into the pressurizer ahead of the chemical being added is at a boron concentration greater than or equal to that required to meet the SDM.

The chemical addition (e.g., hydrazine) is normally planned as batch additions of 20 gallons each through the chemical mixing tank with the flow orifice limiting flow to 2 gpm. The local operator dedicated to the evolution, in continuous communication with the control room, will only unisolate the unborated water flow path from the chemical mixing tank for 10 minutes, at which time the path will be re-isolated. During the 10 minute evolution, the control room operators will monitor the boric acid flow rate (via CVS-JE-FIC115) and total makeup flow rate (via CVS-JE-FIC157A/B). Any indication that flow from the BAST is not sufficient will result in immediate termination of the chemical addition. If the operators fail to suspend the blended flow injection at 10 minutes, the additions to the pressurizer will continue at a boron concentration sufficient to maintain SDM.

Additional protection is provided with the chemical addition being made to the pressurizer. Multiple independent failures are not postulated to occur. However, in the unlikely event that blended flow from the BAST is not maintained, and the injection is not immediately terminated by either the low-pressure trip of the CVS makeup pumps or the dedicated operators assigned to the evolution (i.e., multiple independent failures) resulting in a solution below the boron concentration required to meet SDM being introduced to the pressurizer, it will not be transferred to the RCS loops until after RCPs have been started. The operators can re-establish an adequately borated pressurizer volume by borating to the pressurizer spray nozzle and turning on heaters, mixing water within the pressurizer. Furthermore, once introduced into the RCS hot leg, the water will mix with the rest of the coolant as it passes through the steam generator and RCP before reaching the core.

UFSAR Subsection 15.4.6.1 is revised to present the appropriate controls supporting the limited allowance for unisolating the unborated water source through the chemical mixing tank for injection to the pressurizer when RCPs are not in operation. These controls are

implemented in the proposed changes to Technical Specification 3.4.8. UFSAR Subsections 15.4.6.2.2, 15.4.6.2.3, and 15.4.6.2.4 are also revised to provide a reference to the exception identified in the proposed changes to UFSAR Subsection 15.4.6.1 for chemical addition to the pressurizer when RCPs are not in operation. The changes align with the proposed changes for Technical Specification 3.4.8 LCO Note 1 to permit chemical addition to the pressurizer when RCPs are not in operation. Therefore, there is no adverse impact to the safety analyses as described in UFSAR Subsection 15.4.6.

The safety function of the RCS to maintain the reactor coolant pressure boundary is not adversely affected by this change. RCS provisions for core cooling, reactivity control and process monitoring are not changed. Plant conditions which initiate automatic depressurization of the RCS are not modified by the proposed activity. Conditions which allow chemical addition to the pressurizer to be performed when RCPs are not in operation are supported by this change.

The safety functions of the CVS to isolate CVS lines to containment, terminate boron dilution events, isolate makeup upon receipt of steam generator or pressurizer high level signal, and preservation of the RCS pressure boundary are not adversely impacted by the proposed activity. An inadvertent boron dilution event is precluded during chemical addition to the pressurizer with RCPs not in operation because of the prescribed administrative controls. Normal functions of the CVS including but not limited to purification, RCS inventory control and makeup, and oxygen and chemical control are not adversely impacted.

Chemistry parameters and guidelines are not adversely impacted by this change. No effluent release path is impacted by this change. The types and quantities of expected plant effluents are not changed. Therefore, neither radioactive nor non-radioactive material effluents are affected by this activity.

Plant radiation zones, radiation controls established to satisfy 10 CFR 20 requirements, and expected amounts and types of radioactive materials are not affected by the proposed changes. Therefore, individual and cumulative radiation exposures are not significantly affected by this change.

The proposed changes do not impact any safety analysis input or result or design/safety margin as the prescribed administrative controls prevent an inadvertent boron dilution event. No design basis acceptance limit or criterion is challenged or exceeded by the requested changes. Implementation of administrative controls provides a means for precluding an inadvertent boron dilution event during chemical addition to the pressurizer as prescribed. Thus, no margin of safety is reduced.

Summary

The above proposed changes revise the UFSAR in the form of departures from the plant-specific DCD Tier 2 information, and involve changes to COL Appendix A Technical Specifications to allow unisolating an unborated water source through the chemical mixing tank for the purpose of chemical addition to the pressurizer under administrative controls for ≤ 1 hour with RCPs not in operation. There is no significant increase in the risk of an inadvertent boron dilution event occurring during chemical addition. Protective measures are in place to support the preclusion of a potential event including dedicated operators stationed at the chemical mixing tank valve controls and located in the control room, low flow rates and total volumes of chemical batch addition, a brief period of addition, and existing CVS design features. The proposed activity will not adversely affect any safety-related function, design function, radioactive material barrier or safety analysis.

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

10 CFR 52.98(c) requires NRC approval for any modification to, addition to, or deletion from the terms and conditions of a Combined License (COL). This activity involves a departure from COL Appendix A information; therefore, this activity requires an amendment to the COL. Accordingly, NRC approval is required prior to making the plant-specific changes in this license amendment request.

10 CFR 52, Appendix D, Section VIII.C.6 states that after issuance of a license, "Changes to the Technical Specifications will be treated as license amendments under 10 CFR 50.90." 10 CFR 50.90 addresses the applications for amendments of licenses, construction permits and early site permits. As discussed above, changes to COL Appendix A, Technical Specification 3.4.8 are requested, and thus a license amendment request (LAR) (as supplied herein) is required.

10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants" General Design Criterion (GDC) 10 – Reactor design. The reactor core and associated coolant, control and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

The proposed change does not adversely impact the reactor design. Design margins are not changed. Fuel design limits are not exceeded during any condition of operation regarding this change. Therefore, compliance with GDC 10 is not changed.

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

The proposed change does not adversely affect any instrumentation or control systems. Existing monitoring is not changed and instrumentation will continue to monitor dilution paths and chemical and volume control system (CVS) flow paths. Alarm indications to alert operators of a potential event are not changed. Therefore, compliance with GDC-13 is not changed.

10 CFR 50, Appendix A, GDC 15 – Reactor coolant system design. 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 does not adversely impact the reactor coolant system (RCS) design, but allows unborated water sources to be unisolated under administrative controls for the purpose of chemical addition to the pressurizer when reactor coolant pumps (RCPs) are not in operation. Design conditions of the reactor coolant pressure boundary are not exceeded. Therefore, compliance with GDC-15 is not changed.

10 CFR 50, Appendix A, GDC 28 – Reactivity limits. The reactivity control systems shall be designed with appropriate limits on the potential amount and rate of reactivity to assure that the effects of postulated reactivity accidents can neither (1) result in damage to the reactor coolant pressure boundary greater than limited local yielding nor (2) sufficiently disturb the core, its support structures or other reactor pressure vessel internals to impair significantly the capability to cool the core. These postulated reactivity accidents shall include consideration of rod ejection (unless prevented by positive means), rod dropout, steam line rupture, changes in reactor coolant temperature and pressure, and cold water addition.

The proposed change does not adversely impact reactivity limits. Boron concentrations of coolant being injected to the RCS are monitored during chemical addition to the pressurizer to maintain the required shutdown margin (SDM). Therefore, compliance with GDC-28 is not changed.

10 CFR 50, Appendix A, GDC 31 – Fracture prevention of reactor coolant pressure boundary. The reactor coolant pressure boundary shall be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions (1) the boundary behaves in a nonbrittle manner and (2) the probability of rapidly propagating fracture is minimized. The design shall reflect consideration of service temperatures and other conditions of the boundary material under operating, maintenance, testing, and postulated accident conditions and the uncertainties in determining (1) material properties, (2) the effects of irradiation on material properties, (3) residual, steady state and transient stresses, and (4) size of flaws.

These changes do not adversely impact the reactor coolant pressure boundary or the fracture prevention of the reactor coolant pressure boundary. The probability of fracture is not increased by this change. Therefore, compliance with GDC 31 is not changed.

4.2 Precedent

None.

4.3 Significant Hazards Consideration Determination

The requested change(s) revise the Updated Final Safety Analysis Report (UFSAR) in the form of departures from the plant-specific Design Control Document (DCD) Tier 2 information, and involve changes to Combined License (COL) Appendix A, Technical Specifications. This change permits an unborated water source through the chemical mixing tank to be unisolated under administrative controls for ≤ 1 hour for the purpose of chemical addition to the pressurizer when reactor coolant pumps (RCPs) are not in operation. Chemical addition to the pressurizer can be performed only under administrative controls and with sources known to be sufficiently borated to maintain SDM. The amount of water and solution to be added is controlled by procedural guidance in order to maintain any injected water at boron concentrations greater than the required SDM as required by the proposed changes to the Technical Specifications. An inadvertent boron dilution event is precluded by these administrative controls.

Administrative controls consist of a dedicated operator stationed at manual valves in constant communication with the main control room dedicated operator. The control room dedicated operator is provided to continuously monitor the boric acid flow rate and total makeup flow rate during the evolution. The 1 hour time limit minimizes the potential duration of the activity and provides time for operators to establish the necessary requirements for performing chemical addition to the pressurizer. Unisolated unborated water sources are promptly reisolated following the completion of the evolution. The performance of chemical addition to the pressurizer in accordance with the proposed Technical Specification requirements results in boron concentrations significantly higher than required SDM concentrations. Implementation of these administrative controls prevents inadvertent boron dilution events from occurring during chemical addition to the reactor coolant system (RCS) pressurizer with RCPs not in operation.

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

Updated Final Safety Analysis Report (UFSAR) 15.4.6, Chemical and Volume Control System Malfunction that Results in a Decrease in the Boron

Concentration in the Reactor Coolant, addresses inadvertent boron dilution events. The principal means of positive reactivity insertion to the core is the addition of unborated, primary-grade water from the demineralized water transfer and storage system (DWS) into the reactor coolant system (RCS) through the reactor makeup portion of the chemical and volume control system (CVS).

These events are primarily evaluated with one or more reactor coolant pumps (RCPs) in operation providing adequate mixing. The changes proposed by this amendment request do not involve operations where the RCPs are in operation. Therefore, there is no increase in the probability or consequences of inadvertent boron dilution events with RCPs operating.

UFSAR Subsection 15.4.6 also describes that when a reactor coolant pump is not operating, the demineralized water isolation valves are closed and an uncontrolled boron dilution transient cannot occur. The proposed amendment adds provisions to allow a specific CVS unborated water source flow path to be opened through the chemical mixing tank to the RCS pressurizer when RCPs are not in operation for the purpose of chemical addition to the pressurizer. The administrative control provisions proposed provide adequate assurance that any injection to the RCS pressurizer would only occur such that injected water is limited to boron concentrations greater than the required concentrations to meet the SDM. With no reduction in SDM, there would be no means of positive reactivity insertion to the core leading to an adverse reactivity event. As such, there is no significant increase in the probability of a previously evaluated boron dilution event as a result of this change.

Since the proposed change does not lead to any positive reactivity insertion, there are no increased consequences of an accident previously evaluated.

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 administrative control provisions proposed provide adequate assurance that any injection to the pressurizer would only occur such that injected water is limited to boron concentrations greater than the required concentrations to meet the SDM. With no reduction in SDM, there would be no means of positive reactivity insertion to the core leading to an adverse reactivity event.

Failure modes involving procedural controls and operator actions are considered in evaluating inadvertent boron dilution events. The possibility of a new or different kind of failure, malfunction, or sequence of events has been evaluated with these proposed changes; events are precluded with the proposed administrative controls and defense in depth features inherent in the AP1000 design.

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 margin of safety is established by maintaining the required SDM during shutdown activities. The proposed changes to the UFSAR and Technical Specifications do not adversely affect the safety-related functions of the RCS or CVS in maintaining adequate SDM. Provisions are proposed for a specific CVS unborated water source flow path to be opened through the chemical mixing tank to the RCS pressurizer when RCPs are not in operation; however, this activity is performed under administrative controls that preclude the potential for a reduction in SDM.

The changes do not affect containment penetrations or any other safety-related equipment or fission product barriers. The requested changes will not 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 requested changes. The existing design and operation of the associated systems are adequate to preclude an inadvertent boron dilution from occurring when RCPs are not in operation.

Therefore, the proposed 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

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. 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.

5. ENVIRONMENTAL CONSIDERATIONS

Section 2 of this license amendment request provide the details of the proposed changes.

This review supports a request for proposed changes to revise the UFSAR in the form of departures from the plant-specific DCD Tier 2 information, which involve changes to COL Appendix A Technical Specifications in support of performing chemical addition to the pressurizer by unisolating an unborated water source through the chemical mixing tank under administrative controls for ≤ 1 hour when reactor coolant pumps (RCPs) are not in operation.

Updated Final Safety Analysis Report (UFSAR) accident analyses discuss chemical and volume control system (CVS) malfunctions which result in a decrease in the boron concentration in the reactor coolant system (RCS). The addition of unborated water into the RCS through the makeup portions of the CVS is a means for positive reactivity addition into the core. The proposed change permits chemical addition to the pressurizer prior to startup. Revision to the Technical Specifications provides for unisolating an unborated water source through the chemical mixing tank for ≤ 1 hour under administrative control for the purposes of achieving proper water quality through chemical addition to the pressurizer. In order to perform this chemical addition when RCPs are not in operation, administrative controls are required to prevent boron dilution events. Coolant which maintains Limiting Condition for Operation (LCO) 3.1.1 shutdown margin (SDM) requirements must be used and core outlet temperatures must be maintained at least 10°F below saturation temperature. Dedicated operators stationed at the chemical mixing tank valve controls and located in the control room, monitoring of the flow rates and total volumes for makeup flow and batch chemicals, and the limited duration of the activity, support the safety findings of this change.

A review has determined that the proposed amendment would change how a requirement is met with respect to the 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. This review has determined that the proposed change would require an amendment from the COL; however, a review of the anticipated construction and operational effects of the proposed 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 proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated; (2) the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated; and (3) the proposed amendment does not involve a significant reduction in a margin of safety. Therefore, 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.

- (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 in the requested amendment support unisolating an unborated water source through the chemical mixing tank under administrative controls for ≤ 1 hour for the purpose of chemical addition to the pressurizer when RCPs are not in operation. 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 functionality of any design or operational features that are credited with controlling the release of effluents during plant operation. Therefore, it is concluded that the proposed 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 support unisolating an unborated water source through the chemical mixing tank under administrative controls for ≤ 1 hour for the purpose of chemical addition to the pressurizer when RCPs are not in operation. Plant radiation zones, radiation controls established to satisfy 10 CFR 20 requirements, and expected amounts and types of radioactive materials are not affected by the proposed changes. The requested change assigns a dedicated operator to local valve controls; however, operators routinely perform work activities in various radiation areas during plant shutdown operations. Performing these required activities in accordance with procedures to minimize occupational dose assure that doses are maintained within Regulatory limits. There are no changes to the estimated doses as discussed in UFSAR Section 12.4 and the Vogtle Units 3&4 Final Environmental Impact Statement (NUREG-1872), Section 5.9.4. Therefore, it is concluded that the proposed amendment does not involve a significant increase in individual or cumulative occupational radiation exposure.

Based on the above review of the proposed amendment, it has been determined that anticipated construction and operational effects of the proposed 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 individual or cumulative occupational radiation exposure. Accordingly, the proposed 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 exemption is not required.

6. REFERENCES

None.

Southern Nuclear Operating Company

ND-17-0894

Enclosure 2

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Proposed Changes to the Licensing Basis Documents

(LAR-17-019)

Note:

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(Enclosure 2 consists of 4 pages, including this cover page)

Technical Specification 3.4.8

3.4.8 Minimum RCS Flow

LCO 3.4.8 At least one Reactor Coolant Pump (RCP) shall be in operation with a total flow through the core of $\geq 3,000$ gpm.

- NOTES -

1. All RCPs may be removed from operation for ≤ 1 hour per 8 hour period for the purpose of testing.

OR

With no RCPs in operation, an unborated water source through the chemical mixing tank may be unisolated under administrative controls for ≤ 1 hour for the purpose of chemical addition to the pressurizer.

provided:

- a. No operations are permitted that would cause introduction into the RCS, coolant with boron concentration less than required to meet the SDM of LCO 3.1.1; and
- b. Core outlet temperature is maintained at least 10°F below saturation temperature.

Updated Final Safety Analysis Report (UFSAR) subsection 15.4.6.1

15.4.6.1 Identification of Causes and Accident Description

* * *

This event is a Condition II incident (a fault of moderate frequency), as defined in **Subsection 15.0.1**.

The Technical Specifications contain exceptions which allow all RCPs to be removed from operation in Modes 3, 4, and 5 for a limited duration while performing required tests or while an unborated water source flow path through the chemical mixing tank to the pressurizer is unisolated under administrative controls. This is acceptable provided no operations are permitted that would add coolant to the RCS that has an insufficient boron concentration to meet the required shutdown margin, and the core outlet temperature remains sufficiently subcooled. With respect to chemical additions, the system design includes a flow orifice which limits flow from the chemical mixing tank to 2 gpm and allows combining the chemical addition solution with flow from the boric acid storage tank to the suction of the CVS makeup pumps. Administrative controls include dedicated control room and local operators to secure the unborated water source flow path after completion of the chemical addition or if flow rates indicate the potential for inadequately borated blended flow. Procedural controls also require the chemical addition flow path to be directed to the pressurizer for the short duration allowed for this exception. This limits the flow rate and duration of an unisolated unborated water flow path during this evolution.

UFSAR subsection 15.4.6.2.2

15.4.6.2.2 Dilution During Cold Shutdown (Mode 5)

* * *

- The reactor coolant system dilution volume is considered well-mixed. The Technical Specifications require that, when in Mode 5, at least one RCP shall be operating with a flow of at least 3000 gpm. This provides sufficient flow through the system to maintain the system well-mixed. If a reactor coolant pump is not operating, the demineralized water isolation valves are closed and an uncontrolled boron dilution transient cannot occur, as discussed in **Subsection 15.4.6.2.1**. (subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)

UFSAR subsection 15.4.6.2.3

15.4.6.2.3 Dilution During Safe Shutdown (Mode 4)

* * *

- The reactor coolant system dilution volume is considered well-mixed. The Technical Specifications require that at least one reactor coolant pump shall be operating with a flow of at least 3000 gpm when in Mode 4. This provides sufficient flow through the system to maintain the system well-mixed. If a reactor coolant pump is not operating, the demineralized water isolation valves are closed and an uncontrolled boron dilution transient cannot occur, as discussed in Subsection 15.4.6.2.1. (subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)

UFSAR subsection 15.4.6.2.4

15.4.6.2.4 Dilution During Hot Standby (Mode 3)

* * *

- The reactor coolant system dilution volume is considered well-mixed. The Technical Specifications require that at least one reactor coolant pump shall be operating with a flow of at least 3000 gpm when in Mode 3. This provides sufficient flow through the system to maintain the system well mixed. If a reactor coolant pump is not operating, the demineralized water isolation valves are closed and an uncontrolled boron dilution transient cannot occur, as discussed in Subsection 15.4.6.2.1. (subject to the limited exception discussed in UFSAR Subsection 15.4.6.1)

Southern Nuclear Operating Company

ND-17-0894

Enclosure 3

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Conforming Technical Specification Bases Changes

(LAR-17-019)

(For Information Only)

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(Enclosure 3 consists of 2 pages, including this cover page)

Revise Technical Specifications Bases Section 3.4.8 as shown below:

BASES

LCO (continued)

Note 1 permits all RCPs to be removed from operation for ≤ 1 hour per 8 hour period for the purpose of testing. This Note also permits an unborated water source through the chemical mixing tank to be temporarily unisolated under administrative controls with no RCPs in operation for the purpose of chemical addition to the pressurizer. The purpose of the ~~Note~~ testing allowance is to permit tests that are designed to validate various accident analysis values. One of these tests is for the validation of the pump coastdown curve, used as input to a number of accident analyses including a loss of flow accident. This test is generally performed in MODE 3 during the initial startup testing program, and as such should only be performed once. If, however, changes are made to the RCS that would cause a change to the flow characteristics of the RCS, the input values of the coastdown curve may need to be revalidated by conducting the test again.

Another test performed during the startup testing program is the validation of the rod drop times during cold conditions, both with and without flow.

The no-flow tests may be performed in MODE 3, 4, or 5, and require that the pumps be stopped for a short period of time. The Note permits removing all RCPs from operation in order to perform this test and validate the assumed analysis values. As with the validation of the pump coastdown curve, this test should only be performed once, unless the flow characteristics of the RCS are changed. The 1 hour time period specified is adequate to perform the desired tests and experience has shown that boron stratification is not a problem during this short period with no forced flow.

Additionally, the Note allows chemical additions to be performed and mixed with CVS makeup operations using a blend of borated and unborated water sources for the purpose of achieving proper RCS water quality. In this case, RCPs are not initially running; therefore, the allowance is made to permit chemical addition to the pressurizer under administrative controls so that the Applicability can be entered without violating the RCP in operation requirement. These administrative controls consist of stationing a dedicated operator at the valve controls, who is in continuous communication with a dedicated operator in the control room. In this way, the flow path from the chemical mixing tank to the RCS can be rapidly isolated locally or from the control room after completion of the limited duration chemical addition, or if flow rates indicate the potential for inadequately borated blended flow.

Utilization of the Note is permitted provided the following conditions are met along with any other conditions imposed by ~~initial startup test~~ procedures: