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52-026

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10 CFR 52.63

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Southern Nuclear Operating Company
Vogtle Electric Generating Plant Units 3 and 4
Supplement to Request for License Amendment and Exemption:
Addition of In-containment Refueling Water Storage Tank (IRWST)
Lower Narrow Range Level Instrumentation (LAR-16-032S1)

Ladies and Gentlemen:

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, by letter ND-17-0271, dated February 17, 2017 [ADAMS Accession Number ML17048A533], Southern Nuclear Operating Company (SNC) requested 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 plant-specific Tier 1 information (and corresponding changes to COL Appendix C). Additionally, this request involves changes to the VEGP Units 3 and 4 COL Appendix A, Technical Specifications. Because the proposed changes impact Tier 1 of the Plant-Specific (DCD), Appendix C of the COL, and the Technical Specifications, this activity has been determined to require prior NRC approval. Pursuant to the provisions of 10 CFR 52.63(b)(1), an exemption from elements of the design as certified in the 10 CFR Part 52, Appendix D, design certification rule is also requested for the plant-specific Tier 1 material departures.

This letter supplements LAR-16-032 to address a Request for Additional Information (RAI) from the NRC Staff to support review of LAR-16-032. In addition, this supplement also contains revised UFSAR markups to accurately reflect the changes described in Enclosure 1 of the original submittal of LAR-16-032.

Enclosure 5 provides the RAI responses, including LAR revisions to support the RAI responses. In addition to the RAI responses, this supplement is providing additional clarifications to the LAR-16-032 version contained in Southern Nuclear Operating Company letter ND-17-0271.

Enclosure 6 provides revised mark ups of the UFSAR text provided in Enclosure 3 of the original submittal of LAR-16-032.

The supplemental information provided in Enclosure 5 does not change the scope, affect the Technical Evaluation, or alter the conclusions of the Significant Hazards Consideration Determination or Environmental Considerations in LAR-16-032.

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

In order to support the Vogtle Units 3 and 4 ITAAC schedule, SNC requests NRC staff review and approval of the license amendment and exemption no later than October 19, 2017. Approval by this date will allow sufficient time to implement licensing basis changes prior to performance of affected ITAAC activities. 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 January 5, 2018.

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

Should you have any questions, please contact Mr. Christopher L. Whitfield at (205) 992-5071.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 21st day of July 2017.

Respectfully submitted,

Brian H. Whitley
Director, Regulatory Affairs
Southern Nuclear Operating Company

Enclosures: 1) – 4) (previously submitted with the original LAR, LAR-16-032, in SNC letter ND-17-0271)
5) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Response to NRC Staff Request for Additional Information (RAI) Regarding LAR-16-032 (LAR-16-032S1)
6) Vogtle Electric Generating Plant (VEGP) Units 3 and 4 – Revised Changes to Licensing Basis Document Markups in LAR-16-032 (LAR-16-032S1)

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Southern Nuclear Operating Company

ND-17-1182

Enclosure 5

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Response to NRC Staff Request for Additional Information (RAI)

Regarding LAR-16-032 (LAR-16-032S1)

Note:

Added text is shown as Blue Underline

Deleted text is shown as ~~Red Strikethrough~~

(Enclosure 5 consists of 14 pages, including this cover page)

Request for Additional Information (RAI) for LAR 16-032 (Changes to IRWST Level Instrumentation)

10 CFR 50.55a(h), "Protection and Safety Systems," requires compliance with IEEE Std. 603-1991, "IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations," and the correction sheet dated January 30, 1995. Clause 5.1 of IEEE Std. 603-1991 requires, in part, that safety systems shall perform all safety functions required for a design basis event in the presence of any single detectable failure within the safety systems concurrent with all identifiable but non-detectable failures. Clause 5.7 of IEEE Std. 603-1991 requires, in part, that capability for test and calibration of safety system equipment shall be provided while retaining the capability of the safety system to accomplish their safety functions. Clause 6.7 of IEEE Std. 603-1991 requires, in part, that capability of a safety system to accomplish its safety function shall be retained while sense and command features equipment is in maintenance bypass.

10 CFR 52.47(a)(2), "Contents of applications; technical information", states, in part, with regard to systems, structures and components (SSCs) that the description shall be sufficient to permit understanding of the system designs.

1. As mentioned above, Clause 5.1 of IEEE Std. 603-1991 covers single-failure criterion, Clause 5.7 requires capability for test and calibration for safety system equipment, and Clause 6.7 has the maintenance bypass criterion. It states in the LAR that only two of the three remaining wide range level channels are used for the refueling cavity and SFS isolation function. Please provide a safety justification for using only two level channels (and specifically justify having only one remaining channel when the other channel is out-of-service for maintenance) for the refueling cavity and SFS isolation safety function.
2. The LAR states, in part, that isolation valves are added for the four newly proposed lower narrow range level instruments. But the revised Figure 6.3-2 in Enclosure 3 of the LAR shows that existing and new IRWST level instruments share the existing isolation valves. Do the new lower narrow range level instruments have their own isolation valves? Revise Figure 6.3-2 if necessary.
3. Page 9 of Enclosure 1 in the LAR states that the four new lower narrow range level instruments are specified to "meet the same environmental qualification requirements with the exception of a PAMS function, with only a required 24 hours operating time". NRC staff understands this to mean that two of the three remaining wide range level channels (PXS-047 and PXS-048) remain required to be environmentally qualified for post-accident monitoring functions (PAMS) with a required four months operating time. The revised Table 3.11-1 in Enclosure 3 of the LAR still anticipates four months PAMS operating time for all three remaining wide range level channels for their PAM functions.

   Please provide the following:

   a. Provide a justification to support this exception of a 24 hours operating time, instead of 4 month operating time required for PAMS.
   b. The statements in these two sections appear inconsistent. Make the statements consistent or provide an explanation for why they are already consistent.

4. It states in the LAR that the L-2, L-3, and PAM functions are re-assigned to the new level instruments, but it is not clear what PAM functions are assigned to the new lower narrow range level instruments. Which PAM functions are retained for the remaining three existing wide range level instruments?
5. Note 4 in Table 7.5-1 of UFSAR states that two instruments are required after plant conditions become stable. Three instruments are required for non-stable plant conditions. Enclosure 1 of this LAR states that two of the three remaining wide range level channels (PXS-047 and PXS-048) must be environmentally qualified for PAMS function with a required four months operating time. Please explain the inconsistency between the need for three instruments for non-stable conditions and the possibility of having only two instruments available based on the EQ requirements.
6. The LAR states that isolation valves are added for the four newly proposed lower narrow range level instruments. The existing isolation valves PXS-PL-V150A, -150B, -150C, and -150D are deleted in the revised Table 3.2-3 in Enclosure 3. How will the remaining three wide range level channels be isolated for maintenance?
7. The LAR states that the existing wide range level instrument channels cannot provide their Low-3 actuation signal within the accuracy assumed in the safety analysis. What is the required accuracy of the IRWST level instruments assumed in the safety analysis for the Low-3 actuation signal? How will the new level instruments meet the accuracy requirement assumed in the safety analysis?

Response to RAI Question 1:

IEEE Std. 603-1991 does not prescribe a number of level instruments necessary to perform the refueling cavity and SFS automatic isolation function. The use of 1-out-of-2 actuation logic meets the single-failure criterion requirements of Clause 5.1 of IEEE Std. 603-1991 in that a single failure of one channel continues to provide actuation capability from the remaining channel.

With one channel in maintenance, single failure protection would not be maintained. However, because this new function supports continued operability of the IRWST when aligned to the non-seismic SFS piping, planned maintenance would not be performed on this function while the IRWST is aligned to the SFS. The use of the SFS for IRWST purification, cooling, and inventory control is only infrequently used during operations (absent any unexpected or unusual conditions inside containment), primarily to purify the water in the IRWST shortly before the start of each refueling outage. Therefore, planned maintenance can be performed during times when the IRWST is not aligned to the SFS. Otherwise, if either or both channels of this new function fail or require maintenance while the IRWST is connected to the SFS, then the IRWST would be declared inoperable until the SFS containment isolation valves are closed to eliminate the non-seismic SFS piping connection to the IRWST. In addition, the IRWST wide range level instrumentation channels remain within the scope of the Design Reliability Assurance Program (D-RAP) as shown in UFSAR Table 17.4-1, and are therefore highly reliable, so maintenance is not expected to be necessary during the infrequent times that the IRWST is aligned to the SFS. Therefore, there is no detrimental effect on overall sense and command features availability, satisfying the requirements of Clause 5.7 and Clause 6.7 of IEEE Std. 603-1991.

Based on these clarifications, there are no proposed changes to Enclosure 1 of Southern Nuclear Operating Company letter ND-17-0271.

Response to RAI Question 2:

While the proposed UFSAR Figure 6.3-2, "Simplified Passive Core Cooling System Piping and Instrumentation Diagram," does show a common impulse line for each of the three pairs of instruments, the figure does not show the instruments sharing a common isolation valve. The proposed UFSAR Figure 6.3-2, "Simplified Passive Core Cooling System Piping and Instrumentation Diagram," is consistent with the format and content of other simplified piping and instrumentation diagrams in the UFSAR, which do not include showing instrument isolation valves. Therefore, this specific information is not added to UFSAR Figure 6.3-2. The design does include separate instrument isolation valves for each transmitter. As described in the LAR, Enclosure 1, page 5, "the addition of IRWST lower narrow range level instruments (PXS-066, PXS-067, PXS-068, and PXS-069) include new isolation valves (PXS-PL-V161A, PXS-PL-V161B, PXS-PL-V161C, and PXS-PL-V161D) on the lower instrument lines from the IRWST." As also described in the LAR, the existing IRWST wide range level transmitters retain their existing isolation valves (PXS-PL-V151B, PXS-PL-V151C, and PXS-PL-V151D), which are renamed.

Based on these clarifications, there are no proposed changes to Enclosure 1 of Southern Nuclear Operating Company letter ND-17-0271.

Response to RAI Question 3:

a. The three remaining IRWST wide range level transmitters (PXS-JE-LT046, PXS-JE-LT047, and PXS-JE-LT048) remain specified and required to be qualified as Regulatory Guide 1.97, Revision 3, Type B1, D2, and F2 PAMS IRWST level instrumentation, and the existing PAMS post-accident operating time required in UFSAR Table 3.11-1 for the IRWST wide range level instrumentation channels is not proposed to be changed. Therefore, the PAMS post-accident operating time for all three of the remaining IRWST wide range level instrumentation channels remain as four months.

   The new IRWST lower narrow range level transmitters (PXS-JE-LT066, PXS-JE-LT067, PXS-JE-LT068, and PXS-JE-LT069) are specified and required to be qualified as Regulatory Guide 1.97, Revision 3, Type D2 PAMS IRWST level instrumentation to support monitoring of the ESFAS automatic actuation function. The ESFAS automatic actuation function for the new IRWST lower narrow range level instrumentation is specified in the LAR for 24 hours post-accident operating time, which is the same as currently specified in UFSAR Table 3.11-1 for the IRWST wide range level instrumentation.

   UFSAR Table 3D.4-2 states that equipment not required for Type A, B, or C primary variables shall have a PAMS qualification time specific to its function. Therefore, these instruments do not require PAMS qualification beyond the first 24 hours as the required Type D2 PAMS monitoring of IRWST level is provided by the remaining three IRWST wide range level instruments beyond the first 24 hours for a period of four months. The IRWST wide range level sensors are located above the floodup level and are qualified for four months in accordance with UFSAR Table 3D.4-2.

b. Based on the discussions above provided in part a, clarification is required to make the cited statements consistent in regards to the required post-accident operating times of the IRWST wide range level instruments (two channels are qualified for an ESF 24 hour operability time and all three channels are qualified for a PAMS 4 month operability time) and the IRWST narrow range level instruments (all four channels are qualified for an ESF 24 hour operability time and all four channels are qualified for a PAMS 24 hour operability time). Therefore, the following changes are proposed to Enclosure 1 of Southern Nuclear Operating Company letter ND-17-0271.

1. LAR Enclosure 1, page 5, fourth paragraph, is revised as follows:

   b. Each existing IRWST wide range level instrumentation channel provides PAMS level indication in the main control room and both PXS-JE-LT047 and PXS-JE-LT048 also provide~~s~~ a Low-2 IRWST level alarm~~, with three channels required to function short-term (24 hours), and two channels required to function long-term (4 months), following a design basis accident for performing the PAMS IRWST level instrumentation function~~.

2. LAR Enclosure 1, page 9, second paragraph, is revised as follows:

   As described in UFSAR Table 3.11-1, the ~~existing~~ IRWST wide range level transmitters (~~PXS-JE-LT045,~~ PXS-JE-LT046, PXS-JE-LT047, and PXS-JE-LT048) are required to be environmentally qualified to operate after a design basis accident in a harsh environment for a PAMS function with a required 4 month operating time, and two of them (PXS-JE-LT047, and PXS-JE-LT048) for an ESFAS function with a required 24 hour operating time. The proposed four new IRWST lower narrow range level transmitters (PXS-JE-LT066, PXS-JE-LT067, PXS-JE-LT068, and PXS-JE-LT069) are specified to ~~meet the same environmental qualification requirements, with the exception of~~ be environmentally qualified to operate after a design basis accident in a harsh environment including submergence for a PAMS function~~,~~ with only a required 24 hour~~s~~ operating time, and for an ESFAS function with a required 24 hour operating time. ~~Two of the~~The three remaining IRWST wide range level transmitters (PXS-JE-LT046, PXS-JE-LT047, and PXS-JE-LT048) remain required to be environmentally qualified for a PAMS function with a required 4 month operating time.

3. LAR Enclosure 1, page 12, last paragraph, is revised as follows:

   The three remaining IRWST wide range level instrumentation channels (PXS-046, PXS-047, and PXS-048) remain ~~specified and required to be~~ unchanged and qualified as Regulatory Guide 1.97, Revision 3, Type B1, D2, and F2 PAMS IRWST level instrumentation, with ~~the three channels required to function short-term (24 hours), and two channels (PXS-047 and PXS-048) required to function long-term (4 months), following a design basis accident. As specified in UFSAR Table 7.5-1, Note 4, the number of instruments required after stable plant conditions is two (PXS-047 and PXS-048). The third channel (PXS-046) is available to resolve information ambiguity if necessary~~ a required 4 month operating time.

4. LAR Enclosure 1, page 13, last paragraph, third and fourth sentences, are revised as follows:

   The three remaining IRWST wide range level instrumentation channels (PXS-046, PXS-047, and PXS-048) remain ~~specified and required to be~~ unchanged and qualified as Regulatory Guide 1.97, Revision 3, Type B1, D2, and F2 PAMS IRWST level instrumentation, with ~~the three channels required to function short-term (24 hours), and two channels (PXS-047 and PXS-048) required to function long-term (4 months), following a design basis accident. As specified in UFSAR Table 7.5-1, Note 4, the number of instruments required after stable plant conditions is two (PXS-047 and PXS-048). The third channel (PXS-046) is available to resolve information ambiguity if necessary~~ a required 4 month operating time.

Response to RAI Question 4:

As clarified in the response to RAI Question 3, the IRWST wide range level instrumentation channels remain unchanged and qualified as Regulatory Guide 1.97, Revision 3, Type B1, D2, and F2 PAMS IRWST level instrumentation, and the existing PAMS functions and post-accident operating time for the IRWST wide range level instrumentation channels are not proposed to be changed. In addition, the new IRWST lower narrow range level instrumentation channels (PXS-066, PXS-067, PXS-068, and PXS-069) are specified and required to be qualified as Regulatory Guide 1.97, Revision 3, Type D2 PAMS IRWST level instrumentation with a post-accident operating time of 24 hours.

The three remaining IRWST wide range level instrumentation channels continue to support Type B1, D2, and F2 PAMS IRWST level instrumentation functions, as follows:

- The Type B1 PAMS function continues to meet the Technical Specification 3.3.17 PAMS requirement for heat sink maintenance.
- A new Type D2 PAMS function is added to monitor the performance of the safety-related systems (i.e., SFS containment isolation valves) to verify that the SFS containment isolation valves close upon reaching the proposed Low IRWST wide range level setpoint as part of the refueling cavity and SFS isolation function. The existing Type D2 PAMS function to monitor the performance of the safety-related systems (i.e., containment recirculation valves) to verify that the containment recirculation valves open upon reaching the Low-3 IRWST lower narrow range level setpoint is relocated to the new IRWST lower narrow range level instrumentation channels for the first 24 hours following a DBA. However, the IRWST wide range level instruments remain specified and qualified to perform this Type D2 PAMS function beyond the first 24 hours and for up to four months following a DBA.

- The Type F2 PAMS function supports preplanned manual actions using nonsafety-related systems to prevent unnecessary actuation of the safety-related systems for the scenario when, under depressurized plant conditions within the normal residual heat removal system (RNS) pump discharge pressure capabilities (less than approximately 175 psig), reactor coolant is lost and the RNS is used to provide an alternative to IRWST gravity injection by providing a path from the IRWST through valve RNS-V023 to help restore reactor coolant system inventory, prevent continuing core makeup tank draindown and subsequent actuation of ADS Stage 4 and IRWST injection squib valves, and establish subcooled reactor coolant system fluid conditions.

For the new IRWST lower narrow range level instrumentation channels, only one channel of PAMS IRWST level instrumentation is needed following a DBA to meet the requirements for a Type D2 PAMS variable. Therefore, for the short-term period (24 hours), the new IRWST lower narrow range level instrumentation channels were incorrectly specified as requiring three channels. Based on Regulatory Guide 1.97, Revision 3 only requiring one instrumentation channel for a Type D2 PAMS variable, the LAR is revised to require one channel of the IRWST lower narrow range level instrumentation channels.

The IRWST wide range level instrumentation provide the Type D2 PAMS IRWST level instrumentation function beyond the first 24 hours and up to four months following a DBA. No change is needed for the IRWST wide range level instrumentation PAMS requirements as Regulatory Guide 1.97, Revision 3, requires Category 1 variables to meet single failure criteria and provide a means to resolve information ambiguity if the redundant displays disagree. This can be accomplished with three independent channels for Type B1 PAMS variables or by providing a diverse measurement channel. Therefore, changes are proposed to the LAR as follows:

1. LAR Enclosure 1, page 11, item j, is revised as follows:

   j. Table 7.5-1 is revised to add new Variable for IRWST lower narrow range water level, and specify Range/Status as 0-100% of span, Type/Category as D2, Environmental Qualification as Harsh, Seismic Qualification as Yes, Number of Instruments Required as ~~3 (Note 4)~~ 1, Power Supply as 1E, and QDPS Indication as No.

2. LAR Enclosure 3, page 39, markup for UFSAR Table 7.5-1 is revised to change “3” to “1”, and to delete “(Note 4)”, for the IRWST lower narrow range water level Variable.

Response to RAI Question 5:

The responses to RAI Questions 3 and 4 address the PAMS requirements for the IRWST wide range level instrumentation channels.

Although UFSAR Table 7.5-1, Note 4, remains applicable to the IRWST wide range level instrumentation channels, Note 4 is not required for the IRWST lower narrow range level instrumentation channels as only one channel of this Type D2 PAMS IRWST level instrumentation function is required as described in the response to RAI Question 4.

Based on these clarifications, there are no additional proposed changes to Enclosure 1 of Southern Nuclear Operating Company letter ND-17-0271 beyond those described and shown in the responses to RAI Question 3 and RAI Question 4.

Response to RAI Question 6:

The upper instrument reference lines for the three remaining IRWST wide range level transmitters are proposed to be removed from connecting to the IRWST and left open to the containment atmosphere. Therefore, the existing IRWST wide range level transmitter upper reference line isolation valves (PXS-PL-V150A, PXS-PL-150B, PXS-PL-150C, and PXS-PL-150D) are deleted. The lower instrument lines for the three remaining IRWST wide range level transmitters (PXS-046, PXS-047, and PXS-048) can be isolated by the existing IRWST wide range level transmitter isolation valves (PXS-PL-V151B, PXS-PL-V151C, and PXS-PL-V151D). Therefore, the existing design is not changed for isolating the lower instrument lines, which provides that each of the three remaining IRWST wide range level transmitters can be independently isolated from the IRWST for maintenance.

Based on these clarifications, there are no proposed changes to Enclosure 1 of Southern Nuclear Operating Company letter ND-17-0271.

Response to RAI Question 7:

The statement “accuracy assumed in the safety analysis” refers to the required accuracy of the IRWST level instrumentation channels assumed in the UFSAR Chapter 15 accident analyses for the Low-3 IRWST level actuation setpoint. The Low-3 IRWST level actuation is described in UFSAR Subsection 7.3.1.2.9, Containment Recirculation, and is required during the plant response to a loss-of-coolant accident (LOCA) as described in UFSAR Subsection 15.6.5, Loss-of-Coolant Accidents Resulting from a Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary. As described in UFSAR Subsection 15.6.5.4C.1, Long-Term Cooling Analysis Methodology, the safety-related systems are designed to provide adequate cooling of the reactor indefinitely. Initially, this is achieved by discharging water from the IRWST into the reactor vessel. When the Low-3 IRWST level setpoint is reached, the containment recirculation subsystem isolation valves open and water from the containment reactor coolant system compartment can flow into the reactor vessel through the passive core cooling system piping.

Although not explicitly described in the licensing basis, the UFSAR Subsection 15.6.5.4C.1 long-term core cooling analysis assumes that the transition to containment recirculation on Low-3 IRWST level following a LOCA occurs between an upper limit at 110.0' elevation, and a lower limit at 107.8' elevation. The total instrument uncertainty of the IRWST wide range level instrumentation channels determined by the approved AP1000 setpoint methodology, which includes a statistical evaluation of manufacturer-specified instrument accuracy and other variables including calibration equipment accuracy, instrument drift, and environmental effects, exceeds this required accuracy. The existing IRWST wide range level instrumentation channels have a large span of 24.0' and a sensor reference accuracy of ±0.25% of span, or approximately ±0.72". When combined with other setpoint methodology uncertainties, the resultant total instrument uncertainty does not support the assumed actuation range. The new IRWST lower narrow range level instrumentation channels have a smaller span of 35.0" and a sensor reference accuracy of ±0.25% of span, or approximately ±0.0875". This results in a total instrument uncertainty determined by the AP1000 setpoint methodology within the required accuracy for the Low-3 IRWST level actuation setpoint with margin. Therefore, the proposed new IRWST lower narrow range level instrumentation channels meet the accuracy requirements assumed in UFSAR Subsection 15.6.5.4C.1 long-term core cooling analysis for both the upper and lower Low-3 IRWST level ESFAS actuation limits.

Based on these clarifications, there are no proposed changes to Enclosure 1 of Southern Nuclear Operating Company letter ND-17-0271.

Additional LAR Clarifications

In addition to the responses provided to the seven RAI questions, Southern Nuclear Operating Company (SNC) is providing clarifications to the LAR-16-032 contained in SNC letter ND-17-0271:

1. ND-17-0271 Enclosure 1 and 2 are revised throughout to remove "defense-in-depth" as an adjective describing the new Low IRWST wide range level ESFAS automatic actuation function. In some instances, "ESFAS automatic actuation" replaces "defense-in-depth" and/or additional minor grammatical changes are made:

   ND-17-0271 Enclosure 1, page 3, seventh item, is revised as follows:

   7. A ~~defense-in-depth~~new Low IRWST wide range level ESFAS automatic actuation function is proposed to be added for refueling cavity and SFS isolation, including a P-9 permissive and interlock.

   ND-17-0271 Enclosure 1, page 32, fifth paragraph, is revised as follows:

   * * *The initiating event frequency of such a pipe rupture while the SFS is connected to the IRWST is estimated at 2.01E-5/year. This is above the cutoff frequency established by ANS 51.1 (1.0E-6/year) and the AP1000 PRA cutoff frequency (10E-7/year). Therefore, an ESFAS automatic actuation~~defense-in-depth~~ change addresses the potential for a pipe rupture while the SFS is connected to the IRWST. As a result, a new ~~defense-in-depth~~ ESFAS automatic actuation to close the existing SFS containment isolation valves on Low IRWST wide range level is proposed.

   ND-17-0271 Enclosure 1, page 34, third paragraph, is revised as follows:

   * * *This includes draining the IRWST inventory to the refueling cavity in MODES 5 and 6 to support refueling activities, which may cause undesired and unnecessary actuation of the proposed ~~defense-in-depth design~~ESFAS automatic actuation function to close the existing SFS containment isolation valves on Low IRWST wide range level.

   ND-17-0271 Enclosure 1, page 35, second paragraph, is revised as follows:

   1. The capability to manually isolate the IRWST from the SFS remains available as required by COL Appendix A Technical Specifications Table 3.3.9-1, Function 12. This new ~~defense-in-depth~~ESFAS automatic actuation function is not required to protect the core and mitigate the consequences of design basis

ND-17-0271 Enclosure 1, page 36, first paragraph, is revised as follows:

* * *The proposed changes to add the P-9 permissive and interlock to the new ESFAS Low IRWST wide range level function are acceptable as they allow blocking of ~~a defense-in-depth~~the ESFAS automatic actuation function during cold shutdown conditions, while automatically reinstating the new ~~defense-in-depth~~ ESFAS automatic actuation function prior to reaching the MODES necessary during plant startup.

ND-17-0271 Enclosure 1, page 40, second and third paragraph, are revised as follows:

The design changes to add RTS P-9 permissive and interlock for Low-2 steam generator narrow range water level and Low-2 steam generator wide range level coincident with high wide range hot leg temperature reactor trip functions; ESFAS P-9 permissive and interlock for CMT actuation, RCP Trip, PRHR heat exchanger actuation, and BDS isolation for Low-2 steam generator narrow range water level and Low-2 steam generator wide range water level ESFAS functions; and ESFAS P-9 permissive and interlock for refueling cavity and SFS isolation for the Low IRWST wide range level ~~defense-in-depth~~ ESFAS automatic actuation function; meet the design requirements of IEEE 603 as discussed in WCAP-15776, including design for indication of P-9 status.

* * *There is no interface with the diverse actuation system (DAS), and no change to the design functions of the DAS to provide diverse manual actuation of the IRWST injection squib valves and the containment recirculation squib valves. In addition, the new ~~defense-in-depth~~ ESFAS automatic actuation function for refueling cavity and SFS isolation on Low IRWST wide range level addresses a seismic or other event resulting in a pipe rupture in the nonsafety-related, nonseismic SFS that could potentially result in a loss of IRWST inventory.

ND-17-0271 Enclosure 1, page 41, second paragraph, is revised as follows:

* * *No system or design function or equipment qualification is adversely affected by the proposed changes. The proposed new P-9 interlocks and blocks, and the new ~~defense-in-depth~~ ESFAS automatic actuation Low IRWST wide range level function, are designed and comply with the regulatory requirements described in the UFSAR.

ND-17-0271 Enclosure 1, page 45, second paragraph, is revised as follows:

The proposed changes to the PMS include addition of IRWST lower narrow range level instruments, changes to the IRWST wide range level instruments, addition of ~~defense-in-depth~~a new ESFAS automatic actuation of refueling cavity and spent fuel pool cooling system (SFS) isolation Low IRWST wide range level, including a P-9 interlock and block; addition of P-9 interlock and block for Low-2 steam generator narrow range water level reactor trip function; and addition of P-9 interlock and block for Low-2 steam generator narrow range water level and Low-2 steam generator wide range water level ESFAS automatic actuation functions.

ND-17-0271 Enclosure 1, page 45, last paragraph, is revised as follows:

* * *The proposed change to add the new ~~defense-in-depth~~ refueling cavity and SFS isolation on Low IRWST wide range level addresses a seismic or other event resulting in a pipe rupture in the nonsafety-related, nonseismic SFS when connected to the IRWST that could potentially result in a loss of IRWST inventory.

ND-17-0271 Enclosure 1, page 46, next to last paragraph, is revised as follows:

* * *The proposed change to add the new ~~defense-in-depth~~ refueling cavity and SFS isolation on Low IRWST wide range level addresses a seismic or other event resulting in a postulated pipe rupture in the nonsafety-related, nonseismic SFS when connected to the IRWST that could potentially result in a loss of IRWST inventory.

ND-17-0271 Enclosure 1, page 47, third paragraph, is revised as follows:

* * *The proposed change to add the new ~~defense-in-depth~~ refueling cavity and SFS isolation on Low IRWST wide range level addresses a seismic or other event resulting in a postulated pipe rupture in the nonsafety-related, nonseismic SFS when connected to the IRWST, maintaining the required IRWST inventory and preserving the original margin of safety assumed for the PXS and SFS.* * *

ND-17-0271 Enclosure 1, page 48, first paragraph, is revised as follows:

The proposed changes to the PMS include addition of IRWST lower narrow range level instruments, addition of ~~defense-in-depth~~ ESFAS automatic actuation of refueling cavity and spent fuel pool cooling system (SFS) isolation on Low IRWST wide range level, and addition of P-9 interlocks and blocks for Low-2 steam generator narrow range water level reactor trip functions, Low-2 steam generator narrow range water level and Low-2 steam generator wide range water level ESFAS functions; and the new refueling cavity and SFS isolation for Low IRWST wide range level ~~defense-in-depth~~ ESFAS function.

2. ND-17-0271 Enclosure 1, page 32, second paragraph, is revised as follows:

   The SFS contains a line that connects the IRWST and the refueling cavity to the SFS pumps and therefore penetrates the containment boundary. The containment isolation valves close automatically on a containment isolation signal ~~to preclude the possibility of draining the IRWST during an accident~~. These valves also close on a low spent fuel pool level to preclude the possibility of draining the refueling cavity and/or spent fuel pool during refueling operations.

3. ND-17-0271 Enclosure 1, page 34, third and new fourth paragraph, are revised as follows:

   The SFS may be connected to the IRWST for purification, cooling, and inventory control for the IRWST during any operational condition. ~~However, this This new defense-in-depth ESFAS automatic actuation function is not required to protect the core and mitigate the consequences of design basis events when required. Instead, the existing ESFAS containment isolation function performs the necessary safety-related design function to meet the requirements of the safety analysis, without crediting the proposed defense-in-depth design function of closure of the SFS containment isolation valves on Low IRWST wide range level.~~ The SFS may also be connected to the refueling cavity and the IRWST during cold shutdown * * * existing SFS containment isolation valves on Low IRWST wide range level.

   This new ESFAS automatic actuation function supports continued IRWST operability when the non-seismic SFS piping connection is unisolated. Without the automatic low IRWST wide range level isolation function, connecting the non-seismic SFS would result in declaring the IRWST inoperable. The ability of the IRWST to perform it's safety-related function, as assumed in the safety analysis, is retained when the low IRWST wide range level actuation is functional; therefore, the IRWST operability can be maintained when the non-seismic SFS piping connection is unisolated.

4. ND-17-0271 Enclosure 1, page 34, last paragraph, is revised as follows:

   The use of a 1-out-of-2 actuation logic is acceptable for this function as the SFS isolation valves are normally maintained closed~~, and the safety-related ESFAS containment isolation function performs the necessary safety-related design function to meet the requirements of the safety analysis, without crediting the proposed defense-in-depth design function of closure of the SFS containment isolation valves on Low IRWST wide range level when required~~. In addition, the use of the SFS for IRWST purification, cooling, and inventory control is only infrequently used during operations with T_{avg} above the P-9 permissive setpoint of 200°F. This is consistent with other existing 1-out-of-2 actuation logics for ESFAS automatic actuations only required during infrequent operations.

With one channel in maintenance, single failure protection would not be maintained. However, because this new function supports continued operability of the IRWST when aligned to the non-seismic SFS piping, planned maintenance would not be performed on this function while the IRWST is aligned to the SFS. Planned maintenance can be performed during times when the IRWST is not aligned to the SFS. Otherwise, if either or both channels of this new function fail or require maintenance while the IRWST is connected to the SFS, then the IRWST would be declared inoperable until the SFS containment isolation valves are closed to eliminate the non-seismic SFS piping connection to the IRWST. In addition, the IRWST wide range level instrumentation channels remain within the scope of the Design Reliability Assurance Program (D-RAP) as shown in UFSAR Table 17.4-1, and are therefore highly reliable, so maintenance is not expected to be necessary during the infrequent times that the IRWST is aligned to the SFS.

5. ND-17-0271 Enclosure 1, page 45, last paragraph, is revised as follows:

The proposed change to add IRWST lower narrow range level instruments addresses the accuracy required to initiate IRWST containment recirculation following a design basis * * * nonseismic SFS when connected to the IRWST that could potentially result in a loss of IRWST inventory. ~~Isolation of the SFS from the IRWST to mitigate the consequences of a design basis accident continues to be implemented by the existing containment isolation function, and does not rely on the new defense-in-depth refueling cavity and SFS isolation on Low IRWST wide range level.~~ The addition of RTS and ESFAS P-9 interlocks and blocks does not affect the availability of the actuated equipment to perform their design functions to mitigate the consequences of an accident. The proposed changes do not involve any accident initiating component/system failure or event, thus the probabilities of the accidents previously evaluated are not affected.

6. ND-17-0271 Enclosure 1, page 46, next to last paragraph, is revised as follows:

The proposed change to add IRWST lower narrow range level instruments include requirements similar in function and qualification to many safety-related instruments already performing the affected safety functions as described in the current licensing basis * * * level addresses a seismic or other event resulting in a postulated pipe rupture in the nonsafety-related, nonseismic SFS when connected to the IRWST that could potentially result in a loss of IRWST inventory. ~~Isolation of the SFS from the IRWST to mitigate the consequences of a design basis accident continues to be implemented by the existing containment isolation function, and does not rely on the new defense-in-depth refueling cavity and SFS isolation on Low IRWST wide range level.~~ The addition of RTS and ESFAS P-9 interlocks and blocks does not affect the availability of the actuated equipment to perform their design functions to mitigate the consequences of an accident. This activity does not allow for a new radioactive material release path, result in a new radioactive material barrier failure mode, or create a new sequence of events that would result in significant fuel cladding failures.

7. ND-17-0271 Enclosure 2, page 4, first paragraph, is revised as follows:

   The SFS contains a line that connects the IRWST and the refueling cavity to the SFS pumps and therefore penetrates the containment boundary. The containment isolation valves close automatically on a containment isolation signal~~ to preclude the possibility of draining the IRWST during an accident~~. These valves also close on a low spent fuel pool level to preclude the possibility of draining the refueling cavity and/or spent fuel pool during refueling operations. When the IRWST piping is aligned to the SFS for purification, cooling, and inventory control, a seismic or other event resulting in a pipe rupture in the nonsafety-related, nonseismic SFS could potentially result in a loss of IRWST inventory. Therefore, an ESFAS automatic actuation function~~defense-in-depth~~ change addresses the potential for a pipe rupture while the SFS is connected to the IRWST. As a result, a new ~~defense-in-depth~~ ESFAS automatic actuation to close the existing SFS containment isolation valves on Low IRWST wide range level is proposed. During cold shutdown conditions this alignment also provides for draining the IRWST inventory to the refueling cavity to support refueling activities, which may cause undesired and unnecessary ESFAS actuation that close SFS containment isolation valves on Low - IRWST wide range level. Therefore, a new reactor coolant average temperature (P-9) permissive and interlock is added to allow blocking this IRWST low level isolation actuation.

Southern Nuclear Operating Company

ND-17-1182

Enclosure 6

Vogtle Electric Generating Plant (VEGP) Units 3 and 4

Revised Changes to Licensing Basis Document Markups in LAR-16-032

(LAR-16-032S1)

Note:

Brackets with [Black text] indicate changes for conformance with existing UFSAR text

Brackets with [Blue and/or ~~Red Strikeout~~, ~~Blue Strikeout~~ or ~~Black Strikeout~~] indicate appropriate conformance for proposed revised text

The Brackets themselves are not be retained as part of the actual change

(Enclosure 6 consists of 6 pages, including this cover page)

Revise UFSAR Subsection Table 7.2-3, "Reactor Trip Permissives and Interlocks," as shown below:

Designation	Derivation	Function
* * *		
[$\overline{\text{P-6}}$]	Intermediate range neutron flux below setpoint	Automatically resets source range reactor trip
P-9	Reactor coolant average temperature above setpoint	Automatically resets **[**Low-2**]** steam generator **[**narrow range**]** water level reactor trip
$\overline{\text{P-9}}$	Reactor coolant average temperature below setpoint	Allows manual block of **[**Low-2**]** steam generator **[**narrow range**]** water level reactor trip
* * *		

Revise UFSAR Subsection 7.3.1.2.5, "Reactor Coolant Pump Trip" as shown below:

* * *

[~~1.~~3.**]** Low-2 pressurizer level

[~~2.~~4.**]** ~~Low wide range~~Low-2 steam generator wide range water level coincident with High hot leg temperature

* * *

Revise UFSAR Table 7.3-1, "Engineered Safety Features Actuation Signals," as shown below:

Actuation Signal	No. of Divisions/ Controls	Actuation Logic	Permissives and Interlocks
* * *			
6. Core Makeup Tank Injection (Figure 7.2-1, Sheets 7, 12 and 15)			
* * *	* * *	* * *	* * *
c. Low-2 pressurizer level	4	2/4-BYP[1]	Manual block permitted below P-12 Automatically unblocked above P-12
d. Low-2 ~~wide range~~ **[**steam**]** generator wide range water level coincident with	4/steam generator	2/4-BYP[1] in both steam generators	~~None~~Manual block permitted below P-9 Automatically unblocked above P-9
* * *	* * *	* * *	* * *

Revise UFSAR Table 7.3-2, "Interlocks for Engineered Safety Features Actuation System," as shown below:

Designation	Derivation	Function
* * *	* * *	* * *
[$\overline{\text{P-6}}$]	Intermediate range neutron flux channels below setpoint	Automatically resets the manual block of flux doubling actuation of the boron dilution block
P-9	Reactor coolant average temperature above setpoint	(a) Automatically unblocks core makeup tank actuation on [Low-2] steam generator wide range water level (b) Automatically unblocks steam generator blowdown system isolation on [Low-2] steam generator narrow range water level (c) Automatically unblocks passive residual heat removal actuation on [Low-2] steam generator [wide~~narrow~~] range water level and on [Low-2] steam generator [narrow~~wide~~] range water level (d) Automatically unblocks refueling cavity and spent fuel pool cooling system isolation on low IRWST wide range level
$\overline{\text{P-9}}$	Reactor coolant average temperature below setpoint	(a) Permits manual block of core makeup tank actuation on [Low-2] steam generator wide range water level (b) Permits manual block of steam generator blowdown system isolation on [Low-2] steam generator narrow range water level (c) Permits manual block of passive residual heat removal actuation on [Low-2] steam generator [wide~~narrow~~] range water level and on [Low-2] steam generator [narrow~~wide~~] range water level (d) Permits manual block of refueling cavity and spent fuel pool cooling system isolation on low IRWST wide range level

Revise UFSAR Table 7.5-1, "Post-Accident Monitoring System," as shown below (New Addition to LAR-16-032):

Variable	Range/ Status	Type/ Category	Qualification		Number of Instruments Required	Power Supply	QDPS Indication (Note 2)	Remarks
			Environmental	Seismic				
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *
Steam generator wide range water level~~(wide range)~~	0-100% of span	D2, F3	Harsh	Yes	1/steam generator	1E	Yes	
Steam generator narrow range water level~~(narrow range)~~	0-100% of span	D2, F2	Harsh	Yes	1/steam generator	1E	Yes	
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *

* * *

Variable	Range/ Status	Type/ Category	Qualification		Number of Instruments Required	Power Supply	QDPS Indication (Note 2)	Remarks
			Environmental	Seismic				
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *
IRWST lower narrow range water level	0-100% of span	D2	Harsh	Yes	[~~31~~] [~~(Note 4)~~]	1E	No	
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *

Revise Table 15.2-1 (Sheet 5), "Time Sequence of Events for Incidents Which Result in a Decrease in Heat Removal By the Secondary System" as shown below:

Accident	Event	Time (seconds)
II.A. Loss of ac power to the plant auxiliaries	* * *	* * *
	PRHR heat exchanger actuation on ~~low~~Low-2 steam generator narrow range water level (~~narrow range~~ coincident with low start up flow rate)	~~132.4~~**[**401.0**]**
	* * *	* * *

Revise Table 15.2-1 (Sheet 6), "Time Sequence of Events for Incidents Which Result in a Decrease in Heat Removal by the Secondary System" as shown below:

Accident	Event	Time (seconds)
II**[**I**]**.**[**~~A~~B**]**. Loss of normal feedwater flow	Feedwater is lost	10.0
	~~Low~~Low-2 steam generator narrow range water level reactor trip set point is reached	~~70.4~~**[**58.2**]**
	* * *	* * *
	PRHR heat exchanger actuation on ~~low~~Low-2 steam generator narrow range water level (~~narrow range~~ coincident with low start up flow rate)	~~132.4~~**[**120.2**]**
	* * *	* * *