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NL-24-0238
10 CFR 50.90

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001

Joseph M. Farley Nuclear Plant Units 1 and 2
Docket Nos. 50-348 and 50-364

Subject: RIPE License Amendment Request to Change Containment Air Temperature Actions, Supplemental Information

By letter dated April 19, 2024, Southern Nuclear Operating Company (SNC) requested a license amendment to the Technical Specifications (TS) for Joseph M. Farley Nuclear Plant (FNP), Units 1 and 2 renewed facility operating licenses NPF-2 and NPF-8, respectively (ML24110A126). The requested amendment would revise the operating license, Appendix A, Technical Specification (TS) 3.6.5, Containment Air Temperature, Actions upon exceeding the containment average air temperature limit and remove an expired Limiting Conditions for Operation Note. On May 28, 2024, the NRC Staff identified the need for supplemental information and confirmatory information. The requested supplemental and confirmatory information is provided in the Enclosure. The supplemental and confirmatory information does not change the significant hazards consideration or the environmental evaluation.

This letter contains no regulatory commitments. This letter has been reviewed and determined not to contain security-related information. In accordance with 10 CFR 50.91, SNC is notifying the State of Alabama of this supplemental and confirmatory information request response by transmitting a copy of this letter to the designated State Official. If you have any questions, please contact Ryan Joyce at 205-992-6468.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on the 14th day of June 2024.

Respectfully submitted,

Jamie Coleman

Jamie M. Coleman
Director, Regulatory Affairs
Southern Nuclear Operating Company

JMC/was/cbg

Enclosure: Supplemental and Confirmatory Information

cc: NRC Regional Administrator, Region II
NRR Project Manager – Farley 1 & 2
Senior Resident Inspector – Farley 1 & 2
Alabama – State Health Officer for the Department of Public Health
RType: CFA04.054

RIPE License Amendment Request to Change Containment Air Temperature Actions, Supplemental Information

Enclosure

Supplemental and Confirmatory Information

ENCLOSURE

RIPE License Amendment Request to Change Containment Air Temperature Actions, Supplemental and Confirmatory Information

Request for Supplemental Information 1 – Adherence to 10 CFR 50.36

The information provided should demonstrate that the requested TS changes are derived from the analysis contained in the SAR, as updated, as required by 10 CFR 50.36(b).

The current LCO temperature limit of 120 °F represents the lowest functional capability required for safe operation of the system as required by 10 CFR 50.36(c)(2)(i) under all conditions in which the TS is applicable.

a. Explain why the proposed Required Actions which provide a higher containment temperature (i.e., 122 °F) and lower RWST temperature are not an alternate set of conditions that represent the lowest functional capability of the system, as required by the regulations, that should be included in the LCO instead of in the Required Actions.

b. Provide a basis for allowing the containment to be in an elevated temperature (i.e., 122 °F) in conditions that are outside its design basis conditions for 30 days instead of 8 hours as required by the existing Completion Time and the Westinghouse STS.

Response to Request for Supplemental Information 1

a. Explain why the proposed Required Actions (RAs) are not an alternate set of conditions that represent the lowest functional capability of the system.

The requirements for a Limiting Condition for Operation (LCO) are provided in 10 CFR 50.36(c)(2)(i) which states “(i) Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.” The requirement clearly differentiates between the LCO and the remedial actions to be followed when the LCO is not met. The LCO is the lowest functional capability of the equipment required for safe operation, *in the absence of implementation of the remedial actions.* Such remedial actions may allow for continued safe operation and may constitute an alternative “functional capability or performance level of equipment required for safe operation of the facility.” It is the remedial actions to be taken in the event containment temperature exceeds the LCO, not the LCO itself, that the LAR seeks to modify. Neither the design basis containment functional analyses nor the design basis containment structure external pressure analyses have been formally updated to reflect an initial condition of 122 °F.

Contrary to the implication in the Request for Supplemental Information, the proposed modification to the RA does not establish a new lowest functional capability of the system. Instead, the proposed RA extends the period during which containment air temperature may return to the design basis assumed conditions, provided that (a) the containment air temperature does not exceed 122°F, (b) that containment air temperature has not exceeded 120°F for greater than 720 cumulative hours (30 days) during the calendar year, and (c) that the refueling water storage tank (RWST) temperature is maintained below a lower limit (100°F) to offset the additional heat input. These remedial actions are based on risk assessment, including considerations for defense in depth and safety margin (see Subsection 3.5 of original LAR). The assessment confirms the change in risk is low and performance assumptions assumed in the probabilistic risk assessment (PRA) continue to be met. The remedial actions are not based on the "initial condition for a design basis accident," and therefore do not constitute a "lowest functional capability" of the system. The technical basis for these remedial actions is discussed in the LAR and is further discussed in the responses to the request for supplemental information 2, 3, and confirmatory information 1 below. Per 10 CFR 50.36, the proposed remedial actions are appropriately included as Required Actions rather than as an LCO.

In addition, multiple precedents for remedial Required Actions that provide an alternate set of conditions for continued safe operation exist within the existing TS and within the established Standard Technical Specifications approved as NUREGs.

One such example in the existing TS is LCO 3.6.8, which requires two Hydrogen Mixing System (HMS) trains shall be OPERABLE. With both HMS trains inoperable, operation is allowed to continue for up to 7 days provided remedial actions are completed. This alternative method of maintaining the hydrogen control function similarly does not constitute "an alternate set of conditions that represent the lowest functional capability of the system."

Other examples of remedial actions that allow for continued operation (i.e., an alternate set of conditions for continued operation) unlimited or limited operation) can be found throughout Section 3.1, Reactivity Control Systems (e.g., TS 3.1.2 Conditions A and B, TS 3.1.3 Condition B, TS 3.1.4 Conditions A, B and D, TS 3.1.5 Conditions A and B, TS 3.1.6 Conditions A, B, and C, TS 3.1.7 Conditions A, B, C and D), throughout Section 3.2, Power Distribution Limits (e.g., TS 3.2.1 Condition A, TS 3.2.2 Condition A, TS 3.2.4 Condition A), throughout Section 3.4, Reactor Coolant System (RCS) (e.g., TS 3.4.11 Condition A,, TS 3.4.15 Condition A, TS 3.4.16 Condition A, TS 3.4.17 Condition A), in Section 3.6, Containment Systems, TS 3.6.10 Condition A, and throughout Section 3.7, Plant Systems (e.g., TS 3.7.1 Conditions A and B, TS 3.7.6 Condition A, and TS 3.7.10 Condition B).

b. Provide a basis for the proposed 30-day Completion Time.

As noted in the proposed Bases for the requested change, short-term exceedance of the containment average air temperature limit has been evaluated and determined to be of minimal impact to safety. The proposed 30-day Completion Time (vs the current 8-hour Completed Time) is based on a combination of (a) the expected need based on the historical (and potential) periods of extended high ambient temperatures in the region of the plant and (b) the risk assessment which shows no appreciable increase in risk. As an additional backstop, Required Action A.2 will ensure the 120 °F limit is not exceeded for greater than 720 cumulative hours (30 days) in a calendar year, such that the 30-day Completion Time cannot be fully "reset" if the LCO were to be not met on separate occasions during the calendar year. In addition, SNC has performed a conservative deterministic assessment that concluded that the change does not have more than a minimal impact on safety. The deterministic assessment was performed per the NRC temporary staff guidance on the Risk-Informed Process for Evaluations (TSG-DORL-2021-01). The 30-day Completion Time is expected to provide sufficient allowances for avoidance of potential emergency LARs during the upcoming summer high temperatures. Thus, the Risk-Informed Process for Evaluations (or RIPE) was chosen for this change request. The proposed 30-day restoration time is appropriate given the conservatisms (including uncertainty assumptions and assumed initial conditions) in the containment and steam line break analyses and given the proposed limitations and remedial actions required to be implemented by Required Actions A.1, A.2 and A.3.

Industry precedents exist for allowing a restoration time of ≥30 days when an LCO is not met. For example, TSTF-448 allows an extended period of time (up to 90 days) outside the control room emergency filtration system analyzed limits, and TSTF-567 allows an extended period of time (up to 90 days) with the containment accident generated and transported debris exceeding analyzed limits. Both TSTF-448 and TSTF-567 have been approved by the NRC and have been incorporated into Revision 5 of the Standard Technical Specifications for Westinghouse Plants (NUREG-1431). All three cases (TSTF-448, TSTF-567, and this change) are based on a very low safety risk, and in all three cases appropriate remedial actions are provided to maintain the plant in a safe condition. In addition, in all three cases, the remedial actions do not constitute “an alternate set of conditions that represent the lowest functional capability of the system.”

Request for Supplemental Information 2 - Impacts on Net Positive Suction Head (NPSH)

The current submittal does not address the effect of the increase in containment air temperature on the available NPSH for the pumps that draw water from the sump during the LOCA recirculation phase. The NRC staff requests that information be provided detailing the adverse impact of the present request on the LOCA sump temperature response, available NPSH during LOCA recirculation phase, and if any (or additional) containment accident pressure is needed during the transient to maintain positive NPSH margin.

Further, the submittal references Table 6.2-3 of the Final Safety Analysis Report that sets the “inside temperature” of containment at 127 °F for the containment pressure analysis, which is a biased input for the peak pressure and temperature response; however, this table also shows the accumulator tank water temperature is 120 °F. To maximize the sump temperature response during LOCA recirculation phase for NPSH analysis, the information requested above should include biased inputs for a conservative analysis.

Response to Request for Supplemental Information 2

As noted in the amendment request (page E-6), “MAAP calculations provide integrated analyses of plant response to postulated accident sequences including an assessment of available NPSH and pump NPSH requirements following the transfer to recirculation. Specifically, the risk evaluation shows MAAP results comparing the times to transfer to recirculation, changes to containment pressures, and impacts on sump water temperature and NPSH for several different accident sequences due to a change in the containment initial gas temperature from 120°F to 122°F.

Results of the analyses indicate no significant changes to sequence timing and minimal impact to peak containment pressures and containment sump water temperatures. Therefore, no changes to RHR success criteria are noted.”

Additional details are also provided in the amendment request (page E-14), “A review of NPSH calculation “NPSH Calculation from Containment Sump to the Residual Heat Removal (RHR) Pumps – Recirculation Mode” documents available NPSH margin at sump temperatures between 120°F and 291°F. The NPSH margins up to 180°F are greater than 14 feet of head. The strainer head losses are also shown to decrease as the sump temperature increases above 140°F. Based on the competing effects between vapor pressure of the sump inventory and strainer head losses, the pump NPSH margin would be expected to increase or stay the same as the sump temperature increases above 212°F. Therefore, a temporary increase in containment temperature from 120°F to 122°F would be expected to have no adverse impacts on NPSH margin."

The margins identified in the above evaluation are more than sufficient to overcome the possible minor reduction due to the increased temperature.

In addition to the information noted above in the LAR, SNC provides the following additional information.

The impact of the temporary allowance for containment temperature increase on the LOCA sump temperature response is minimal, and therefore the effect of the increase in containment air temperature on the available NPSH for the pumps that draw water from the sump during the LOCA recirculation phase is also minimal. A bounding GOTHIC evaluation determined a LOCA sump temperature increase of no more than 0.34°F during this time, leading to an available NPSH margin of more than 1 foot for the Residual Heat Removal and Core Spray pumps in recirculation mode at a temperature of 292.4°F. The bounding high-end temperature of 292.4 is conservative and is the saturation temperature corresponding to the maximum containment peak pressure that occurs during a LOCA of 45 psig (59.7 psia). The temperature of 292.4°F utilizes the guidance in Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-Of-Coolant-Accident," that the containment pressure is equal to the vapor pressure of the sump inventory. This ensures that credit is not taken for containment pressurization during the transient.

Regarding biased inputs for a conservative analysis, the GOTHIC evaluation assumed a containment air temperature of 127°F, and an accumulator water temperature of 124°F. As discussed in the LAR, the containment average air instrument uncertainty calculation demonstrates sufficient margin to the assumed safety analyses initial condition of 127°F to account for an increase from 120°F to 122°F. The assumed accumulator water temperature of 124°F (4°F increase from the FSAR analysis) bounds the expected response from the 2°F increase in containment air temperature. The GOTHIC evaluation did not account for the restriction on RWST temperature (i.e., it assumed 110°F versus 100°F). As discussed in the preceding paragraph, various conservative assumptions/biases were used to verify adequate NPSH margin based on the calculated change in containment sump temperature.

Request for Supplemental Information 3 – Impacts on Peak Cladding Temperature (PCT)

The NRC staff requests an analysis using an appropriate methodology for addressing the impact on PCT of this proposed change. The PCT impact is qualitatively assessed as a direct change relative to the increase in containment air temperature in the submittal. The NRC staff experience has shown this conclusion is not necessarily true (meaning a 2°F increase in containment air temperature does not necessarily limit PCT increase to only 2°F). A quantitative discussion of PCT margin relative to the 10 CFR 50.46(b)(1) PCT safety limit of 2200°F that compares the effects of the proposed changes to the current analysis of 120°F is requested to determine the magnitude of the PCT change and to adequately assess the effects on dose consequences of the respective accident sequences.

Response to Request for Supplemental Information 3

Consistent with the vendor (Westinghouse) standard practice, the effect of an increased containment air temperature on the licensing basis LOCA analyses was estimated pursuant to 10 CFR 50.46(a) due to the small change in the design basis inputs. The small break and large-break LOCA licensing basis analyses are supported by the NRC generically approved

NOTRUMP and Automated Statistical Treatment of Uncertainty Method (ASTRUM) methodologies (WCAP-10054-P-A, WCAP-10054-P-A Addendum 2, Revision 1, WCAP-10079-P-A, and WCAP-16009-P-A).

The evaluation of the impacts of a small break LOCA show a 0°F impact. Based on the relatively small reduction in total energy removal capability of the accumulator fluid associated with a 122°F initial containment temperature (the increase in containment temperature corresponds to an enthalpy increase of ~2 Btu/lbm [~2.23%]), accumulator initial injection timing and characteristics remaining unaffected, and the low core and vessel internals stored energy associated with a small break transient, it is concluded that temporarily increasing the maximum containment temperature from 120°F to 122°F will have a negligible impact on the small break LOCA analysis of record, leading to an estimated peak cladding temperature impact of 0°F and a negligible impact on the maximum local oxidation reaction on the cladding surfaces.

As noted in the amendment request (page E-15), “The evaluation of the impact of increasing the containment temperature and accumulator temperature by 2°F indicates a maximum of 2°F increase in peak clad temperature (PCT) as a result of a large break LOCA. The latest rack-up of Farley PCT is 2034°F, so the PCT rack-up would increase to 2036°F under this containment temperature assumption. The increased PCT would still be less than the regulatory acceptance criterion of 2200°F.” Accumulator temperature sensitivities from similar pressurized water reactor plant designs with similar fuel assembly design, power level, and predicted cladding temperature response were performed to determine an estimated effect for FNP. It is acknowledged that accumulator temperature sensitivities were executed prior to modeling of fuel thermal conductivity degradation (TCD) in best-estimate LOCA analyses and fuel performance codes. The sensitivities remain valid for the purpose of estimating the effect of the increased accumulator temperature range; however, the overall PCT for limiting transients when modeling fuel TCD are on the order of 150°F higher. As such, a conservative multiplier of 2 is applied to the estimate of effect to account for the use of pre-TCD transient results from representative plants for the evaluation of the impact of the proposed change.

The estimated effect is a PCT increase of ~0.5°F per 1°F increase in accumulator temperature. As such, with the conservative multiplier, the 2°F increase in the maximum accumulator temperature is estimated to have a 2°F effect on the analysis PCT. The latest racked up PCT is 2034°F. With the additional 2°F effect, the racked up PCT is estimated to be 2036°F, which maintains margin to the regulatory acceptance criterion of 2200°F.

These sensitivity evaluations are pursuant to 10 CFR 50.46(a) and do not change the AOR.

Confirmatory Information 1: Consideration of Non-Environmentally Qualified Equipment

The NRC staff’s question spans from the station blackout (SBO) rule which indicates that the agency has accepted the position that most electrical equipment can function indefinitely at temperatures of 120 °F and below.

By letter dated August 22, 2023 (ML23234A151), SNC requested an emergency LAR for Farley, Units 1 and 2. By email dated August 22, 2023 (ML23236A002), the NRC submitted a request for additional information (RAI). By letter dated August 23, 2023 (ML23235A288), SNC responded to the RAI. Although the NRC staff’s RAI explicitly stated ‘non-Environmental Qualification (non-EQ) equipment’, the licensee’s response seemed to be limited to equipment important to safety within the EQ program (i.e., 10 CFR 50.49, “*Environmental qualification of* *electric equipment important to safety for nuclear power plants*") and did not appear to address non-EQ electrical equipment.

As SNC's proposed LAR dated April 19, 2024, is similar to the emergency LAR but requests a permanent versus a one-time temporary change to the average containment air temperature, confirm there is no non-EQ electric equipment (i.e., electric equipment not subject to the requirements in 10 CFR 50.49) within containment that is expected to perform a design function under normal operation (e.g., electrical equipment that is either relied upon by the plant operators to inform operational decisions or provides a signal input to other plant systems or processes) whose failure could mislead a plant operator or cause a plant transient.

Response to Confirmatory Information 1

SNC has reviewed the specifications of the non-EQ electric equipment (i.e., electric equipment not subject to the requirements in 10 CFR 50.49) within containment that is expected to perform a design function under normal operation (e.g., electrical equipment that is either relied upon by the plant operators to inform operational decisions or provides a signal input to other plant systems or processes) whose failure could mislead a plant operator or cause a plant transient and determined that this electrical equipment will not be adversely impacted by the proposed temporary increase in plant temperature.

Confirmatory Information 2: Reactor Coolant Pump (RCP) Seal LOCA Mitigation Strategy

The NRC approved amendments to adopt Initiative 4b (pre-TSTF-505, Revision 2) (ML19175A243) for Risk-Informed Completion Times and 10 CFR 50.69 (ML21137A247) for risk-informed categorization and treatment of structures, systems, and components based on Regulatory Guide 1.200 Revision 2.

In its submittal dated April 19, 2024, the licensee stated, in part, that, "It is noted that a newer version of the peer review process has been developed as NEI 17-07 and has been endorsed for use by RG 1.200. SNC elected to use the process as documented in Appendix X. The differences do not impact the validity of the review," and that, "Updates to FLEX modeling including adoption of PWROG-18042 FLEX equipment data and addition of credit for FLEX pumps to mitigate certain RCP seal leakage sequences if the low leakage RCP seal fails. The updates were performed consistent with the 2022 NRC staff memorandum for crediting FLEX strategies in PRA."

Please confirm, per your submittal, that; (1) Farley has installed Generation III RCP seals and adhering to PWROG-14001-P, Revision 1, "PRA Model for the Generation III Westinghouse Shutdown Seal," including exceptions for Limitations and Conditions, as approved in amendments 217 and 214 (ML17261A087), respectively, for the containment leakage rate testing program, and (2) SNC is not proposing to use, in total or in part, newly developed PRA methods that would be associated with NRC approval of amendments to adopt TSTF-591, "Revise Risk-Informed Completion Time (RICT) Program," Regulatory Guide 1.200, Revision 3, "Acceptability of Probabilistic Risk Assessment Results for Risk-Informed 25 Activities," requirements in PWROG-19027-NP, Revision 2, "Newly Developed Method Requirements and Peer Review," and NEI 17-07, Revision 2, "Performance of PRA Peer Reviews Using the ASME/ANS PRA Standard."

Response to Confirmatory Information 2

SNC confirms that:

(1) Farley has installed Generation III RCP seals, adhering to PWROG-14001-P, Revision 1, including exceptions for Limitations and Conditions, as approved in amendments 217 and 214 (ML17261A087), respectively, for the containment leakage rate testing program; and

(2) SNC is not proposing to use any newly developed PRA methods for this application. All approved PRA methods are documented according to the requirements for each specific PRA hazard.