



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 28, 2020

Ms. Cheryl A. Gayheart
Regulatory Affairs Director
Southern Nuclear Operating Company
3535 Colonnade Parkway
Birmingham, AL 35243

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2 – REQUEST FOR
ADDITIONAL INFORMATION RE: UPDATE THE SPENT FUEL POOL
CRITICALITY SAFETY ANALYSIS (EPID L-2019-LLA-0212)

Dear Ms. Gayheart:

By letter dated September 30, 2019 (Agencywide Documents Access and Management System Accession No. ML19275E393), the Southern Nuclear Operating Company, Inc., (SNC) submitted an amendment request to revise the Joseph M. Farley Nuclear Plant, Unit 1 and Unit 2, Technical Specifications (TS). Specifically, SNC requested to update the spent fuel pool criticality safety analysis and revise TS 3.7.15 "Spent Fuel Assembly Storage" and TS 4.3 "Fuel Storage."

The U.S. Nuclear Regulatory Commission (NRC) staff has determined that additional information is needed as discussed in the Enclosure. We request that SNC respond within 45 days of the date of this letter. Please note that the NRC staff's review is continuing and further requests for information may be developed.

The request for additional information (RAI) contains proprietary information as originally submitted in the September 30, 2019, license amendment request. Proprietary information is identified by text enclosed within double brackets as shown here [[]]. A non-proprietary version of the RAI is also enclosed.

Enclosure 1 transmitted herewith contains SUNSI.
When separated from Enclosure 1, this transmittal
document and Enclosure 2 is decontrolled.

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If you have any questions, please contact me at 301-415-1009 or via e-mail at Shawn.Williams@nrc.gov.

Sincerely,

/RA/

Shawn A. Williams, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-348, 50-364

Enclosures:

1. Request for Additional Information (Proprietary)
2. Request for Additional Information (Non-Proprietary)

cc: w/o enclosure 1: Listserv

ENCLOSURE 2

NON-PROPRIETARY VERSION

REQUEST FOR ADDITIONAL INFORMATION

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

CRITICALITY SPENT FUEL POOL LICENSE AMENDMENT REQUEST

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

NON-PROPRIETARY VERSION

REQUEST FOR ADDITIONAL INFORMATION

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

CRITICALITY SPENT FUEL POOL LICENSE AMENDMENT REQUEST

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

By letter dated September 30, 2019 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML19275E393), the Southern Nuclear Operating Company, Inc., (SNC) submitted an amendment request to revise the Joseph M. Farley Nuclear Plant, Unit 1 and Unit 2, Technical Specifications (TS). Specifically, SNC requested to update the spent fuel pool criticality safety analysis and revise TS 3.7.15 "Spent Fuel Assembly Storage" and TS 4.3 "Fuel Storage."

The U.S. Nuclear Regulatory Commission (NRC) staff has determined that additional information is needed as discussed in the Enclosure. We request that SNC respond within 45 days of the date of this letter.

The request for additional information (RAI) contains proprietary information as originally submitted in the September 30, 2019, license amendment request in WCAP-18414-P, Rev. 0, "J.M. Farley Units 1 and 2 Spent Fuel Pool Criticality Safety Analysis." The proprietary information has been removed and the location of the proprietary information is denoted within double brackets as shown here [[]].

RAI No. 1

Proposed new TS 4.3.1.1.e states the following:

"New or partially spent fuel assemblies that must be stored according to their combination of discharge burnup and nominal enrichment, decay time since operation, required integral fuel burnable absorber (IFBA) (if applicable), and must comply with Figure 4.3-1, Table 4.3-1, and Tables 4.3-3 through 4.3-5 (as applicable). Each assembly should [emphasis added] be stored in an appropriate storage configuration according to its fuel category as specifically described in Table 4.3-1 and geometry based on Figure 4.3-1"

Justify each situation that the term "should" could be used or revise the proposed TS accordingly, for example, use the term "shall."

Enclosure 2

RAI No. 2

Proposed Note 3.c. for new TS Figure 4.3-1 states the following:

For assemblies with Initial Enrichment (En) values greater than or equal to the values in Table 4.3-2, the required Minimum Burnup value (in MWd/MTU) for each Fuel Category is calculated based on initial enrichment, decay time, and the appropriate fitting coefficients.

This statement implies the analysis is acceptable for initial enrichments above 5.0 weight percent (wt/%) U235. However, the licensee did not propose a change to its current TS 4.3.1.1.a, which limits its fuel to a maximum U235 enrichment of 5.0 weight percent (wt/%). Since TS 4.3.1.1.a is not being revised, the NRC staff considers U235 enrichment above 5.0 wt/% out of scope of the license amendment request (LAR). Please provide a confirming statement.

RAI No. 3

It is unclear what fuel assembly power history was used for the depletion analysis. WCAP-18414 P, Section 4.2.2.4, "Maximum Average Assembly Power," states [[

]] However, the power history used in the analysis is not stated nor is the power history used in the analysis justified as it relates to Farley. With respect to the power history used in the analysis, please provide the following information:

- a. Clearly state the power histories used in the analysis and justify their use for Farley.
- b. Table 4.2 lists a [[]]. What is the basis and justification for these values?
- c. Table 4.2 lists a [[]]. In what respect are these values [[]]?
- d. Are [[]] and [[]] referenced below Table 4-2 the same parameter?
- e. Use of the [[]] implies a non-bounding power history was used or may be acceptable. Considering the potential variations and timing of those variations in a fuel assembly's power history, justify the use of a non-bounding power history. Describe any limitations on the use of [[]] and how the licensee will control those limitations.
- f. Describe the effects of a non bounding power history on Fuel Temperature and Operating History and Specific Power as described in WCAP-18414 P, Sections 4.2.2.2 and 4.2.2.3 respectively.
- g. If the power history is non bounding, the Axial Moderator Temperature Profile Selection as described in WCAP-18414 P, Section 4.2.3.2, may be adversely affected. Justify the continued use of the selected Axial Moderator Temperature Profiles.

RAI No. 4

Section 5.2.3.1.13 of WCAP-18414 P, "Eccentric Fuel Assembly Positioning Bias," states:

The fuel assemblies are assumed to be nominally located in the center of the storage rack cell; however, it is recognized that an assembly could in fact be located eccentrically within its storage cell.

With respect to the Eccentric Fuel Assembly Positioning Bias analysis, please provide the following information.

- a. Describe the models used.
- b. Justify the perturbed cases used.
- c. Compare the perturbed cases to nominal case.

RAI No. 5

Section 5.2.3.1.14 of WCAP-18414 P, "SFP [Spent Fuel Pool] Temperature Bias," discusses the determination of the most reactive temperature in the Farley SFP. With respect to the SFP Temperature Bias analysis, please provide the SFP keff at each temperature analyzed.

RAI No. 6

Section 5.4.2 of WCAP-18414 P, "Type 2 Normal Conditions," includes fuel rods with empty lattice locations. The section states:

[[
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With respect to fuel rods with empty lattice locations, please provide the following information.

- a. Will the fuel assemblies be considered as [[
Justify the requirement.]]?]
- b. Can [[
reactive than [[]] fuel assemblies with empty lattices be more
]]?

RAI No. 7

Section 5.6 of WCAP-18414 P, "Rodded Operation," references NUREG/CR 6759, "Parametric Study of the Effect of Control Rods for PWR Burnup Credit," (ADAMS Accession No. ML020810111) in its analysis and states in part:

Any assemblies incurring significant rodded operation going forward must not credit the rodded burnup.

And also states,

Any impact from short term operation at reduced power levels with rods inserted will be negligible.

The significance and negligibility of a reactivity impact needs to be judged against the margin in the analysis. The Recommendations section in NUREG/CR 6759 states, in part:

Consequently, it is concluded that, based on the assumption that U.S. PWRs do not use CRs [Control Rods] to a significant extent (i.e., CRs are not inserted deeper than the top ~20 cm of the active fuel and CRs are not inserted for extended burnups), the effect of CRs on discharge reactivity is relatively small (less than 0.2% Δk)."

While 0.2% Δk may be thought of as relatively small, it would be a large portion of the Administrative Margin in the licensee's analysis. Therefore, for the NRC staff to evaluate the licensee's control of fuel assemblies that have experienced rodded operation, please provide the following information:

- a. What the licensee considers significant/non-negligible rodded operation.
- b. How the licensee will identify and control any fuel assembly that experiences significant/non-negligible rodded operation.

RAI No. 8

Section 6.2 of WCAP-18414 P, "Analysis Area of Applicability"

- a. States in part,

This section details the area of applicability of the analysis concerning assembly characteristics and associated fuel management, including a summary of the data which needs to be confirmed to assure that the results presented here remain valid.

With respect to the area of applicability, please explain how the licensee will verify that the area of applicability is met for all fuel assemblies.

- b. States in part,

[[

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Please provide the methodology that will be used.

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DATED FEBRUARY 28, 2020

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RidsNrrDorLpl2-1 Resource

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ADAMS Accession No.: ML20055E876 (Proprietary)
ML20055E975 (Non-Proprietary)
ML20055E948 (Package)

OFFICE	DORL/LPL2-1/PM	DORL/LPL2-1/LA	DNRL/NCSG/BC	DORL/LPL2-1/BC
NAME	SWilliams	KGoldstein	RLukes	MMarkley
DATE	02/24/2020	02/25/2020	02/10/2020	02/27/2020
OFFICE	DORL/LPL2-1/PM			
NAME	SWilliams			
DATE	02/28/2020			

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