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NL-12-1226

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

Joseph M. Farley Nuclear Plant – Units 1 and 2
License Amendment Request to Allow NEXUS Nuclear Data Methodology in the
Preparation of the Core Operating Limits Report

Ladies and Gentlemen:

Pursuant to 10 CFR 50.90, Southern Nuclear Operating Company (SNC) hereby requests an amendment to Facility Operating License Nos. NPF-2 and NPF-8 for Joseph M. Farley Nuclear Plant (FNP), Units 1 and 2, respectively. This amendment proposes to revise Technical Specification (TS) 5.6.5, "Core Operating Limits Report (COLR)," to reference and allow use of Westinghouse WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," (Reference 1 of Enclosure 1) to determine core operating limits. The non-proprietary version is WCAP-16045-NP-A, Addendum 1-A (Reference 2 of Enclosure 1).

The proposed TS change will allow WCAP-16045-P-A, Addendum 1-A as an alternative methodology to WCAP-11596-P-A for determining the refueling boron concentration for Limiting Condition of Operation (LCO) 3.9.1, "Boron Concentration." WCAP-11596-P-A (Reference 6 of Enclosure 1) was approved as the reference methodology for LCO 3.9.1 as part of the issuance of Amendments 151 (Unit 1) and 143 (Unit 2).

Enclosures 1 through 3 provide the Basis for Proposed Change, Markup of Proposed Technical Specifications, and Clean Type Technical Specifications in support of the amendment request.

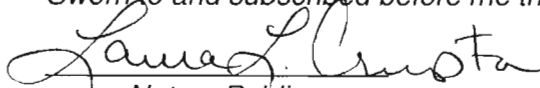
It has been determined that this amendment application does not involve a significant hazard consideration as determined per 10 CFR 50.92. Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

SNC requests approval of the proposed license amendment by June 30, 2013. The proposed changes would be implemented within 60 days of issuance of the amendment.

This letter contains no NRC commitments. If you have any questions, please contact Jack Stringfellow at (205) 992-7037.


Mr. M. J. Ajluni states he is the Nuclear Licensing Director of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and, to the best of his knowledge and belief, the facts set forth in this letter are true.

Sworn to and subscribed before me this 14th day of August, 2012.


Notary Public

My commission expires: 11-02-2013

Respectfully submitted,



M. J. Ajluni
Nuclear Licensing Director

MJA/RMJ/lac

Enclosures:

1. Basis for Proposed Change
2. Markup of Proposed Technical Specification
3. Clean Typed Pages for Technical Specification

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. T. A. Lynch, Vice President – Farley
Mr. B. L. Ivey, Vice President – Regulatory Affairs
Mr. B. J. Adams, Vice President – Fleet Operations
RTYPE: CFA04.054

U. S. Nuclear Regulatory Commission
Mr. V. M. McCree, Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Farley
Mr. E. L. Crowe, Senior Resident Inspector – Farley

Alabama Department of Public Health
Dr. D. E. Williamson, State Health Officer



**Joseph M. Farley Nuclear Plant – Units 1 and 2
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Enclosure 1

Basis for Proposed Change

Enclosure 1
Basis for Proposed Change

Table of Contents

1. Summary Description
2. Detailed Description
3. Technical Evaluation
4. Regulatory Evaluation
 - 4.1 Significant Hazards Consideration
 - 4.2 Applicable Regulatory Requirements / Criteria
 - 4.3 Conclusion
5. Environmental Considerations
6. References

1. Summary Description

Southern Nuclear Operating Company (SNC) proposes to revise the Joseph M. Farley Nuclear Plant (FNP) Technical Specification (TS) 5.6.5, "Core Operating Limits Report (COLR)," to reference and allow use of Westinghouse WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology" (Reference 1) to determine core operating limits. The proposed TS change will allow WCAP-16045-P-A, Addendum 1-A as an alternative methodology to WCAP-11596-P-A for determining the refueling boron concentration for Limiting Condition of Operation (LCO) 3.9.1, "Boron Concentration."

2. Detailed Description

Technical Specification Section 5.6.5.b lists the analytical methods which are allowed for use in preparation of the Core Operating Limits Report (COLR). The proposed TS change will modify Section 5.6.5.b to allow WCAP-16045-P-A, Addendum 1-A, as an alternative methodology to WCAP-11596-P-A for use in preparation of the COLR. TS Section 5.6.5.b lists WCAP-11596-P-A as the methodology for determining the LCO 3.9.1 refueling boron concentration given in the COLR. WCAP-11596-P-A was approved as the methodology for determining the COLR value for LCO 3.9.1 as part of the issuance of Amendments 151 (Unit 1) and 143 (Unit 2) in Reference 6. The proposed amendment will allow WCAP-16045-P-A, Addendum 1-A, or WCAP-11596-P-A, to be used as the methodology for determining the LCO 3.9.1 refueling boron concentration given in the COLR.

The marked-up proposed change to TS Section 5.6.5.b is shown in Enclosure 2. The clean-copy of the proposed change is shown in Enclosure 3.

3. Technical Evaluation

LCO 3.9.1 states that the boron concentrations of the Reactor Coolant System, the refueling canal, and the refueling cavity shall be maintained within the limit specified in the COLR during refueling operations. TS Section 5.6.5.b states that the analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the Nuclear Regulatory Commission (NRC). This section further states that WCAP-11596-P-A, "Qualification of the Phoenix-P/ANC Nuclear Design System for Pressurized Water Reactor Cores," (Reference 5) is the methodology for determining the minimum boron concentration value for LCO 3.9.1.

PHOENIX-P is the neutron transport code traditionally used to provide cross section data as input to the Advanced Nodal Code (ANC) code. The PARAGON computer code is a standalone neutron transport code based on collision probability techniques, and it is approved for use as a standalone lattice physics code and as a cross section generation tool for core simulators, such as ANC, for uranium-fueled pressurized water reactors (PWRs) (Reference 4). ANC is a core simulator code system, which performs calculations based on nuclear data supplied by a code such as PARAGON or PHOENIX-P. The PARAGON nuclear data methodology was developed as a direct replacement to PHOENIX-P.

Topical Report WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON," (Reference 4) confirms the qualifications of the PARAGON code both as a standalone transport code and as a substitute for the PHOENIX-P code as a nuclear data source for nodal codes. As part of the qualification process, the Topical Report includes a comparison of PARAGON predicted values to measured data from several plants. Benchmarking has shown that results from the PARAGON/ANC code package are essentially the same as those obtained from the current PHOENIX-P/ANC system. Topical Report WCAP-16045-P-A concludes that the application of PARAGON does not result in any undesirable changes in predicted fuel performance or safety analysis results. The NRC Safety Evaluation Report for the PARAGON nuclear data methodology (Reference 7) states:

"...the staff considers the new PARAGON code to be well qualified as a stand-alone code replacement for the PHOENIX-P lattice code, wherever the PHOENIX-P code is used in NRC-approved methodologies."

The NEXUS methodology is a re-parameterization of the PARAGON nuclear data output and a new reconstruction approach within the ANC core simulator code to simplify the use of this code system for design use. NEXUS has been implemented in the PARAGON/ANC code system for design use. Specifically, the NEXUS methodology has been implemented in the parameterization of PARAGON cross sections for input to ANC and also in ANC to reconstruct those cross sections at specific nodal conditions. The NEXUS methodology provides a linkage between PARAGON and ANC, establishing a new code system, while still using PARAGON.

Later versions of the ANC code (i.e. Version 9) require cross section data which is generated using the PARAGON neutron transport code. The NEXUS/ANC system is a version of the PARAGON/ANC system in that all nuclear data is based on PARAGON and only the methods of representing this data in ANC have been changed from the version of PARAGON/ANC described in Reference 4. As such, NEXUS methodology will be used as a substitute to the PHOENIX-P when SNC moves to a later version of ANC (i.e. ANC Version 9).

Topical Report WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," Revision 0, verifies the accuracy of NEXUS for cross section representation. As part of this topic report, different assembly types were calculated using NEXUS, which include the following: both Westinghouse and Combustion Engineering assembly types; UO_2 fuel and mixed oxide fuel; and integral fuel burnable absorber (IFBA), wet annular burnable absorber (WABA), and Gd_2O_3 burnable absorbers. The k-infinity results from these calculations were compared directly to PARAGON k-infinities at corresponding conditions. The comparisons demonstrated that the NEXUS cross sections are accurate over the range of temperatures, boron concentrations, and power levels expected to be encountered in PWR core calculations.

The NEXUS methodology has been licensed within the PARAGON/ANC code system. The NRC Safety Evaluation Report for the NEXUS nuclear data methodology (Reference 4) states:

“The NRC staff has reviewed the TR submitted by Westinghouse and determined that the NEXUS/ANC code system is adequate to replace the PARAGON/ANC code system wherever the latter is used in NRC-approved methodologies. The NRC staff, furthermore, has determined that NEXUS/ANC is qualified as a stand-alone code system so long as its use is limited by the provisions listed in Section 4.0 of this safety evaluation.”

The provisions listed in Section 4.0 state that NEXUS/ANC shall be limited to uranium-fueled PWR applications (i.e. not MOX fuel). As such, NEXUS/ANC is acceptable for use for FNP.

The other methodologies used to determine operating limits referenced in the COLR will remain applicable with the use of NEXUS. Future changes to the values of these operating limits are controlled by the 10 CFR 50.59 process, may only be developed using NRC approved methodologies, and must remain consistent with all applicable plant safety analysis limits addressed in the Updated Final Safety Analysis Report. The consequences of the design basis accidents will continue to be calculated using NRC accepted methodologies. Assumptions used in the safety analysis are not changed by the use of NEXUS. Safety analysis acceptance criteria are not being altered by the use of NEXUS.

4. Regulatory Evaluation

4.1 Significant Hazards Consideration

The proposed amendment would revise the Joseph M. Farley Nuclear Plant (FNP), Technical Specification (TS) 5.6.5, “Core Operating Limits Report (COLR),” to reference and allow use of Westinghouse WCAP-16045-P-A, Addendum 1-A, “Qualification of the NEXUS Nuclear Data Methodology” (Reference 1) to determine core operating limits. The proposed TS change will allow WCAP-16045-P-A, Addendum 1-A, as an alternative methodology to WCAP-11596-P-A for determining the refueling boron concentration for Limiting Condition of Operation (LCO) 3.9.1, “Boron Concentration” by adding a reference to TS 5.6.5.b. This TS section lists methods which are used to determine core operating limits. The proposed addition will allow the use of NEXUS nuclear data methodology in preparation of the COLR. This methodology was approved by the Nuclear Regulatory Commission (NRC), by letter dated February 23, 2007, as a standalone code system so long as its use is limited by the provisions listed in Section 4.0 of the Safety Evaluation provided in the February 23, 2007 letter. SNC agrees to all conditions in the NRC Safety Evaluation.

As required by 10 CFR 50.91(a), Southern Nuclear Operating Company (SNC) has evaluated the proposed changes to the FNP TS using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration. An analysis of the issue of no significant hazards consideration is presented below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed additional TS reference is not an accident initiator. The assumed accident initiators are not changed by the introduction of the proposed TS reference. Therefore, operation of the facility in accordance with the proposed amendment will not involve a significant increase in the probability of an accident previously evaluated.

The use of the proposed method will not significantly impact the fission product inventory and transport assumptions in the current licensing basis analyses. Therefore, the radiological consequences of an accident previously evaluated will not increase.

The use of the proposed methods will not increase the consequences of an accident because Limiting Conditions for Operation will continue to restrict operation to within the regions that provide acceptable results, and Reactor Protective System trip setpoints will restrict plant transients so that the consequences of accidents will not exceed the safety analysis acceptance criteria.

Therefore, it is concluded that the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

This change does not alter the physical plant or modes of operation. The plant systems will not be operated outside of design limits, no different equipment will be operated, and system interfaces will not change. Thus, the proposed change does not adversely affect the design function or operation of any structures, systems, and components important to safety.

Therefore, it is concluded that the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

All safety limit values and Limited Conditions of Operability values given in the COLR will be calculated based on NRC approved methodologies. These values ensure the plant is operating in accordance with the TS.

Therefore, it is concluded that the proposed change does not involve a significant reduction in a margin of safety.

Based upon the above analysis, SNC concludes that the proposed amendment does not involve a significant hazards consideration, under the standards set forth in 10 CFR 50.92(c), "Issuance of Amendment," and accordingly, a finding of "no significant hazards consideration" is justified.

4.2 Applicable Regulatory Requirements / Criteria

Technical Specification 5.6.5 requires that the core operating limits are established and documented in the Core Operating Limits Reports prior to each reload cycle. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC. WCAP-11596-P-A, which describes the methodology for the PHOENIX-P/ANC system, is identified as the approved analytical method for determining the LCO 3.9.1 refueling boron concentration given in the COLR.

WCAP-16045-P-A, Addendum 1-A, which describes the methodology for the NEXUS/ANC system, has been reviewed and approved by the NRC as an acceptable methodology. As NEXUS/ANC is a replacement to PHOENIX-P/ANC, SNC is seeking approval of the NEXUS/ANC code system to be used as an acceptable methodology to use in preparation of the COLR.

4.3 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5. Environmental Considerations

SNC has evaluated the proposed change and determine that the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental

impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6. References

1. WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," August 2007.
2. WCAP-16045-NP-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," August 2007.
3. Safety Evaluation by the Office of Nuclear Reactor Regulation for WCAP-16045-P, Addendum 1, "Qualification of the NEXUS Nuclear Data Methodology" (TAC No. MC9606) (ADAMS Accession Number ML070320398).
4. WCAP-16045-P-A, "Qualification of the Two-Dimensional Transport Code PARAGON," August 2004 (ADAMS Accession Number ML042250345).
5. WCAP-11596-P-A, "Qualification of the Phoenix-P/ANC Nuclear Design System for Pressurized Water Reactor Cores," June 1988.
6. NRC letter from F. Rinaldi to D. N. Morey (SNC), "Joseph M. Farley Nuclear Plant, Units 1 and 2 Re: Issuance of Amendments (TAC Nos. MB1906 and MB1907)," December 4, 2001 (ADAMS Accession Number ML013400451).
7. Safety Evaluation by the Office of Nuclear Reactor Regulation for WCAP-16045-P, Revision 0, "Qualification of the Two-Dimensional Transport Code PARAGON" (TAC No. MB8040) (ADAMS Accession Number ML040780402).

**Joseph M. Farley Nuclear Plant – Units 1 and 2
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Enclosure 2

Markup of Proposed Technical Specification

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

3a. WCAP-12945-P-A, Volume 1, Revision 2, and Volumes 2 through 5, Revision 1, "Code Qualification Document for Best Estimate LOCA Analysis," March 1998 (W Proprietary).

3b. WCAP-12610-P-A, "Vantage+ Fuel Assembly Reference Core Report," April 1995 (W Proprietary).

(Methodology for LCO 3.2.1 - Heat Flux Hot Channel Factor and LCO 3.4.1-RCS Pressure, Temperature and Flow Departure from Nucleate Boiling Limits.)

3c. WCAP-16009-P-A, "Realistic Large Break LOCA Evaluation Methodology Using Automated Statistical Treatment of Uncertainty Method (ASTRUM)" M.E. Nissley, et al., January 2005 (Proprietary).

4. WCAP-8745-P-A, "Design Bases for the Thermal Overpower ΔT and Thermal Overtemperature ΔT Trip Functions," September 1986 (Westinghouse Proprietary)

(Methodology for Overpower ΔT and Thermal Overtemperature ΔT Trip Functions)

5. WCAP-14750-P-A Revision 1, "RCS Flow Verification Using Elbow Taps at Westinghouse 3-Loop PWRs. (Westinghouse Proprietary)

(Methodology for minimum RCS flow determination using the elbow tap measurement.)

6a. WCAP-11596-P-A, "Qualification of the Phoenix-P/ANC Nuclear Design System for Pressurized Water Reactor Cores," June 1988

6b. WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," August 2007.

(Methodology for LCO 3.9.1 - Boron Concentration. Methods 6a and 6b are direct replacements for each other; therefore, either may be used.)

7. WCAP-11397-P-A "Revised Thermal Design Procedure," April 1989

(Methodology for LCO 2.1.1-Reactor Core Safety Limits, LCO 3.4.1-RCS Pressure, Temperature and Flow Departure from Nucleate Boiling Limits.)

(continued)

**Joseph M. Farley Nuclear Plant – Units 1 and 2
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Enclosure 3

Clean Typed Pages for Technical Specification

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

- 3a. WCAP-12945-P-A, Volume 1, Revision 2, and Volumes 2 through 5, Revision 1, "Code Qualification Document for Best Estimate LOCA Analysis," March 1998 (W Proprietary).
- 3b. WCAP-12610-P-A, "Vantage+ Fuel Assembly Reference Core Report," April 1995 (W Proprietary).

(Methodology for LCO 3.2.1 - Heat Flux Hot Channel Factor and LCO 3.4.1-RCS Pressure, Temperature and Flow Departure from Nucleate Boiling Limits.)
- 3c. WCAP-16009-P-A, "Realistic Large Break LOCA Evaluation Methodology Using Automated Statistical Treatment of Uncertainty Method (ASTRUM)" M.E. Nissley, et al., January 2005 (Proprietary).
- 4. WCAP-8745-P-A, "Design Bases for the Thermal Overpower ΔT and Thermal Overtemperature ΔT Trip Functions," September 1986 (Westinghouse Proprietary)

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- 6a. WCAP-11596-P-A, "Qualification of the Phoenix-P/ANC Nuclear Design System for Pressurized Water Reactor Cores," June 1988
- 6b. WCAP-16045-P-A, Addendum 1-A, "Qualification of the NEXUS Nuclear Data Methodology," August 2007.

(Methodology for LCO 3.9.1 - Boron Concentration. Methods 6a and 6b are direct replacements for each other; therefore, either may be used.)
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(Methodology for LCO 2.1.1-Reactor Core Safety Limits, LCO 3.4.1-RCS Pressure, Temperature and Flow Departure from Nucleate Boiling Limits.)

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