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

January 18, 2012

Mr. M. J. Ajluni
Nuclear Licensing Director
Southern Nuclear Operating Company, Inc.
40 Inverness Center Parkway
Post Office Box 1295, Bin-038
Birmingham, AL 35201-1295

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2, SAFETY EVALUATION OF RELIEF REQUEST FNP-ISI-ALT-11, VERSION 1.0, FOR THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL (TAC NOS. ME5908 AND ME5909)

Dear Mr. Ajluni:

By letter to the U.S. Nuclear Regulatory Commission (NRC), dated March 22, 2011, Southern Nuclear Operating Company, Inc. (the licensee) submitted request for relief FNP-ISI-ALT-11, Version 1, from certain requirements of the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code) at the Joseph M. Farley Nuclear Plant, Units 1 and 2. The proposed alternative would allow certain piping, tubing, fittings, valves, and supports to remain as the current design configuration and to replace these items with items constructed to ASME Section III (Code Class1).

The NRC staff has determined that requiring the licensee to upgrade the affected piping, valves, instrumentation tubing lines, and associated components described in the alternative to ASME Code, Section III, Class 1 requirements would result in a hardship or unusual difficulty because the scope of the change would require substantial time and resources to upgrade the current design configuration without a compensating increase in the level of quality and safety. The NRC staff finds that the licensee's proposed alternatives provide reasonable assurance of structural integrity and are acceptable, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(a)(3)(ii). Therefore, relief is granted pursuant to 10 CFR 50.55a(3)(ii) for the remainder of the fourth 10-year inservice inspection interval. All other ASME Code, Section XI, requirements for which relief was not specifically requested and

authorized herein by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

for

Nancy Salgado, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-348 and 50-364

Enclosure:
Safety Evaluation

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST NO. FNP-ISI-ALT-11, VERSION 1

FOR PRESSURIZER UPPER LEVEL INSTRUMENTATION

AND OTHER LINES AND ASSOCIATED COMPONENTS

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-348 AND 50-364

1.0 INTRODUCTION

By letter dated March 22, 2011 (Agencywide Documents Access & Management System (ADAMS) ML110820259), Southern Nuclear Operating Company, Inc. (SNC, the licensee), submitted relief request (RR) No. FNP-ISI-ALT-11, Version 1, related to the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code), Section XI, requirements for the fourth 10-year interval inservice inspection (ISI) program for the Joseph M. Farley Nuclear Plant (FNP), Units 1 and 2. The proposed alternative would allow the licensee to treat the existing ASME Code, Section III, Class 2 small diameter piping tubing, fitting, valves and their supports as Class 2 components in lieu of upgrading them to Class 1 components. The alternative proposal is applicable to the components connected to the reactor coolant system pressurizer above the normal water level in the pressurizer. Based on analysis, these components were misclassified as Code Class 2, hence the need for an upgrade to Code Class 1 category.

The regulations in Part 50, Section 50.55a(c) of Title 10 of the *Code of Federal Regulations* (10 CFR) require that reactor coolant pressure boundary components meet the ASME Code, Section III, requirements for Class 1 components. Specifically, the licensee's alternative applies to the ASME Code, Section III, as-designed and installed Class 2 portions of the reactor coolant system including piping, instrument lines, and valves connected to the pressurizer above the normal water level in the pressurizer. The proposed alternative would allow these lines, piping, and valves to remain as designed and constructed as Class 2.

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a require that components which are part of the reactor coolant pressure boundary meet the requirements for Class 1 components in Section III of the ASME Code, except where alternatives have been authorized by the Commission pursuant to paragraphs (a)(3)(i) or (a)(3)(ii) of 10 CFR 50.55a. In proposing alternatives, the licensee must

demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety, or (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Section 50.55a allows the Commission to authorize alternatives upon making the necessary findings.

In addition, 10 CFR 50.55a(c) states, in part:

> (c) Reactor coolant pressure boundary
>
> (1) Components which are part of the reactor coolant pressure boundary must meet the requirements for Class 1 components in Section III of the ASME Boiler and Pressure Vessel Code, except as provided in paragraphs (c)(2), (c)(3), and (c)(4) of this section.
>
> (2) Components which are connected to the reactor coolant system and are part of the reactor coolant pressure boundary as defined in § 50.2 need not meet the requirements of paragraph (c)(1) of this section, *Provided*:
> (i) In the event of postulated failure of the component during normal reactor operation, the reactor can be shut down and cooled down in an orderly manner, assuming makeup is provided by the reactor coolant makeup system; . . .

In a letter dated April 3, 2000, Westinghouse Electric Company issued its Nuclear Safety Advisory Letter (NSAL), "NSAL-00-006: Pressurizer Upper Level Instrument Safety Classification." This letter identified an issue where a break in the instrument lines for the upper (steam side) pressurizer level instruments may result in a rapid depressurization of the reactor coolant system (RCS) sufficient to cause an emergency core cooling system actuation. Westinghouse NSAL 07-09, Revision 01, "Safety Classification of Small Lines Connected to the Pressurizer Steam Space," expanded the scope of the aforementioned letter to include all instrument and other small lines connected to the pressurizer steam space. In these letters, Westinghouse indicated that the aforementioned instrument lines should be classified as ASME Code Class 1. Given that a break in these lines would not result in a shutdown and cooldown "in an orderly manner," the licensee determined that the existing affected ASME Code Class 2 instrument and other lines and associated components connected to the pressurizer steam space should be classified as ASME Code Class 1, in accordance with 10 CFR 50.55a(c). The licensee has determined that these existing affected Class 2 lines are not in compliance with 10 CFR 50.55a(c). Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee proposes to allow these lines and valves to remain as designed and constructed as Class 2.

The NRC has approved similar requests for relief regarding classification of pressurizer upper level piping and components for Wolf Creek Generating Station on May 31, 2005 (ADAMS Accession No. ML051520256), and for Seabrook Station on April 19, 2009 (ADAMS Accession No. ML091120034).

3.0 EVALUATION OF RELIEF REQUEST

3.1 Items for Which Relief is Requested

The affected lines are shown in Table 1 for FNP Unit 1 and Table 2 for FNP Unit 2 of the licensee's March 22, 2011, submittal. Attachments 5 and 6 and Attachments 7 and 8 of the licensee's March 22, 2011, submittal include Piping and Instrumentation Drawings (P&IDs) for FNP Units 1 and 2, respectively. The P&IDs provide details for the pressurizer portion of the RCS at FNP Units 1 and 2.

3.2 Code Requirement

The regulations in 10 CFR 50.55a(c) require that components which are part of the reactor coolant pressure boundary must meet the requirements for Class 1 components in Section III of the ASME Code.

3.3 Proposed Alternative

The licensee stated that the piping, fittings, tubing, valves and supporting elements identified in the request were constructed using the ASME Code, Section III, Subsection NC (Class 2) requirements. Construction as used in Section III, Division 1, included requirements for materials, design, fabrication, examination, testing, inspection, and certification required in the manufacture and installation of items.

The proposed alternative would allow the piping, tubing, and valves to remain as designed and constructed (ASME Code Class 2) in lieu of upgrading the current design configuration and replacing these items with items constructed to ASME Section III, Subsection NB (ASME Code Class 1).

3.4 Basis for Relief

The licensee stated that upgrading the affected components to ASME Code, Section III, Subsection NB (Class 1), would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety because the scope of the change would require substantial time and resources to upgrade the plant design configuration and perform plant modification work to replace the affected items. Additionally, a modification of this type would result in personnel radiation exposure, and radioactive waste, and would not result in a compensating increase in the level of quality or safety. The estimated time for the potential removal and re-installation of the affected piping, tubing and valves would be approximately 3,000 man-hours.

Although the components identified in the alternative meet most of the Section III requirements for Class 1 items, they do not meet all Section III requirements for Class 1 items. For example, the valves do not meet the component certification requirements of Section III, which require that a valve be stamped by an appropriate ASME Certificate Holder with the Class 1 identification mark and be certified by an appropriate ASME Certificate Holder on the Section III Code Data Report (Form NPV-1) for being in full compliance with Code Class 1 requirements.

To justify the proposed alternative, the licensee compared the ASME Code, Section III requirements in Subsection NB for Class 1 components to the design rules in Subsection NC for Class 2 components using the applicable editions and addenda of the ASME Code. The comparison considered each Article of Subsections NB and NC (covering the areas of materials, design, fabrication and installation, examination, testing, protecting against overpressure, nameplates, stamping and reports) and determined whether the differences were technical, quality, or administrative requirements. Differences in Section III administrative requirements such as certification and stamping, furnishing of a Stress Report, and marking of items, were determined to not reduce the quality or safety of the items and would only affect literal compliance with the ASME Code. Minimal differences were identified in quality requirements between Class 1 and Class 2 because most quality requirements are contained in the General Requirements Subsection NA and are equally applicable to both Class 1 and Class 2. No differences in quality requirements were identified that would reduce the quality or safety of the items.

There were some differences in technical requirements between Class 1 and Class 2 in the areas of piping and tubing material examination (NB/NC-2510), valve design (NB/NC-3500), and piping design (NB/NC-3600). However, replacing the affected items would provide minimal increase in quality and safety, as demonstrated in the following paragraphs discussing the technical requirement differences.

For piping and tubing material examination, the later provisions of NB-2501(a) in the summer 1983 Addenda exempted 1 inch and less seamless pipe, tubes and fittings from the examination requirements of NB-2500, thus making the Class 1 rules the same as Class 2 and eliminating the technical difference between Class 1 and Class 2. For piping design, there are considerable differences between Class 1 and Class 2 requirements but these differences were eliminated by the Summer 1975 Addenda change to NB-3630(d). This change allowed 1 inch and smaller Class 1 piping to be designed to NC-3600, thus making the Class 1 design rules the same as Class 2. The NRC accepted the Summer 1975 Addenda for use in 10 CFR 50.55a. The licensee claimed that any ASME Code, Section III, Class 2 piping of 1" nominal pipe size (NPS) and less that was designed and installed after the year 1975 would meet the ASME Code, Section III, Class 1 criteria for 1" NPS and less.

In the area of valve design, the requirements in NB-3500 are considerably different than the requirements in NC-3500. However, the small valves that are affected have been evaluated to the applicable requirements in NB-3500 and all the valves were found to meet the technical requirements of NB-3500 applicable to small valves. Therefore, there are no technical differences between the installed Class 2 valves and the requirements for Class 1 valves that would reduce the assurance that the valves would perform their intended safety function. No increases in quality and safety would be realized by replacing the valves with valves constructed to Class 1 requirements.

The licensee in the March 22, 2011, submittal provided information regarding the condensate receiver that is attached to pressurizer upper level instrumentation lines. The following paragraphs provide licensee's description of the condensate receiver design:

> "Each pressurizer upper level instrumentation line has a condensate receiver which is shown in Attachment 1 of the March 22, 2011 submittal. Each receiver is made from a

1-1/2 inch SA-182, 6000# socket welded tee with appropriate insert reducing bushings to mate with the 3/4 inch inlet piping and the 3/8 inch outlet tubing.

Because the tee is greater than 1 inch in diameter, the NB-2510(a) rules for material examination (discussed above) do not apply. Per ASME Section III, NB·2551, a Class 1 tee is required to have a liquid penetrant (PT) examination of all accessible internal and external surfaces, in addition to any other examinations required by the material specification for SA·182 material. The PT is not a requirement for a Class 2 tee. This is considered insignificant, because after installation the three attachment welds received a PT examination per the requirements of ASME Section III, NC-5250. This PT would have examined a minimum of a 1 inch area of the tee at each of the three welds. Therefore, for a 1-1/2 inch tee the most critical areas were examined. Additionally, the tees and bushings have been in service for approximately 30 years with no evidence of problems during normal operation or during ASME Section XI pressure testing.

Because the tee is greater than 1 inch in diameter, the NB·3630(d) rules for piping design (discussed above) do not apply. The significance of this is minimal because the Farley piping specification material requirements and pressure class requirements for Class 1 and Class 2 fittings are the same. In conclusion, there are no technical differences between the installed Class 2 condensate receivers and the requirements for Class 1 condensate receivers that would reduce the assurance that they will perform their intended safety function. Therefore, no increase in quality and safety would be realized by replacing the condensates receivers with those constructed to Class 1 requirements."

A discussion was provided on support elements in which the licensee stated that it compared the design requirements between the ASME Code, Section III Class 1 and Class 2 piping support elements. The ASME Code, Section III Class 2, 1971 Edition Paragraph NC-3674 requires that the support elements are to be designed per Paragraphs 120 and 121 of the American National Standards Institute (ANSI) B31.1, "Power Piping," 1967 Edition. Whereas, the ASME Code, Section III Class 1 support elements are to be designed per the ANSI B31.7, "Nuclear Power Piping," 1969 Edition. After comparing the ANSI B31.1 and ANSI B31.7 Codes, the licensee concluded that there is no technical difference that would affect the quality of the support elements.

Based on the above discussions, the licensee concluded that for the piping, tubing, valves, the support elements, and the condensate receiver identified in this request, the technical, quality, and administrative differences between the Section III ASME Code requirements for Class 1 and Class 2 construction would have minimal impact on the ability of these items to perform their intended safety function. Upgrading the affected components stated above would result in hardship and, therefore, under the provisions of 10 CFR 50.55a(a)a(3)(ii), the licensee requested that the NRC approve the proposed alternative.

3.5 Staff's Evaluation

The piping and instrument piping (including tubing) identified in the relief request were designed and analyzed in accordance with the 1971 Edition with the Summer 1971 Addenda of Section III of the ASME Code. A provision added in the Summer 1975 Addendum to the 1974 Edition in subparagraph NB-3630(d) allowed Code Class 2 rules to be used for Code Class 1 design for

piping less than or equal to 1 inch in size. The NRC staff, by letter dated July 28, 2011, in a request for additional information (RAI), RAI 4, requested the licensee to confirm that an as-built piping and instrument piping (including tubing) was performed by the licensee with respect to piping and instrument piping (including tubing) assembly. In its response dated August 16, 2011, the licensee stated that it performed an as-built code piping and instrument piping (including tubing) using the Summer 1983 Addenda of the ASME Section III, Code. The licensee's contention was that if the piping design and construction was done after the Summer 1975, the design criteria and the installation requirements of ASME Code, Section III, Class 2 piping would have met the requirements of ASME Code, Section III, Class 1 piping. The NRC staff finds that the differences between Section III requirements for Class 1 and Class 2 construction would have minimal impact on the affected Code Class 2 piping design and material examination requirements. Hence, the NRC staff concludes that the structural integrity of the existing Code Class 2 piping is not compromised and that the Code Class 2 requirements provide an equivalent level of safety to Code Class 1 requirements provided in the ASME Code.

The NRC staff compared the differences in the non-destructive examination (NDE) criteria between ASME Code, Section III, Code Class 1 and Code Class 2. In this context, by letter dated July 28, 2011, in RAI-2, the NRC staff identified that the ASME Code, Section III, 1971 Edition through Summer 1971 Addenda, Subsection NC, Paragraph NC-5222 requires radiography for the full penetration butt welds in Code Class 2 piping systems. Whereas Paragraph NB-5220 in ASME Code, Section III, requires radiography and surface examination on 1/2 inch on each side of the full penetration butt welds in Code Class 1 piping systems. Surface quality of the weld is to be verified on Code Class 1 piping due to fatigue considerations. However, surface examination i.e., penetrant testing (PT), was not performed on the existing (if any) Code Class 2 small bore full penetration pipe butt welds identified in the proposed alternative. In its response to RAI-2, the licensee, by a letter dated August 16, 2011, stated that the small bore piping systems addressed in the proposed alternative are socket weld joints and as such there are no circumferential butt welds. The NRC staff accepts this response and considers that this issue is resolved.

Regarding the valve design aspects related to the relief request, the licensee indicated that while the requirements for Class 1 small valves are considerably different than the requirements for Code Class 2 small valves, the affected valves were evaluated to the Code Class 1 requirements and found to meet all of the technical requirements found in NB-3500. Regarding the material examination facets of the affected piping and components, the later provisions of NB-2501(a) in the Summer 1983 Addenda exempted 1 inch and less seamless pipe, tubes and fittings from the examination requirements of NB-2500, thus there are no technical differences between Code Class 1 and Code Class 2 rules. Given this, had the design and construction of these systems been completed at a later date, the current Code Class 2 configuration would meet the Code Class 1 material examination requirements of NB-2500. Based on the considerations above, the NRC staff finds for the affected Class 2 valves and material examination requirements, the Class 2 requirements provide an equivalent level of safety to Code Class 1 requirements provided in the ASME Code.

The NRC staff noted that each pressurizer level instrumentation line has a condensate receiver of 1.5 inches in diameter socket welded tee component. Paragraph NB-2551 in the ASME Code, Section III Class 1 systems requires PT examination of all accessible internal and external surfaces is required for piping with NPS greater than 1 inch in diameter. PT is not required for ASME Code, Section III, Class 2 systems. However, during the installation of the

condensate receiver, per Paragraph NC-5250 in ASME Code, Section III, Class 2, a PT examination was performed of a 1 inch area of the tee at each of the three weld joints and the results were acceptable. The weld joints in the condensate receiver are more critical, and are more prone to cracking than the surrounding base metal. The critical weld joints in the condensate receiver thus far exhibited no service related degradation during the normal operation or during the ASME Section XI pressure testing, and the original fabrication welds of the condensate receiver did not show any rejectable (per the ASME Section III, Code Class 2) indications. The NRC staff also noted that the length of the condensate receiver is smaller than the remaining pressurizer level instrumentation line. Furthermore, the staff noted that there are very little technical differences in fabrication, installation, examination, and material quality between the installed Code Class 2 condensate receiver and Code Class 1 condensate receiver. Therefore, the staff concludes that the existing Code Class 2 condensate receiver would maintain its functionality during the current fourth in-service inspection (ISI) interval. The proposed alternative for retaining the Code Class 2 status for the subject condensate receiver in pressurizer level instrumentation line does not affect its safety and quality.

Regarding the piping support elements, the staff reviewed the technical differences between the ASME Code, Section III Class 1 and Class 2 piping support elements. In this context, by letter dated July 28, 2011, the staff requested that the licensee provide a brief summary of the comparison of the technical attributes (design, fabrication and examination) between the ASME Code Section III Code Class 1 and Code Class 2 piping support elements. In a letter dated August 16, 2011, the licensee stated that it compared the design differences between American ANSI B.31.1 (applicable to Code Class 2 piping support elements) and ANSI B.31.7 (applicable to Code Class 1 piping support elements). The licensees compared the following attributes in the design criteria: (a) loads on the piping support elements; (b) allowable stresses; and (c) spacing of the piping support elements. Based on the review, the NRC staff noted that for the support elements for piping with 1 inch NPS and smaller, the design requirements addressed in the original construction Code Class 2 (ANSI B31.1) are similar to Code Class 1 (ANSI B31.7). Absence of any service induced degradation in the existing piping support elements indicated that the proposed alternative for retaining the Code Class 2 status for the subject piping support elements does not affect the safety and quality of the piping system.

The overall effect of the above differences in fabrication, installation, examination, and material quality is the potential for a slight decrease in the quality of these lines and associated components, compared to those components constructed to meet ASME Code Class 1 requirements. However, from the preceding discussions, the NRC staff concludes that for the piping, tubing, valves, condensate receiver and piping support elements identified in this request, the differences between ASME Code, Section III requirements for Class 1 and Class 2 construction would have minimal impact on the ability of these items to perform their intended safety function and the proposed alternative provides reasonable assurance of structural integrity of the subject components. Therefore, authorizing this alternative to allow continued operation with the current design configuration would not adversely impact the health and safety of the public.

4.0 CONCLUSION

Based on the above review, the NRC staff has determined that requiring the licensee to upgrade the affected piping, valves, instrumentation tubing lines and associated components described in the alternative to ASME Code, Section III, Class 1 requirements would result in a

hardship or unusual difficulty because the scope of the change would require substantial time and resources to upgrade the current design configuration without a compensating increase in the level of quality and safety. The licensee's proposed alternatives provide reasonable assurance of structural integrity of the pressurizer upper level instrument and other lines and associated components, as designed and constructed. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternatives in relief request FNP-ISI-ALT-11, Version 1, is authorized for the fourth 10-year ISI interval of the FNP, Units 1 and 2. All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Ganesh Cheruvenki

Date: January 18, 2012

authorized herein by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

/RA/ by VSreenivas Acting for

Nancy Salgado, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-348 and 50-364

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Safety Evaluation

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