July 26, 2002

Mr. D. N. Morey
Vice President - Farley Project
Southern Nuclear Operating
Company, Inc.
Post Office Box 1295
Birmingham, Alabama 35201-1295

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT (FARLEY), UNIT 2 RE: REQUEST FOR RELIEF NO. RR-46 FOR THE THIRD 10-YEAR INSERVICE INSPECTION (ISI) INTERVAL (TAC NO. MB33244)

Dear Mr. Morey:

By letter dated August 15, 2001, you submitted Relief Request No. RR-46 for the Farley, Unit 2, third 10-year ISI program, that requested relief from the examination volume of the steam generator nozzle to safe-end and safe-end to elbow welds on the primary side and the feedwater nozzle to shell welds on the secondary side.

We have reviewed and evaluated the information provided in Relief Request No. RR-46 against the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, and Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g). The staff has determined that Code compliance is impractical. Therefore, the staff grants relief for the subject welds pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval for Farley, Unit 2. Our Safety Evaluation is enclosed.

Sincerely,

/RA/

John A. Nakoski, Section Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-364

Enclosure: As stated

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

RELIEF REQUEST NO. RR-46

JOSEPH M. FARLEY NUCLEAR PLANT, UNIT 2

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

DOCKET NO. 50-364

1.0 INTRODUCTION

By letter dated August 15, 2001, Southern Nuclear Operating Company (SNC) requested relief from the examination volume of the steam generator nozzle to safe-end and safe-end to elbow welds on the primary side and the feedwater nozzle to shell welds on the secondary side.

The inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the applicant demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The inservice inspection Code of record for the Joseph M. Farley Nuclear Plant (Farley), Unit 2, third 10-year ISI interval is the 1989 Edition of the ASME B&PV Code. NRC Safety Evaluation dated March 20, 1997, approved an early update for the Farley, Unit 2 ISI and IST program plan interval start and end date, and Code Edition.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information will be submitted to the Commission in support of that determination and a request must be made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and/or may impose alternative requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

2.0 CODE REQUIREMENTS (as stated)

> Category B-F, Item No. B5.70, Table IWB-2500-1 of ASME Section XI requires a volumetric and surface examination of pressure retaining dissimilar metal welds. Category B-J, Item No. B9.11 requires a volumetric and surface examination of pressure retaining circumferential welds. The applicable examination volume for both categories is shown in Figure IWB-2500-8. Section XI, Article I-2200 applies to these welds and requires that ultrasonic examination of vessel welds, less than or equal to two inches in thickness, and all piping welds be conducted in accordance with Appendix III. Appendix III-3230 requires full coverage of the examination volume from four directions. ASME Section XI[,] Appendix III, Supplement 4, requires that when scanning for reflectors oriented transverse (perpendicular) to the weld seam in austenitic and dissimilar metal welds, that examinations be performed in two directions along the axis of the weld such that a minimum area from 1/2-inch from one side of the weld crown to 1/2-inch from the other side of the weld crown (including the crown) be examined.
>
> Category C-B, Item No. C2.21, requires a volumetric and surface examination of nozzle to shell welds in vessels. The applicable examination volume is shown in Figure IWC-2500-4(a). Section XI, Article I-2100 requires ultrasonic examination of vessel welds greater than 2 inches in thickness to be conducted in accordance with Article 4 of Section V as supplemented by Table I-2000-1. Article T-441.3.2.5 requires scanning with angle beam search units both at right angles to the weld axis and along the weld axis. Wherever feasible, each examination shall be performed in two directions. T-441.3.2.6 and T-441.3.2.7 describe the scanning requirements for reflectors oriented parallel and transverse to the weld.

3.0 LICENSEE'S CODE RELIEF REQUEST (as stated)

> Complete coverage cannot be obtained for the code required examination volume.

3.1 System/Components for Which Relief is Requested

The licensee has requested relief for the following: steam generator nozzle to safe-end welds and the safe-end to elbow welds on the primary side and the feedwater nozzle to shell welds on the secondary side. This request applies to the new steam generators installed during refueling outage 2R14. Specific welds are identified in the table below.

ASME Section XI Category/ Item No.	Identification No.	Description	Limitation	Approximate Percentage
B-F/B5.7-0	APRI-4100-25RDM	Safe-end to Inlet Nozzle	One-sided examination due to nozzle configuration	75%
B-F/B5.7-0	APRI-4100-26RDM	Outlet Nozzle to Safe-end	One-sided examination due to nozzle configuration	75%
B-J/B9.11	APRI-4100-4R	Elbow to Safe-end	Taper of Safe-end	71%
B-J/B9.11	APRI-4100-5R	Safe-end to Elbow	Taper of Safe-end	71%
B-F/B5.70	APRI-4200-25RDM	Safe-end to Inlet Nozzle	One-sided examination due to nozzle configuration	75%
B-F/B5.70	APRI-4300-24RDM	Outlet Nozzle to Safe-end	One-sided examination due to nozzle configuration	75%
B-J/B9.11	APRI-4200-4R	Elbow to Safe-end	Taper of Safe-end	71%
B-J/B9.11	APRI-4200-5R	Safe-end to Elbow	Taper of Safe-end	71%
B-F/B5.70	APRI-4300-23RDM	Safe-end to Inlet Nozzle	One-sided examination due to nozzle configuration	75%
B-F/B5.70	APRI-4200-26RDM	Outlet Nozzle to Safe-end	One-sided examination due to nozzle configuration	75%
B-J/B9.11	APRI-4300-4R	Elbow to Safe-end	Taper of Safe-end	71%

ASME Section XI Category/ Item No.	Identification No.	Description	Limitation	Approximate Percentage
B-J/B9.11	APRI-4300-5R	Safe-end to Elbow	Taper of Safe-end	71%
C-B/C2.21	APR2-3100-8	Steam Generator to Feedwater Nozzle Weld	One-sided examination due to nozzle configuration	75%
C-B/C2.21	APR2-3200-8	Steam Generator to Feedwater Nozzle Weld	One-sided examination due to nozzle configuration	75%
C-B/C2.21	APR2-3300-8	Steam Generator to Feedwater Nozzle Weld	One-sided examination due to nozzle configuration	75%

3.2 Licensee's Basis for Requesting Relief (as stated)

Complete volumetric examination of these welds requires access from both sides of the weld; however, examination is limited on the B-F welds (Nozzle to safe[-]end) by the nozzle geometry and on the B-J welds (safe[-]end to elbow) by the weld geometry configuration due to the difference in the thickness of the safe[-]end and the elbow (safe[-]end taper). Composite coverage for the B-F and the B-J welds is calculated to be 75% and 71% respectively. Typical examination volume coverages are shown in Attachment 3 (for clockwise/counter-clockwise scans on the weld and adjacent base material) and Attachment 4 (for axial scans) [of the licensee's submittal]. For the B-J weld, due to the cast material on the elbow, a refracted longitudinal (IT) wave was used. Maximum coverage was obtained by utilizing transducer wedges that compensated for the taper, from the safe[-]end side.

Complete examination of each Category C-B nozzle to shell weld requires access from both sides of the weld. Access from the nozzle side of the weld is limited by nozzle geometry, however, and only a partial examination is possible. Composite coverage is calculated to be 75%.

The examinations identified herein are being conducted to the fullest extent practical. Various techniques were evaluated for the piping welds such as bouncing the ultrasound off the inside surface; however, they are not practical for use on cast stainless steel components or with the use of refracted longitudinal wave techniques.

Compliance with Code coverage requirements which would require SNC to refabricate the nozzles to perform the Code required examinations is impractical; therefore, approval should be granted pursuant to 10 CFR 50.55a(g)(6)(i).

3.3 Licensee's Proposed Alternative Examination (as stated)

None. Coverage, to the maximum extent practical, has been obtained.

4.0 EVALUATION

The staff has reviewed the information concerning the third 10-year ISI program Request for Relief No. RR-46 for Farley, Unit 2 in SNC's letter dated August 15, 2001. The information provided by the licensee in support of the request for relief from Code requirements has been evaluated and the basis for disposition is documented below.

The staff noted that the examinations referenced in RR-46 are tied to the steam generator replacement for Farley, Unit 2. The preservice examinations for examination Categories B-F and C-B were performed in Fall 2000. The safe-end to elbow welds (Category B-J) were examined during the Spring 2001 steam generator replacement outage.

The materials of the Category B-F welds consist of a carbon steel nozzle, inconel nozzle buttering and weld, and a wrought austenitic safe-end. The staff noted that the ultrasonic examination of these dissimilar metal welds was performed per Appendix III of Section XI. The staff also agreed with the licensee that Supplement 10 of Appendix VIII for dissimilar metal welds has an implementation date of November 22, 2002. The licensee indicated that when examinations are performed later in the ISI interval after other Appendix VIII supplements are implemented, Farley will submit additional relief requests based on the examination results and requirements in effect at that time. The staff found this approach acceptable.

The Category B-J welds consist of wrought austenitic safe-end, and the static cast austenitic elbow. The ultrasonic examination requirements are different for each side of these welds: (a) the safe-end side was examined per Supplement 2 of Appendix VIII that was implemented on May 22, 2000, while (b) the elbow side was examined per Appendix III of Section XI since cast austenitic piping weld examinations per Supplement 9 does not have an implementation date assigned yet. For the examination of the safe-end side, the staff verified that the examination personnel were qualified for Supplement 2 of Appendix VIII examinations. The staff noted that Farley purchased a mock-up of this configuration to determine the best possible ultrasonic techniques for the maximum examination of these welds.

ASME Code, Section XI, Category B-F, Item No. B5.70, Table IWB-2500-1 requires a volumetric and surface examination of pressure retaining dissimilar metal welds and Category B-J, Item No. B9.11 requires a volumetric and surface examination of pressure retaining circumferential welds. The staff reviewed the licensee's drawing of their B-F welds and Attachments 3 and 4 of the submittal that provided drawings of the B-J welds. Based on the review of the licensee's drawings of the B-F and B-J welds, the staff agreed with the licensee that the Code examinations are limited on the B-F welds by the nozzle geometry (taper of nozzle) and on the B-J welds by the weld geometry configuration due to the difference in thickness of the safe end and the elbow (safe-end taper). Composite coverage for the B-F and B-J welds is calculated to be 75 percent and 71 percent, respectively. For the B-J weld, due to

the cast material on the elbow, a refracted longitudinal wave was used. Maximum coverage was obtained by utilizing transducer wedges that compensated for the taper, from the safe-end side.

The licensee noted that complete examination of each Category C-B nozzle to shell weld requires access from both sides of the weld. However, access from the nozzle side of the weld is limited by nozzle geometry and only a partial examination is possible. The licensee obtained a calculated composite coverage of 75 percent. The licensee indicated that Figure IWC 2500-4 (Nozzle to Vessel Welds) of Section XI of the 1989 version of the Code represents the geometry of the C-B welds. The staff reviewed this figure of the 1989 version of the Code and agreed that access from the nozzle side of the weld is limited by nozzle geometry and that the licensee conducted these examinations to the fullest extent possible.

To examine these welds as required by Code, the welds would have to be redesigned and modified resulting in a considerable burden on the licensee. Therefore, the Code volumetric examination requirements are impractical to perform. The licensee is conducting these examinations to the fullest extent practical. The licensee obtained a calculated composite coverage of 75 percent of the subject welds and the licensee completed 100 percent of the Code required surface examinations. These examinations should have detected any significant areas of degradation, if present, and therefore, provide reasonable assurance of continued structural integrity.

5.0 CONCLUSION

For Request for Relief RR-46, the staff concludes that to examine the subject welds as required by the Code, the subject components would have to be redesigned and modified resulting in a considerable burden on the licensee. Therefore, the staff concludes that the Code volumetric examination requirements are impractical to perform. The licensee conducted these examinations to the fullest extent practical. The licensee obtained significant coverage of the subject welds and completed 100 percent of the Code-required surface examinations. These examinations should have detected any significant areas of degradation, if present, and therefore, provide reasonable assurance of continued structural integrity. Therefore, relief is granted for the third interval pursuant to 10 CFR 50.55a(g)(6)(i).

Principal Contributor: M. Khanna

Date: July 26, 2002

Joseph M. Farley Nuclear Plant

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