April 17, 2003

Mr. J. B. Beasley, Jr.
Vice President - Farley Project
Southern Nuclear Operating
Company, Inc.
Post Office Box 1295
Birmingham, Alabama 35201-1295

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT (FARLEY), UNITS 1 AND 2 RE: REQUEST FOR RELIEF NO. RR-48 CONCERNING INSERVICE INSPECTION (ISI) REQUIREMENTS FOR THE CLASS 1 REACTOR VESSEL NOZZLES (TAC NOS. MB5179 AND MB5180)

Dear Mr. Beasley:

By a letter dated September 28, 2001, you submitted requests for relief RR-48 and RR-49 from certain requirements specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). The staff authorized the proposed alternative for RR-49 on July 26, 2002 (ML022070476). By letter dated April 30, 2002, as supplemented by letter dated March 10, 2003, you submitted a revised RR-48. Specifically, the revised RR-48 requested relief from ASME Code, Section XI, IWB-2500-1, Examination Category B-D, Item B3.100. In lieu of the ASME Code requirements, you proposed an alternative examination using enhanced remote visual equipment that is capable of a 1-mil (0.001 inch) wire resolution. The visual examination will be performed on essentially 100 percent of the inner nozzle radius. The request for relief is for the third 10-year interval at Farley, Units 1 and 2.

We have reviewed and evaluated the information provided by you in support of Relief Request No. RR-48 and determined that the proposed alternative for RR-48, as revised on April 30, 2002, and supplemented on March 10, 2003, will provide an acceptable level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(i), the staff authorizes the proposed alternative for the remainder of the third 10-year ISI interval (December 1, 1997, through November 30, 2007) at Farley, Units 1 and 2. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved remain applicable, including third party review by the Authorized Nuclear Inservice Inspector. 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 Nos. 50-348 and 50-364

Enclosure: As stated

cc w/encl: See next page

April 17, 2003

Mr. J. B. Beasley, Jr.
Vice President - Farley Project
Southern Nuclear Operating
Company, Inc.
Post Office Box 1295
Birmingham, Alabama 35201-1295

SUBJECT: JOSEPH M. FARLEY NUCLEAR PLANT (FARLEY), UNITS 1 AND 2 RE: REQUEST FOR RELIEF NO. RR-48 CONCERNING INSERVICE INSPECTION (ISI) REQUIREMENTS FOR THE CLASS 1 REACTOR VESSEL NOZZLES (TAC NOS. MB5179 AND MB5180)

Dear Mr. Beasley:

By a letter dated September 28, 2001, you submitted requests for relief RR-48 and RR-49 from certain requirements specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). The staff authorized the proposed alternative for RR-49 on July 26, 2002 (ML022070476). By letter dated April 30, 2002, as supplemented by letter dated March 10, 2003, you submitted a revised RR-48. Specifically, the revised RR-48 requested relief from ASME Code, Section XI, IWB-2500-1, Examination Category B-D, Item B3.100. In lieu of the ASME Code requirements, you proposed an alternative examination using enhanced remote visual equipment that is capable of a 1-mil (0.001 inch) wire resolution. The visual examination will be performed on essentially 100 percent of the inner nozzle radius. The request for relief is for the third 10-year interval at Farley, Units 1 and 2.

We have reviewed and evaluated the information provided by you in support of Relief Request No. RR-48 and determined that the proposed alternative for RR-48, as revised on April 30, 2002, and supplemented on March 10, 2003, will provide an acceptable level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(i), the staff authorizes the proposed alternative for the remainder of the third 10-year ISI interval (December 1, 1997, through November 30, 2007) at Farley, Units 1 and 2. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved remain applicable, including third party review by the Authorized Nuclear Inservice Inspector. 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 Nos. 50-348 and 50-364

Enclosure: As stated

cc w/encl: See next page

Distribution:

PUBLIC	JNakoski	FRinaldi	CHawes	OGC	DNaujock, DE
PDII-1 R/F	SMoore	GHill(4)	ACRS	BBonser,RII	TChan, DE
BSmith,EDO					

Document Name: C:\ORPCheckout\FileNET\ML031070429.wpd
ADAMS ACCESSION NUMBER: ML031070429 *No major changes to SE

OFFICE	PDII-1/PM	PDII-1/LA	DE/EMCB*	OGC	PDII-1/SC
NAME	FRinaldi	CHawes	Tchan	Scole(NLO)	JNakoski
DATE	4/7/03	4/7/03	3/26/03	4/14/03	4/17/03

OFFICIAL RECORD COPY

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

RELIEF REQUEST NO. RR-48

JOSEPH M. FARLEY NUCLEAR PLANT, UNITS 1 AND 2

SOUTHERN NUCLEAR OPERATING COMPANY, INC.

DOCKET NOS. 50-348 AND 50-364

1.0 INTRODUCTION

By a letter dated September 28, 2001, Southern Nuclear Operating Company, Inc. (SNC) submitted requests for relief RR-48 and RR-49 from the inservice inspection (ISI) requirements specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). The staff authorized the proposed alternative for RR-49 on July 26, 2002, (ML022070476). By letter dated April 30, 2002, as supplemented by letter dated March 10, 2003, SNC revised RR-48. Specifically, the revised RR-48 requested relief from the ASME Code, Section XI, IWB-2500-1, Examination Category B-D, Item B3.100. In lieu of the Code requirements, SNC proposed an alternative examination using enhanced remote visual equipment that is capable of a 1-mil (0.001 inch) wire resolution. The visual examination will be performed on essentially 100 percent of the inner nozzle radius. The subject relief request is for the third 10-year interval at Joseph M. Farley Nuclear Plant (Farley), Units 1 and 2.

2.0 REGULATORY REQUIREMENTS

The ISI of ASME Code Class 1, 2, and 3 components is 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 licensee 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 components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

3.0 TECHNICAL EVALUATION

3.1 Component Function/Description

This request covers a total of 12 Reactor Pressure Vessel (RPV) inner nozzle radii. The specific nozzles are:

Unit 1: ALA1-1100-17IR, -18IR, -19IR, -20IR, -21IR, and -22IR;

Unit 2: APR-1100-17IR, -18IR, -19IR, 20IR, -21IR, and -22IR.

3.2 Code Requirements for which Relief is Requested

The 1989 Edition of ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.100 requires a volumetric examination of the RPV inner nozzle radius section. Relief is requested from the requirements to perform the volumetric examination of the inner nozzle radii for the nozzles listed in Section 3.1 above.

3.3 Licensee's Proposed Alternative

The licensee proposes to perform a visual examination per the requirements of the approved Farley ISI, Non-destructive Examination (NDE) Program. The required visual coverage will be essentially 100-percent (greater than 90-percent for each nozzle) of the surface M-N as shown in Figure IWB-2500-7 (a) and (b) of 1989 Edition of ASME Section XI in lieu of the volumetric examinations required by Table IWB-2500-1, Examination Category B-D, Item B3.100 of ASME, Section XI.

The equipment will use the required lighting and magnification to detect a 0.001" (1 mil) wire. The camera operators will be trained to the use and control of the equipment. The examination will be performed remotely. The examination will be demonstrated with a resolution standard that will have the 0.001" (1 mil) wire in a holder that will be placed in the water. The resolution standard will be resolved at the minimum and maximum distance from the camera to the resolution standard, along with the lighting to be used during the examination. This resolution demonstration will be recorded, along with the examination on a video tape or similar permanent storage medium.

3.4 Licensee's Bases for Alternative (as stated)

> All nozzle forgings were nondestructively examined during fabrication and have previously been examined using inservice ultrasonic techniques specific to the nozzle configuration. No indication of fabrication defects or service related cracking has been detected by these examinations.

> Nozzle inner radius examinations are the only non-welded area requiring examination on the RPV. This requirement was deterministically made early in the development of ASME Section XI, and applied to 100% of nozzles welded with full penetration welds. Fatigue cracking is the only applicable degradation mechanism for the nozzle inner radius region. For FNP [Farley] nozzles, there is no significant thermal cycling during operation. Therefore, from a risk perspective there is no need to perform volumetric examination. No service related cracking has ever been discovered in any PWR [Pressurized Water Reactors] fleet plant nozzles. Southern Nuclear believes that application of a visual examination alternative for the RPV nozzle inner radius regions ensures an acceptable level of quality and safety.

3.5 Evaluation

In the mid 1970s, fatigue-initiated cracking was discovered in the nozzle inner radius section of feedwater nozzles of 18 Boiling Water Reactors (BWR) vessels. The cracks were found using visual examinations. Ultrasonic testing (UT) failed to reveal the presence of these cracks. The shortcomings with UT prompted the NRC to issue NUREG-0619, “BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking,” which modified inspection requirements for these components.

In NUREG-0619, the NRC staff concluded that UT of the vessel nozzle inner radius section involves complex geometries, long examination metal paths, and inherent UT beam spread, scatter, and attenuation. During the intervening years, improvements in UT technologies were introduced (e.g., computer modeling, tip diffraction, and phased array scanning) that improved the quality of the examination for this component. However, the area remains difficult to examine completely.

The NRC staff finds that even with vessel examinations using improved nondestructive examination (NDE) technology from the outside surface, the complex geometry of the RPV head nozzle inner radius sections prevents complete UT coverage. For the RPV head nozzles, the licensee proposed to perform an enhanced direct VT-1 visual examination (EVT) with “essentially 100-percent coverage,” in lieu of UT. The enhancement refers to using a procedure and personnel that have the capability of detecting a 1-mil wire standard, or equivalent, at 2 feet.

The demonstration provides assurance that an examiner would recognize a crack if one were to exist. The estimated coverage for each nozzle is provided in the licensee’s submittal dated March 10, 2003. The licensee indicated that measures to assure examination conditions, including adequate lighting, will be consistent with the conditions used for the demonstration of examiner competency.

The primary degradation mechanism in RPV nozzles is fatigue that produces hairline surface indications along the circumference of the nozzle at the inner radius section. The licensee will be using high magnification cameras that have demonstrated resolution capability of detecting a 1-mil wire or equivalent and will be performing the examination over essentially 100 percent (greater than 90 percent) of the nozzle inner radius surface area. Given the 1-mil resolution capability of the EVT, it is highly unlikely that the licensee would not detect detrimental flaws.

The staff has determined that the high resolution image from the camera, as demonstrated, will provide adequate assurance of structural integrity and may be used in lieu of UT for the inner nozzle radius region.

4.0 CONCLUSION

Based on the information provided in the licensee's submittal, the NRC staff has determined that the proposed alternative RR-48, as revised on April 30, 2002, and supplemented March 10, 2003, will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the proposed alternative for the remainder of the third 10-year ISI interval (December 1, 1997, through November 30, 2007) for Farley, Units 1 and 2. This authorization is limited to those components described in Section 2.1 above.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: D. Naujock

Date: April 17, 2003

Joseph M. Farley Nuclear Plant

cc:

Mr. Don E. Grissette
General Manager -
Southern Nuclear Operating Company
Post Office Box 470
Ashford, Alabama 36312

Mr. B. D. McKinney, Licensing Manager
Southern Nuclear Operating Company
Post Office Box 1295
Birmingham, Alabama 35201-1295

Mr. M. Stanford Blanton
Balch and Bingham Law Firm
Post Office Box 306
1710 Sixth Avenue North
Birmingham, Alabama 35201

Mr. J. D. Woodard
Executive Vice President
Southern Nuclear Operating Company
Post Office Box 1295
Birmingham, Alabama 35201

State Health Officer
Alabama Department of Public Health
434 Monroe Street
Montgomery, Alabama 36130-1701

Chairman
Houston County Commission
Post Office Box 6406
Dothan, Alabama 36302

Resident Inspector
U.S. Nuclear Regulatory Commission
7388 N. State Highway 95
Columbia, Alabama 36319

William D. Oldfield
SAER Supervisor
Southern Nuclear Operating Company
P. O. Box 470
Ashford, Alabama 36312