

March 16, 2000

Mr. James Scarola, Vice President  
Shearon Harris Nuclear Power Plant  
Carolina Power & Light Company  
Post Office Box 165, Mail Code: Zone 1  
New Hill, North Carolina 27562-0165

SUBJECT: EVALUATION OF ASME SECTION XI INSERVICE INSPECTION RELIEF  
REQUEST 2R1-013 - SHEARON HARRIS NUCLEAR POWER PLANT  
(TAC NO. MA7886)

Dear Mr. Scarola:

By letter dated December 20, 1999, you submitted relief request 2R1-013 for relief from certain requirements of the 1989 Edition of the American Society of Mechanical Engineers (ASME) Code, Section XI for the Harris Nuclear Plant (HNP). Specifically, you requested relief from performing at least 50% of the reactor vessel shell-to-flange weld examination by the end of the first inspection period, and requested relief to use ASME Code Case N-623 for 100% deferral of the shell-to-flange weld examination to the end of the inservice inspection (ISI) interval.

The staff has reviewed and evaluated your request as documented in the enclosed Safety Evaluation. The staff has determined that the proposed alternative to use Code Case N-623 for the reactor vessel shell-to-flange weld examination provides an acceptable level of quality and safety. The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval at HNP until such time as Code Case N-623 is incorporated into a future revision of Regulatory Guide (RG) 1.147. Upon issuance of the RG, you shall follow all provisions in Code Case N-623, including any exceptions or limitations discussed in the RG.

Sincerely,

*/RA/*

Richard P. Correia, Chief, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST 2R1-013

REACTOR VESSEL SHELL-TO-FLANGE WELD

CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

DOCKET NO. 50-400

1.0 INTRODUCTION

By letter dated December 20, 1999, Carolina Power and Light Company (the licensee) submitted a request for relief from the ASME Code Section XI nondestructive examination (NDE) requirements.

2.0 BACKGROUND

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2 and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(6)(g)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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) shall 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 Code of record for the Shearon Harris Nuclear Power Plant's second 10-year ISI interval is the 1989 Edition of Section XI of the ASME B&PV Code.

3.0 THE COMPONENT FOR WHICH RELIEF IS REQUESTED

Class 1 reactor vessel shell-to-flange weld (Category B-A)

3.1 APPLICABLE CODE REQUIREMENT FROM WHICH RELIEF IS REQUESTED (as stated):

The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI, 1989 Edition with no Addenda, Table IWB-2500-1, Examination Category B-A, requires inspection of the reactor vessel shell-to-flange weld. Partial deferral of the volumetric examination is permitted. Notes 3 and 4 in Table IWB-2500-1, Category B-A state, "If partial examinations are conducted from the flange face, the remaining volumetric examinations required to be conducted from the vessel wall may be performed at or near the end of each inspection interval. The examination of shell-to-flange welds may be performed during the first and third inspection periods in conjunction with the nozzle examinations of Exam. Cat. B-D (Program B). At least 50% of the shell-to-flange welds shall be examined by the end of the first inspection period, and the remainder by the end of the third inspection period."

Relief is requested from performing at least 50% of the shell-to-flange weld by the end of the first inspection period. Relief is requested to use ASME Code Case N-623 for 100% deferral of the shell-to-flange weld examination to the end of the inservice inspection interval.

3.2 LICENSEE'S BASIS FOR REQUESTING RELIEF (as stated):

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that compliance with the original examination requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The ASME Code Committee has approved Code Case N-623, "Deferral of Inspections of Shell-to-Flange and Head-to-Flange welds of a Reactor Vessel Section XI, Division 1." Code Case N-623 provides an alternative to costly and time consuming first period examinations. In Code Case N-623, the ASME Code Committee has stated that the Code Case may be used if the following conditions have been met:

- (a) No weld repair/replacement activities have ever been performed on the shell-to-flange or head-to-flange weld.
- (b) Neither the shell-to-flange weld nor head-to-flange weld contains identified flaws or relevant conditions that currently require successive inspections in accordance with IWB-2420(b).
- (c) The vessel is not in the first inspection interval.

The Harris Nuclear Plant (HNP) reactor vessel complies with these requirements. Therefore, this code case is applicable to HNP.

By performing the reactor vessel shell-to-flange weld examination at the end of the inspection interval, it can be performed with the same automated equipment used to

examine the remaining reactor vessel welds. This will provide a significant reduction in radiation exposure and cost associated with performing the examination.

### 3.3 LICENSEE'S PROPOSED ALTERNATIVE EXAMINATION (as stated):

Code Case N-623 is to be applied to the reactor vessel shell-to-flange weld. The required examination is to be performed at the end of the inspection interval.

### 3.4 LICENSEE'S TECHNICAL JUSTIFICATION FOR RELIEF REQUEST (as stated):

The proposed alternative provides an acceptable level of quality and safety since the shell-to-flange weld will still receive the same high quality examinations that have been required by the ASME Code Section XI since the reactor was placed in commercial service. The only change is that the shell-to-flange weld will be examined at the same time as the remainder of the reactor vessel welds, including the nozzle examinations of Examination Category B-D. Reactor vessel nozzle weld examinations are allowed to be deferred to the end of the interval by Code Case N-521, which is acceptable to the NRC staff for application as stated in NRC Regulatory Guide 1.147, Revision 12, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." No changes are being made to the volumes or areas of material that are examined, nor to the nondestructive examination (NDE) personnel qualifications. This relief request does not involve changes to NDE methods or acceptance criteria.

In addition, the following information should be considered. HNP is currently in the first period of the second inspection interval. The shell-to-flange weld was partially examined, as required, from the flange face during the first period of the first interval. This exam was conducted again at the end of the first interval in conjunction with the 10-year vessel examination. The weld was examined from the flange face as well as the vessel wall using both Code required techniques and Performance Demonstration Initiative (PDI) techniques. This will allow the examination schedule for this weld not to exceed the length of one inspection interval.

## 4.0 STAFF EVALUATION AND CONCLUSION

Section XI of the ASME Code, 1989 Edition, Table IWB-2500-1, requires that the reactor pressure vessel (RPV) shell-to-flange weld be volumetrically examined once each inspection interval. The footnotes to Table IWB-2500-1 provide partial deferrals for the subject weld. Footnote 3 specifies that during the first and second period, the examination may be performed from the flange face, and the remaining volumetric examinations required to be conducted from the vessel wall may be performed at or near the end of the inspection interval. Footnote 4 provides deferral of the shell-to-flange weld stating that the examinations may be performed during the first and third periods, provided at least 50% of the shell-to-flange weld be examined by the end of the first period, and the remainder by the end of the third inspection period.

The licensee proposes to follow the requirements of Code Case N-623 for the reactor vessel shell-to-flange weld. The staff finds the licensee meets the requirements listed in Code Case N-623 and that deferral of the weld examinations to the end of the inspection interval is supported by the operating history of the industry. Industry experience to date indicates that examinations performed on the RPVs' shell-to-flange weld have not identified any detrimental flaws or relevant conditions and that changing the schedule for examining this weld to the end

of the licensee's 10-year ISI interval will provide a suitable frequency for verifying the integrity of the subject weld. The subject weld will still receive the same examinations that have been required by the ASME Code Section XI since the reactor was placed in commercial service. The only change is that the RPV shell-to-flange weld examinations will be deferred to the end of the inspection interval without conducting partial examinations from the flange face earlier in the inspection interval. No changes are being made to the volumes or areas of material that are examined, nor to the NDE personnel qualifications. This relief request does not involve changes to NDE methods or acceptance criteria. In addition, the licensee partially examined the shell-to-flange weld from the flange face during the first period of the first interval, as required. This examination was conducted again at the end of the first interval in conjunction with the 10-year vessel examination. The weld was examined from the flange face as well as the vessel wall using both Code-required techniques and PDI techniques. This allows for the examination schedule for this weld to not exceed the length of one inspection interval.

The staff has determined that the licensee's proposed alternative to use Code Case N-623 for the reactor vessel shell-to-flange weld provides an acceptable level of quality and safety. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year ISI interval at the Shearon Harris Nuclear Power Plant, Unit 1 until such time as Code Case N-623 is incorporated into a future revision of Regulatory Guide (RG) 1.147. Upon issuance of the RG, the licensee will follow all provisions in Code Case N-623, including any exceptions or limitations discussed in the RG.

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Date: March 16, 2000

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