



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

July 13, 2012

Mr. William R. Gideon, Vice President  
Carolina Power & Light Company  
H. B. Robinson Steam Electric Plant,  
3581 West Entrance Road  
Hartsville, South Carolina 29550

SUBJECT: H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 – RELIEF  
REQUEST-6 FOR THE FIFTH 10-YEAR INTERVAL INSERVICE INSPECTION  
PROGRAM PLAN (TAC NO. ME8257)

Dear Mr. Gideon:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 14, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12082A009), as supplemented by letter dated May 10, 2012 (ADAMS Accession No. ML12138A010), Carolina Power & Light Company (the licensee), doing business as Progress Energy Carolinas, Inc., submitted Relief Request-6 for the Inservice Inspection (ISI) Program Plan for the fifth 10-year interval for the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP).

The relief requested approval to use a proposed alternative to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Table IWB-2500-1, for the required outside diameter surface examinations of the pressure retaining dissimilar metal welds in the reactor pressure vessel hot and cold leg nozzles at HBRSEP. Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(ii), the licensee requested to use proposed alternatives on the basis that the alternatives provide an acceptable level of quality and safety.

The fourth 10-year interval in HBRSEP began on February 19, 2002, and was scheduled to end on February 18, 2012. As allowed by ASME Section XI, IWA-2430(d)1 the licensee extended the fourth 10-year interval through July 20, 2012, to complete the refueling outage-27 which was postponed to January 18, 2012. The duration of proposed alternative is for the fifth 10-year ISI interval that begins on July 21, 2012, and ends on February 18, 2022.

As discussed with the licensee on July 9, 2012, the NRC staff is concerned with the amount of information provided in the submittal that required revision after review by and questions from the NRC staff, and your request for multiple concurrent reviews with a short review timeframe. The uncharacteristic inattention to detail observed in the submittal resulted in the need to focus limited resources to address mostly administrative issues. Additional attention to ensure a high quality submittal would allow for a more efficient use of review resources, and better ability of the NRC staff to accommodate requests for a shortened review timeframe.

The details of the NRC staff review are included in the enclosed safety evaluation. The NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii) and, therefore, is in compliance with the ASME Code requirements.

W. Gideon

- 2 -

Therefore, the licensee's proposed alternative is authorized in accordance with 10 CFR 50.55a(a)(3)(ii) for the fifth 10-year ISI interval at HBRSEP, which begins on July 21, 2012, and ends on February 18, 2022.

Sincerely,

***/RA by Eva Brown for/***

Douglas A. Broaddus, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-261

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
ON THE FIFTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

RELIEF REQUEST-6

CAROLINA POWER & LIGHT COMPANY

H.B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 14, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12082A009), as supplemented by letters dated May 10, 2012 (ADAMS Accession No. ML12138A010), Carolina Power & Light Company, doing business as Progress Energy Carolinas, Inc., submitted Relief Request (RR)-6 for the Inservice Inspection (ISI) Program Plan for the fifth 10-year Interval for the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP).

The relief requested approval to use a proposed alternative to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Table IWB-2500-1, related to the ASME Code Class 1 outside diameter (OD) surface examinations of the pressure retaining dissimilar metal (DM) welds in the reactor pressure vessel (RPV) hot and cold leg nozzles.

The fourth 10-year interval in HBRSEP began on February 19, 2002, and was scheduled to end on February 18, 2012. As allowed by ASME Section XI, IWA-2430(d)1 the licensee extended the fourth 10-year interval through July 20, 2012, to complete the refueling outage (RO)-27 which was postponed to January 18, 2012. The ASME Code of record for the fifth 10-year ISI interval at HBRSEP is the ASME Code, Section XI, 2007 Edition with 2008 Addenda. The duration of proposed alternative is for the fifth 10-year ISI interval that begins on July 21, 2012, and ends on February 18, 2022.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g)(4), specifies that ASME Code Class 1, 2, and 3, components (including supports) must meet the requirements, except for the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI 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), 12-months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

Paragraph 10 CFR 50.55a(a)(3) states, in part, that alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the NRC, if the licensee demonstrates (i) the proposed alternatives would provide an acceptable level of quality and safety or if (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee requested authorization of an alternative to the requirements of Table IWB-2500-1 of Section XI of the ASME Code pursuant to 10 CFR 50.55a(a)(3)(ii).

The NRC staff has previously authorized this alternative for HBRSEP for the fourth ISI 10-year interval on September 26, 2002, (ADAMS Accession No. ML0227006010).

### 3.0 TECHNICAL EVALUATION

The NRC staff has evaluated the information provided by the licensee in support of the request for relief from, or alternative to, the ASME Code requirements and the bases for disposition are documented below.

#### 3.1 ASME Code Requirements

Section XI, 2007 Edition with 2008 Addenda of the ASME Code, Table IWB-2500-1, Examination Category B-F, Item No. B5.10, requires volumetric and surface examinations of the RPV nozzle-to-safe end welds in accordance with Figure IWB-2500-8.

#### 3.2 Component for which Relief is Requested

Component description:

ASME Code Class:	Class 1
Examination Category:	B-F, Item No. B5.10, Table IWB-2500-1
Component:	RPV Hot and Cold Leg Nozzle-to-Safe End DM Butt Welds
System:	Reactor Coolant System

The components for which relief is requested are listed below:

<u>Weld Identification No.</u>	<u>Location</u>
CPL-107/1DM	Hot Leg "A"
CPL-107/14DM	Cold Leg "A"
CPL-107A/1DM	Hot Leg "B"
CPL-107A/14DM	Cold Leg "B"
CPL-107B/1DM	Hot Leg "C"
CPL-107B/14DM	Cold Leg "C"

### 3.3 Licensee's Basis for Relief Request

The licensee stated in the March 24, 2012, submittal that the examination of RPV nozzle-to-safe end welds was not considered as part of the original plant design, which occurred prior to issuance of the ASME Code, Section XI, ISI requirements. The access to the affected welds from the refueling cavity is significantly limited. Additionally, due to the configuration of the RPV nozzles as they penetrate the biological shield wall, the weld area accessible for the required examinations is approximately the top one-third of the weld OD surface.

The licensee stated that significant personnel safety hazards associated with the required surface examinations of the subject RPV nozzle-to-safe end welds are not commensurate with the benefits gained from performing such examination. The access to the affected welds from the refueling cavity involves entry into an area that is physically confining with elevated ambient temperatures. These ambient conditions, combined with the required use of personnel protective equipment, create the potential for heat stress and exhaustion. The licensee indicated that the detailed dose assessments have concluded that performance of the ASME Code, Section XI, required examination is not consistent with the principal of "As Low As Reasonably Achievable (ALARA)". For example, with an assumed area radiation dose rate of 600 milli roentgen equivalent man per hour (mRem/hr), the worker exposure for surface examinations of the six affected welds is estimated at approximately 7.5 Rem.

The licensee stated that a review of previous examination history supports the proposed alternative examinations in lieu of the ASME Code, Section XI, required surface examinations. The licensee performed a surface examination on the accessible portions of the subject welds during the second 10-year ISI interval and identified no indications. For the third 10-year ISI interval, (1) the NRC staff granted a relief from surface examination requirements on September 29, 2004 (ADAMS Accession No. ML042740082), and (2) the licensee performed a visual test (VT)-2 examination from the refueling floor through the access hatch.

The licensee stated that the subject DM welds as well as the safe end-to-pipe welds were volumetrically examined at the conclusion of the third 10-year ISI interval. The licensee identified two volumetric indications in the hot leg "B" safe end on the nozzle side, and one in the cold leg "C" nozzle side. The licensee evaluated the three volumetric indications in accordance with the ASME Code, Section XI, requirements and found them acceptable.

During (RO)-25, the fourth 10-year ISI interval, the licensee examined the DM welds in accordance with the Material Reliability Program - 139, "Material Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline," utilizing a phased array ultrasonic testing (UT) technique. The licensee identified volumetric indications in all three hot leg DM welds and the "B" loop on the cold leg DM weld, and the volumetric indications were validated as not inside diameter (ID)-surface connected by eddy current testing (ECT). The licensee scheduled successive examinations during the last outage of the fourth 10-year ISI interval, RO-27, and has planned mitigation activities during the first RO of the fifth 10-year ISI interval, RO-28.

### 3.4 Licensee's Proposed Alternative Examination

The licensee stated that as an alternative to the required surface examination, the VT-2 examinations will be conducted in accordance with requirements of IWA-5242 "Insulated Components" of the 2007 Edition with 2008 Addenda of the ASME Code, Section XI.

The licensee stated that the subject welds will be inspected as required by Section XI of the ASME Code. The licensee indicated that UT examinations will be conducted from the OD surface of the RPV nozzle during the fifth 10-year ISI interval and the examination will include the required weld volume (i.e., lower one-third as well as heat-affected zone). In addition, the licensee stated that subject welds are being examined, according to the requirements of 10 CFR 50.55a(g)(6)(ii)(F), which states, "Licensees of existing, operating pressurized water reactors as of July 21, 2011 shall implement the requirements of ASME Code Case N-770-1, subject to the conditions specified in paragraphs (g)(6)(ii)(F)(2) through (g)(6)(ii)(F)(10) of 10 CFR 50.55a, by the first refueling outage after August 22, 2011."

### 3.5 NRC Staff Evaluation

The NRC staff evaluated the technical aspects of RR-6 against the criteria contained in 10 CFR 50.55a(a)(3)(ii) related to the existence of a hardship or unusual difficulty without a compensating increase in quality or safety. The NRC staff finds the first criteria, hardship or unusual difficulty, to be self explanatory. The NRC staff finds that the second criteria can be met if the proposed alternative provides reasonable assurance of structural integrity or leak tightness of the subject components.

The licensee identified volumetric indications in all three RPV hot leg DM welds and the "B" loop of cold leg DM weld by the UT examinations performed from the ID surface during HBRSEP, fourth 10-year ISI interval. The surface examinations performed by ECT confirmed that the indications were not ID-surface connected. The licensee submitted RR-6 in accordance with the requirements of IWB-3132.3 of Section XI of the ASME Code, which states that the area containing flaw shall be subsequently reexamined in accordance with IWB-2420(b) and (c).

In the letter dated May 10, 2012, the licensee stated that the volumetric indications identified were validated as not ID surface connected. In addition, the licensee stated that during RO-27, the subject DM welds were examined in accordance with ASME Code Case N-770-1, as required by 10 CFR 50.55a(g)(6)(ii)(F). The licensee also stated that there was essentially no change in the indications between RO-25 and RO-27 (the last RO) in the fourth 10-year ISI interval.

The NRC staff evaluated the licensee's basis for hardship in performing the required ASME Code, Section XI, Table IWB-2500-1, OD surface examinations. The NRC staff has determined that the hardship for the licensee is the difficulties associated with accessing the outside surface of the nozzle welds from the refueling cavity, which involves entry into an area that is physically confining with elevated ambient temperatures. The required use of personnel protective equipment combined with working in a confined area with elevated ambient temperature create hazardous condition for personnel safety due to heat stress and exhaustion. In addition, the personnel would be subject to significant radiation exposure which the license estimated to be at approximately 7.5 Rem. Therefore, the NRC staff has determined that the

potential challenges (i.e., safety hazards and radiation exposure) that would be placed on the personnel to comply with the requirements result in hardship or unusual difficulty.

The NRC staff determined that the licensee will conduct VT-2 examinations in accordance with the requirements of IWA-5242 "Insulated Components" of Section XI of the ASME Code as an alternative to the required surface examination. The licensee complied with the requirements of 10 CFR 50.55a(g)(6)(ii)(F), in which the subject DM welds shall be examined in accordance with the ASME Code Case N-770-1 and the conditions specified in paragraphs (g)(6)(ii)(F)(2) through (g)(6)(ii)(F)(10) of 10 CFR 50.55a.

The NRC staff finds that the licensee's proposal will provide reasonable assurance of structural integrity or leak tightness of the subject components and, as a result, requiring the licensee to make a code compliant repair, as opposed to utilizing the proposed alternative will not result in a compensating increase in the level of quality and safety.

Based on the above, the NRC staff finds that the licensee's proposal meet both technical criteria contained in 10 CFR 50.55a(a)(3)(ii), i.e. the licensee has demonstrated that complying with the specified requirement will result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

#### 4.0 CONCLUSION

The NRC staff determines that the proposed alternative provides reasonable assurance of structural integrity or leak tightness of the subject component and that complying with the specified requirement will result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii). Therefore, the NRC staff authorizes the proposed alternative in RR-6 at HBRSEP, for the fifth 10-year ISI interval that begins on July 21, 2012, and ends on February 18, 2022.

All other ASME Section XI requirements for which relief was not specifically requested and authorized by the NRC staff will remain applicable including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Ali Rezai

Date of issuance: July 13, 2012

W. Gideon

- 2 -

Therefore, the licensee's proposed alternative is authorized in accordance with 10 CFR 50.55a(a)(3)(ii) for the fifth 10-year ISI interval at HBRSEP, which begins on July 21, 2012, and ends on February 18, 2022.

Sincerely,

***/RA by Eva Brown for/***

Douglas A. Broaddus, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-261

Enclosure:  
Safety Evaluation

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