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

October 1, 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-2 FOR THE FIFTH 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN (TAC NO. ME8253)

Dear Mr. Gideon:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 14, 2012 (Agencywide Documents Access and Management System Accession No. ML12082A009), as supplemented by letters dated June 19, 2012 (Accession No. ML12187A249) and July 26, 2012 (Accession No. ML12220A501), Carolina Power & Light Company (the licensee), doing business as Progress Energy Carolinas, Inc., submitted Relief Request-2, 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 licensee 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," for the regenerative heat exchanger 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 perform a visual testing (VT) - 3 general visual examination on the regenerative heat exchanger without insulation removal, once each inspection period, as an alternative examination to the required surface/volumetric and VT examinations on the basis that the alternative 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 that was postponed to January 18, 2012. The duration of the proposed alternative is for the fifth10-year ISI interval that began 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.

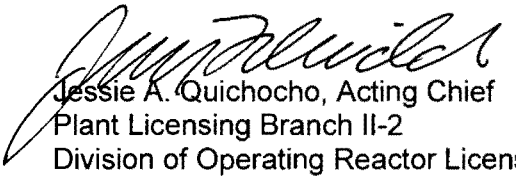
The details of the NRC staff review are included in the enclosed safety evaluation. The NRC staff determines that complying with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The NRC

staff concludes that the licensee proposed alternative provides reasonable assurance of structural integrity or leak tightness of the subject components and is in compliance with the ASME Code requirements.

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 began 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.

Sincerely,



Jessie A. Quichocho, Acting 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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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-2

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 June 19, 2012 (ADAMS Accession No. ML12187A249) and July 26, 2012 (ADAMS Accession No. ML12220A501), Carolina Power & Light Company (the licensee), doing business as Progress Energy Carolinas, Inc., submitted Relief Request-2, 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 licensee 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," for the regenerative heat exchanger (RHX) 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 perform a visual testing (VT)-3 general visual examination on the regenerative heat exchanger without insulation removal, once each inspection period, as an alternative examination to the required surface/volumetric and VT examinations on the basis that the alternative 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 that was postponed to January 18, 2012. The duration of the proposed alternative is for the fifth 10-year ISI interval that began on July 21, 2012, and ends on February 18, 2022.

2.0 REGULATORY EVALUATION

The ISI of the ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable addenda as required by 10 CFR 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 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) 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.

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

ASME Section XI, 2007 Edition with 2008 Addenda, Table IWB-2500-1, Examination Category B-B, "Pressure Retaining Welds in Vessels Other Than Reactor Vessels," Item Numbers B2.51, "Circumferential," and B2.80, "Tubesheet-to-Vessel Welds," require volumetric examination of the RHX vessel head weld and the tube sheet-to-head weld.

ASME Section XI, 2007 Edition with 2008 Addenda, Table IWB-2500-1, Examination Category B-D, "Full Penetration Welded Nozzles in Vessels - Inspection Program B," Item Numbers B3.150, "Nozzle-to-Vessel Welds," and B3.160, "Nozzle Inside Radius Section," require volumetric examination of the RHX nozzle shell welds and inside radius section.

ASME Section XI, 2007 Edition with 2008 Addenda, Table IWB-2500-1, Examination Category B-J, B9.21, "Circumferential Welds" (less than NPS 4), require surface examination of the inlet, outlet, and intermediate connecting piping welds between the shell courses.

ASME Section XI, 2007 Edition with 2008 Addenda, Table IWF-2500-1 Examination Category F-A, "Supports," Item Number F1.40, "Supports Other Than Piping Supports (Class 1, 2, 3, and MC)," requires VT-3 examination of all supports.

3.2 Component for which Relief is Requested

The components for which relief is requested from the volumetric, surface, and VT-3 visual examination requirements for the ASME Code Exam Category B-B, B-D, B-J, and F-A items are described in Table 1 "RHX Components" below.

RHX Components				
Component ID	**Component Description**	**ASME Category**	**ASME Item Number**	**Required Examination**
106/01	Head to Divider Assembly Weld	B-B	B2.51	Volumetric
106/02	Assembly Divider to Tubesheet Weld	B-B	B2.80	Volumetric
106/05	Head to Divider Assembly Weld	B-B	B2.51	Volumetric
106/06	Assembly Divider to Tubesheet Weld	B-B	B2.80	Volumetric
106/09	Head to Divider Assembly Weld	B-B	B2.51	Volumetric
106/10	Assembly Divider to Tubesheet Weld	B-B	B2.80	Volumetric
106/13	RHX to Nozzle	B-D	B3.150	Volumetric
106/13IR	RHX Nozzle Inner Radius	B-D	B3.160	Volumetric
106/14	RHX to Nozzle	B-D	B3.150	Volumetric
106/14IR	RHX Nozzle Inner Radius	B-D	B3.160	Volumetric
106/15	RHX to Nozzle	B-D	B3.150	Volumetric
106/15IR	RHX Nozzle Inner Radius	B-D	B3.160	Volumetric
106/16	RHX to Nozzle	B-D	B3.150	Volumetric
106/16IR	RHX Nozzle Inner Radius	B-D	B3.160	Volumetric
106/17	RHX to Nozzle	B-D	B3.150	Volumetric
106/17IR	RHX Nozzle Inner Radius	B-D	B3.160	Volumetric
106/18	RHX to Nozzle	B-D	B3.150	Volumetric
106/18IR	RHX Nozzle Inner Radius	B-D	B3.160	Volumetric
123/53	RHX Nozzle to Pipe	B-J	B9.21	Surface
123/54	RHX Nozzle to Pipe	B-J	B9.21	Surface
123/57	RHX Nozzle to Pipe	B-i	B9.21	Surface
123/58	RHX Nozzle to Pipe	B-J	B9.21	Surface
123/61	RHX Nozzle to Pipe	B-J	B9.21	Surface
123/62	Pipe to Elbow	B-J	B9.21	Surface
123A/48	Pipe to Elbow	B-J	B9.21	Surface
123A/50	RHX Nozzle to Pipe	B-J	B9.21	Surface
206/A	RHX Support	F-A	F1.40	VT-3
206/B	RHX Support	F-A	F1.40	VT-3
206/C	RHX Support	F-A	F1.40	VT-3
206/D	RHX Support	F-A	F1.40	VT-3
206/E	RHX Support	F-A	F1.40	VT-3
206/F	RHX Support	F-A	F1.40	VT-3

3.3 Licensee's Basis for Relief Request

The licensee requested relief for HBRSEP in accordance to 10 CFR 50.55a(a)(ii) on the basis that hardship and unusual difficulty exists, without a compensating increase in the level of quality and safety.

The licensee stated that radiation surveys in the RHX room identified general area dose rates of 1 to 2 roentgen equivalent man (rem)/hour, and heat exchanger contact dose rates of 3 to 4 rem/hour. As a result, significant worker exposures would result from the preparation for and performance of the ASME Code required examinations. In order to maintain occupational exposures as low as reasonably achievable (ALARA), the licensee requested relief from the ASME Code requirements.

The licensee also stated that the VT-2 examination performed each refueling outage during pressure testing provides reasonable assurance of structural integrity. The VT-2 can be

accomplished in less time versus the visual, surface, and associated volumetric examinations required by the ASME Code.

The ASME Code requirements require a hands-on application to perform surface and volumetric examinations that require scaffolding in addition to insulation removal and weld preparation. In HBRSEP, the asbestos insulation on the RHX is original insulation and would have to be replaced in its entirety based on the brittleness of the insulation.

ASME Section XI, 2007 Edition – 2008 Addenda, IWA-5242(a) states, "Essentially vertical surfaces of insulation need only be examined at the lowest elevation where leakage may be detectable. Essentially horizontal surfaces of insulation shall be examined at each insulation joint." IWA-5242(b) states, "When examining insulated components, the examination of the surrounding area (including floor areas or equipment surfaces located underneath the component) for evidence of leakage, or other areas to which such leakage may be channeled, shall be required." The VT-2 examination can be performed from a distance in a short period of time, thereby lowering radiation exposure to the examiner.

The licensee estimated the total dose associated by performing the ASME Code required examinations of the RHX to approximately 70 rem. The 70 rem total dose is based on approximately 30 rem estimated for preparation and examination, and 40 rem for insulation and scaffolding.

The licensee also stated that there are physical geometric restrictions associated with the RHX components that cause difficulty in the performance of ASME Code required examinations, specifically ultrasonic. For example, the nozzle-to-vessel welds and nozzle inside radius sections for the heat exchanger were not designed for ultrasonic examination from the outside diameter. The small diameter of the heat exchanger shell prevents performing ultrasonic examination of the components for which relief is requested. The ASME Code required volumetric examination on the heat exchanger head circumferential welds is limited due to the weld crown, radius of the closure caps, and the nozzles. The ASME Code required volumetric examination of the tubesheet welds is limited by the weld crown and is obstructed by a support clamp. The clamp must be removed prior to the examination of these welds.

3.4 Licensee's Proposed Alternative Examination

The licensee proposed to perform a VT-3 general visual examination of the RHX, without insulation removal, once each inspection period, as an alternative to the required surface/volumetric and visual examinations.

The licensee stated that the RHX pressure-retaining boundary is examined by VT-2 visual examination during pressure testing that is performed during each refueling outage in accordance with Table IWB-2500-1, Examination Category BP. This ASME Code required pressure testing provides reasonable assurance of structural integrity.

3.5 NRC Staff Evaluation

The NRC staff reviewed and evaluated the licensee's request pursuant to 10 CFR 50.55a(a)(3)(ii). The ASME Code requires volumetric examination of the RHX vessel head weld and the tube sheet-to-head weld, volumetric examination of the RHX nozzle shell welds and inside radius section, surface examination of the inlet, outlet, and intermediate connecting piping

welds between the shell courses, and VT-3 visual examination of all supports. All of these welds and supports are located inside the RHX room.

In the letter dated June 19, 2012, the licensee responded to the NRC staff request for additional information and clarified the following items regarding the (1) materials used for construction/stress relief of the wells; (2) inspection history; (3) description of possible degration mechanisms and (4) justification of the hardship involved if the inspections are performed according to the requirements of the ASME Code.

Regarding the materials of construction and any stress relief treatment that might have been performed after welding, the licensee stated that all materials in the subject RHX welds and supports, constructed in 1967, are austenitic stainless steel, built according to ASME Code Section III, Class C.[1] The base materials for the welds were ASTM SA213 Type 304, ASTM A182 F304, and ASTM A351 Grade CF8 castings. The typical weld material for these components would be type 308 weld materials. Since the materials were austenitic stainless steels, no stress relief was required; therefore, the NRC staff concludes that no stress relief was done after welding.

Regarding the inspection history for the subject RHX welds and supports, the Categories B-B and B-D welds were examined in both the 1st and 2nd 10-year ISI intervals before the first request for relief was submitted by the licensee and approved by the NRC staff on April 2, 1990 (ADAMS Accession No. 9004110080). For the visual, surface, and volumetric inspections performed in the 1st and 2nd intervals, no indications were identified. Also, the NRC staff previously authorized this alternative for HBRSEP for the third ISI 10-year interval on October 19, 1992 (ADAMS Accession No. ML020560394), and for the fourth ISI 10-year interval on September 26, 2002 (ADAMS Accession No. ML022700601).

Regarding the anticipated degradation mechanisms for the subject welds, the licensee concluded that fatigue is the only operative mechanism that could initiate or grow a flaw in these welds. Corrosion, stress corrosion cracking, and other potential mechanisms related to the materials interaction with the environment are not plausible degradation mechanisms because the chemistry of the reactor coolant water is controlled such that the levels of oxygen and other aggressive contaminants are kept below the threshold for any significant degradation.

Finally, regarding the hardship that would be involved if the inspections were performed, the licensee provided more details related to preparation for the inspections (estimates of radiation doses and asbestos insulation issues) as well as physical obstructions that would limit the coverage of the inspections, particularly the volumetric examinations.
The NRC staff reviewed the licensee's June 19, 2012 response and finds the hardship related to the performance of the ASME Code required examinations of the subject RHX welds and supports to be significant. The NRC staff noted that stainless steel vessels like the subject RHX vessel, manufactured to ASME Code requirements, have been free from any significant aging degradation in the pressurized light-water reactor environment. Furthermore, the NRC staff concludes that the only plausible aging mechanism is fatigue, which, the staff notes, is

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[1] HBRSEP was designed to the 1965 ASME Code. ASME Section III, 1965 edition, provided minimum construction requirements for vessels used in nuclear power plants. It classified pressure vessels as A, B, or C. Class A vessels are equivalent to Class 1 vessels of the current code. Class B is concerned with containment vessels, and Class C is concerned with vessels used in a nuclear power system not covered under Classes A or B.

monitored routinely by the licensee by temperature and pressure readings. Therefore, the NRC staff finds that there is a reduced significance for the ASME Code required examinations to ensure structural integrity in the subject RHX welds.

The ASME Code required examinations of the subject RHX welds and supports would result in personnel receiving excessive radiation exposure and potential exposure to asbestos insulation. Also, geometric restrictions associated with some of these welds would preclude performing the 100 percent of the ASME Code required volumetric examinations using ultrasonic techniques. Based on the ALARA concerns surrounding the performance of these examinations, the performance of the ASME Code required examinations associated with the RHX room would result in hardship and unusual difficulty for the licensee without a compensating increase in the level of quality and safety.

As an alternative examination to the ASME Code required surface/volumetric examination, the licensee proposes to perform a VT-2 visual examination for evidence of leakage during the system pressure testing each refueling outage in accordance with Table IWB-2500-1, Examination Category B-P. In addition, the licensee will perform a VT-3 general visual examination of the subject welds inside the RHX room, without insulation removal, once each inspection period (i.e., every 40 months) instead of the ASME Code required surface/volumetric examinations in each inspection interval (i.e., every 10 years).

Based on the above evaluation, the NRC staff finds that compliance with the ASME Code requirements would result in hardship for the licensee that would not be compensated by an increase in quality and safety. The licensee proposed alternative provides reasonable assurance of the continued inservice structural integrity of the subject welds inside the RHX room.

4.0 CONCLUSION

The NRC staff determines that complying with the requirements of the ASME Code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative provides reasonable assurance of structural integrity of the subject components. 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 licensee's proposed alternative for ISI-RR-02 at HBRSEP, for the fifth 10-year ISI interval that began 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: Margaret Audrain
Patrick Purtscher

Date of issuance: October 1, 2012

staff concludes that the licensee proposed alternative provides reasonable assurance of structural integrity or leak tightness of the subject components and is in compliance with the ASME Code requirements.

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 began 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.

Sincerely,

/RA/

Jessie A. Quichocho, Acting 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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