



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001
April 30, 2009

Chris L. Burton, Vice President
Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
Post Office Box 165, Mail Zone 1
New Hill, North Carolina 27562-0165

SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 – REQUEST FOR RELIEF NO. I3R-02 FOR THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL REGARDING THE CONTINUED USE OF A RISK-INFORMED INSERVICE INSPECTION PROGRAM (TAC NO. MD8742)

Dear Mr. Burton:

By letter dated April 29, 2008, as supplemented by letters dated June 19, 2008, and January 9, 2009, Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc. (the licensee), submitted Relief Request No. I3R-02 (RR I3R-02), which requested Nuclear Regulatory Commission (NRC) authorization to extend the risk-informed inservice inspection (RI-ISI) program plan to the third 10-year inservice inspection (ISI) interval at the Shearon Harris Nuclear Power Plant, Unit 1 (HNP).

The HNP RI-ISI program was initially submitted to the NRC staff in a letter dated April 27, 2005, and was reviewed and approved for use during the second 10-year ISI interval by letter dated March 8, 2006. The licensee's current submittal proposes to extend the same RI-ISI process originally authorized for the second 10-year ISI interval to the third 10-year ISI interval.

Based on the information provided in RR I3R-02, the NRC staff concluded that the proposed RI-ISI program will continue to provide an acceptable level of quality and safety and is, therefore, acceptable. Thus, pursuant to Title 10 of the *Code of Federal Regulations*, Part 50.55a(a)(3)(i), the NRC authorizes the ISI program alternatives proposed in RR I3R-02 for the third 10-year ISI interval at the Shearon Harris Nuclear Power Plant, Unit 1.

The NRC staff's safety evaluation is enclosed. If you have any questions regarding this matter, please contact Marlayna Vaaler at (301) 415-3178.

Sincerely,

A handwritten signature in black ink, appearing to read "T. H. Boyce".

Thomas H. Boyce, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-400

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

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

REQUEST FOR RELIEF NO. I3R-02 ON THE

RISK-INFORMED INSERVICE INSPECTION PROGRAM

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-400

1.0 INTRODUCTION

By letter dated April 29, 2008 (Reference 1), as supplemented by letters dated June 19, 2008 (Reference 2), and January 9, 2009 (Reference 3), Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc. (the licensee), submitted Relief Request No. I3R-02 (RR I3R-02) to extend the risk-informed inservice inspection (RI-ISI) program plan for the Shearon Harris Nuclear Power Plant, Unit 1 (HNP) for the third 10-year inservice inspection (ISI) interval.

Specifically, RR I3R-02 requests relief to implement the RI-ISI program as an alternative to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 2001 Edition through the 2003 Addenda, for Class 1, Code Category B-J and B-F and Class 2, Code Category C-F-1 and C-F-2 piping welds

The HNP RI-ISI program was initially submitted to the Nuclear Regulatory Commission (NRC or the Commission) in a letter dated April 27, 2005 (Reference 4), and was reviewed and approved by the NRC for use during the second 10-year ISI interval by letter dated March 8, 2006 (Reference 5). The licensee's April 29, 2008, submittal proposes to extend the same RI-ISI process originally authorized for the second 10-year ISI interval to the third 10-year ISI interval, which began on May 2, 2008, and ends on May 1, 2018.

The NRC staff evaluated the licensee's request for relief and the proposed alternative pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55a(a)(3)(i), in order to determine that the proposed alternative provides an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

Paragraph 50.55a(g) of 10 CFR requires that inservice inspection of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission

Enclosure

pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the NRC, if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The licensee's RI-ISI program from the second 10-year ISI interval was developed in accordance with the methodology contained in the Electric Power Research Institute Topical Report, EPRI TR-112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure, Final Report" (Reference 6), which was reviewed and approved by the NRC staff. In RR I3R-02, the licensee requests NRC authorization to allow continued use of the RI-ISI program that was previously approved in the second 10-year ISI interval for use during the third 10-year ISI interval at HNP. The scope of the RI-ISI program is limited to inspection of ASME Code Class 1 & 2 piping (i.e., Category B-F, B-J, C-F-1, and C-F-2 welds).

All risk-informed applications are assessed against Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment (PRA) in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" (Reference 7). RG 1.174 states that a PRA used in risk-informed regulation should be performed in a manner consistent with accepted practices.

In Regulatory Information Summary 2007-06, "Regulatory Guide 1.200 Implementation" (Reference 8), the NRC clarified that, for all risk-informed applications received after December 2007, the NRC staff will use RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (Reference 9), to determine whether the technical adequacy of the PRA used to support a submittal is consistent with accepted practices.

3.0 TECHNICAL EVALUATION

The licensee is requesting relief to use the proposed RI-ISI program plan, previously approved for the second 10-year ISI interval at HNP, during the third 10-year ISI interval in lieu of the ASME Code Section XI program for piping and piping welds. An acceptable RI-ISI program is expected to meet the five principles of risk-informed decision making discussed in RG 1.174:

- Principle 1: The proposed change meets the current regulations, unless it is explicitly related to the request for alternatives under 10 CFR 50.55a(a)(3) or a requested exemption or rule change, i.e., a "specific exemption" under 10 CFR 50.12 or a "petition for rulemaking" under 10 CFR 2.802.
- Principle 2: The proposed change is consistent with the defense-in-depth philosophy.
- Principle 3: The proposed change maintains sufficient safety margins.
- Principle 4: When proposed changes result in an increase in core damage frequency or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.
- Principle 5: The impact of the proposed change should be monitored by using performance measurement strategies.

Principle 1 is met in this relief request because an alternative ISI program may be authorized pursuant to 10 CFR 50.55a(3)(i). Principles 2 and 3 require assurance that the alternative program is consistent with the defense-in-depth philosophy and that sufficient safety margins are maintained, respectively. In the case of RR I3R-02, this assurance is based on application of an approved methodology, contained in EPRI TR-112657, Revision B-A, that meets the same defense-in-depth and safety margin criteria previously approved for HNP. The licensee stated that no changes to the evaluation methodology currently implemented under EPRI TR-112657, Revision B-A, are required as part of this interval update. Since the methodology used to develop the RI-ISI program for the third 10-year interval is unchanged from the methodology approved for development of the RI-ISI program used during the second 10-year ISI interval, principles 2 and 3 are met.

Principle 4, that any increase in core damage frequency and risk are small and consistent with the Commission's Safety Goal Policy Statement, requires an estimate of the overall change in risk. The change in risk estimate is dependent on the location of inspections in the proposed ISI program as compared to the location of inspections that would be examined under the requirements of the current ASME Code of Record, Section XI, if a RI-ISI program plan were not in place at HNP, as well as the technical adequacy of the HNP PRA.

The licensee stated that no changes were made to the evaluation methodology between the two 10-year ISI intervals, and the potential change in risk between the RI-ISI program proposed for implementation during the third 10-year ISI interval and the ASME Code, Section XI, requirements that existed prior to the implementation of the first RI-ISI program result in a risk impact of $1.51 \text{ E-}09$ (core damage frequency) and $4.59 \text{ E-}11$ (large early release frequency).

The NRC granted relief from selected requirements in the 1989 edition of the ASME Code, Section XI, which was the licensee's code of record when relief was originally requested to implement a RI-ISI program, in a letter dated March 8, 2006. The licensee stated in the April 29, 2008, letter that its code of record for the third 10-year ISI interval is the ASME Code, Section XI, 2001 Edition through 2003 Addenda. This change in the code of record may require changes to a few inspection locations for the third 10-year ISI interval ASME inspection program from which the licensee is requesting relief, as compared to those inspected during the second 10-year ISI interval under the RI-ISI program plan.

The minor changes in ASME Code required inspection locations may affect the risk calculation required by the RI-ISI methodology. The change in risk is evaluated using simple bounding calculations to assess the acceptability of the proposed program, and is not strongly dependent on the individual inspection locations selected for the RI-ISI program plan. This is due to the overall population of the locations selected for inspection being similar between the second and third 10-year ISI intervals, based on the ASME Code editions used at that time. Because the impact of the change is small, the minor inspection differences do not warrant the development of a new ASME inspection program, based on the ASME Code, Section XI, 2001 Edition through 2003 Addenda, to be used simply as a baseline model for calculating the change in risk. Therefore, the staff finds comparison of the risk estimate for the proposed RI-ISI program for the third 10-year ISI interval against the ASME program based on the code of record from which relief was granted during the second 10-year ISI interval appropriate and acceptable.

As discussed in RG 1.174, an acceptable change in risk evaluation (as well as the risk-ranking evaluation used to identify the most risk significant locations) requires the use of a PRA of

appropriate technical quality that models the as-built as well as as-operated and maintained plant. In the April 29, 2008, letter, the licensee reported that the 2001 HNP Internal Events PRA had an Industry Peer Review performed in June 2002, in accordance with the guidance contained in the Nuclear Energy Institute's (NEI's) NEI 00-02, "Probabilistic Risk Assessment Peer Review Process Guidance." The facts and observations generated during this review were resolved with subsequent model updates incorporating responses as applicable. In addition, the licensee stated that a gap assessment of the 2005 HNP Internal Events PRA was performed in April 2006 to ensure the HNP Internal Events PRA also meets RG 1.200.

Identified gaps in the HNP Internal Events PRA have been closed, except for one open item involving human error probability. Some human error probability pre-initiator events have not been updated to use a mean value versus a median value, which does not impact the RI-ISI submittal contained in RR I3R-02. The HNP PRA has been assessed according to RG 1.200, and the reported changes in risk values are less than the acceptance guidelines contained EPRI TR-112657, Revision B-A, which require that the change in core damage frequency be less than 1 E-06 and the change in large early release frequency be less than 1 E-07 per weld year. Therefore, the staff concludes that Principle 4 of risk-informed decision making as discussed in RG 1.174 has been met.

Principle 5 requires that the impact of the proposed change should be monitored using performance measurement strategies. The RI-ISI accomplishes Principle 5 using an update process that evaluates and modifies the program based on information developed from inspections performed in accordance with the RI-ISI program plan. In addition to the PRA update process discussed above, the licensee notes in its submittal that consequence evaluation, degradation mechanism assessment, risk ranking, and element selection steps are applied under the HNP RI-ISI program. The licensee noted that the number of inspection locations proposed for the third 10-year ISI interval under the RI-ISI program remained the same. The licensee also reviewed potential changes to the inspection requirements based on updating the ASME code of record for its third interval ISI program.

Because of recent ongoing issues related to degradation due to primary water stress corrosion cracking in B-F and B-J welds that contain alloy 600/82/182, the licensee will perform the visual and volumetric examinations as defined by the EPRI Materials Reliability Program (MRP) guidance contained in MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guidelines," and its revisions, throughout the inspection interval as an augmented examination program for dissimilar metal welds. These additional inspections will not be used to meet the total number of inspections required under the RI-ISI program. The NRC staff will review these inspections using an NRC inspection procedure described in Temporary Instruction 2515/172, "Reactor Coolant System Dissimilar Metal Butt Welds," which was issued on February 21, 2008.

The licensee stated that a review of design changes was conducted as part of developing the RI-ISI program plan and did not result in any change to the scope of the RI-ISI program. This review covered the period from October 2004 to February 2008. The proposed methodology used to address changes in the HNP RI-ISI program reported by the licensee is consistent with an approved program that would be expected to identify and adapt to changes in risk considerations. Therefore, the staff concludes the licensee has demonstrated that it has implemented a RI-ISI program that can be adequately measured using performance measurements strategies, and that Principle 5 is subsequently met.

Based on the above discussion, the staff finds that the five principles of risk-informed decision making are ensured under the proposed HNP RI-ISI program plan and, therefore, the relief requested in RR I3R-02 to implement the RI-ISI program as an alternative to the ASME Code, Section XI, 2001 Edition through the 2003 Addenda, for Class 1, Code Category B-J and B-F and Class 2, Code Category C-F-1 and C-F-2 piping welds for the third 10-year ISI inspection interval at HNP is acceptable.

4.0 CONCLUSION

Based on the information provided in the licensee's submittals, the NRC staff has determined that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative in RR I3R-02 is authorized for the third 10-year ISI interval at HNP. All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

5.0 REFERENCES

1. Letter from D.H. Corlett, Progress Energy, to U.S. Nuclear Regulatory Commission, "Third Interval Inservice Inspection Program Submittal," dated April 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081330461).
2. Letter from D.H. Corlett, Progress Energy, to U.S. Nuclear Regulatory Commission, "Supplement to Third Interval Inservice Inspection Relief Request I3R-02 Submittal," dated June 19, 2008 (ADAMS Accession No. ML081760292).
3. Letter from D.H. Corlett, Progress Energy, to U.S. Nuclear Regulatory Commission, "Response to Request for Additional Information Regarding Relief Request 13R-02 for the Third 10-Year Inservice Inspection Interval," dated January 9, 2009 (ADAMS Accession No. ML090220201).
4. Letter from T.C. Morton, Progress Energy, to U.S. Nuclear Regulatory Commission, "Relief Request to use a Risk-Informed Inservice Inspection Program for Class 1 and 2 Piping Welds," dated April 27, 2005 (ADAMS Accession No. ML051230314).
5. Letter from Michael L. Marshall, U.S. Regulatory Commission, to Conelius J. Gannon, Carolina Power & Light Company, "Shearon Harris Nuclear Power Plant, Unit 1 - Request for Relief from the Requirements of the ASME Code (TAC NO. MC6850)," dated March 8, 2006 (ADAMS Accession No. ML060390556).
6. EPRI TR-112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure, Final Report," December 1999 (ADAMS Accession No. ML013470102).
7. NRC Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant Specific Changes to the Licensing Basis," November 2002 (ADAMS Accession No. ML023240437).

8. Regulatory Information Summary 2007-06, "Regulatory Guide 1.200 Implementation," March 22, 2009 (ADAMS Accession No. ML070650428).
9. Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," January 2007 (ADAMS Accession No. ML070240001).

Principal Contributors: J. Collins
J. Patel

Date: April 30, 2009

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Chris L. Burton, Vice President
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Carolina Power & Light Company
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SUBJECT: SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 – REQUEST FOR RELIEF NO. I3R-02 FOR THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL REGARDING THE CONTINUED USE OF A RISK-INFORMED INSERVICE INSPECTION PROGRAM (TAC NO. MD8742)

Dear Mr. Burton:

By letter dated April 29, 2008, as supplemented by letters dated June 19, 2008, and January 9, 2009, Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc. (the licensee), submitted Relief Request No. I3R-02 (RR I3R-02), which requested Nuclear Regulatory Commission (NRC) authorization to extend the risk-informed inservice inspection (RI-ISI) program plan to the third 10-year inservice inspection (ISI) interval at the Shearon Harris Nuclear Power Plant, Unit 1 (HNP).

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The NRC staff's safety evaluation is enclosed. If you have any questions regarding this matter, please contact Marlayna Vaaler at (301) 415-3178.

Sincerely,

/RA/

Thomas H. Boyce, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure: Safety Evaluation

cc w/enclosure: Distribution via ListServ

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NRR-028

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