Progress Energy

MAY 27 2010

Serial: HNP-10-059
10 CFR 50.55a

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400/RENEWED LICENSE NO. NPF-63
REQUEST FOR APPROVAL OF PROPOSED ALTERNATIVE I3R-07
IN ACCORDANCE WITH 10 CFR 50.55a(a)(3)(i)
FOR THE THIRD TEN-YEAR INTERVAL INSERVICE INTERVAL

Ladies and Gentlemen:

In accordance with 10 CFR 50.55a(a)(3)(i), Carolina Power and Light Company (CP&L) doing business as Progress Energy Carolinas, Inc. (PEC), submits the following proposed alternative to the inservice inspection Code requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."

This request is applicable to Harris Nuclear Plant's (HNP) Third Ten-Year Inservice Inspection (ISI) Interval, in effect from May 2, 2007, through and including May 1, 2017. In accordance with 10 CFR 50.55a(a)(3)(i), the proposed alternative provides an acceptable level of quality and safety.

HNP requests approval of this request by October 2010, in support of HNP's scheduled refueling outage. Please note that the attached request was previously approved for HNP's Second Ten-Year ISI Interval.

This document contains no new regulatory commitments.

Please refer any question regarding this submittal to me at (919) 362-3137.

Sincerely,

D. H. Corlett
Supervisor – Licensing/Regulatory Programs
Harris Nuclear Plant

DHC/kms

Enclosure: 10 CFR 50.55a Proposed Alternative I3R-07

A047
NRR

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Harris Nuclear Plant
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cc: Mr. J. D. Austin, NRC Senior Resident Inspector, HNP
Mr. L. A. Reyes, NRC Regional Administrator, Region II
Ms. M. G. Vaaler, NRC Project Manager, HNP

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10 CFR 50.55a PROPOSED ALTERNATIVE I3R-07

Proposed Alternative
in Accordance with 10CFR50.55a(a)(3)(i)
--Alternative Provides Acceptable Level of Quality and Safety—

1.0 ASME CODE COMPONENTS AFFECTED

(a) Description:

Proposed alternative for six Pressure Retaining Dissimilar Metal Welds in Examination Category B-F
Item Number: B5.10, "Reactor Pressure Vessel NPS 4 or Larger Nozzle-to-Safe End Butt Welds"

(b) Function:

Pressure Retaining Dissimilar Metal (DSM) Welds in Reactor Pressure Vessel Nozzles

(c) Class:

ASME Code Class 1

(d) Component Numbers:

DISSIMILAR METAL WELDS, EXAMINATION CATEGORY B-F

Description	Weld No.	Nozzle/Piping Base Material	Weld
Loop A Piping to RPV Inlet Nozzle	RVNOZAI-N-01SE 1-RC-1-FW-4	SA508/SA351	82/182
Loop A Piping to RPV Outlet Nozzle	RVNOZAO-N-06SE 1-RC-1-FW-1	SA508/SA376	82/182
Loop B Piping to RPV Inlet Nozzle	RVNOZBI-N-03SE 1-RC-2-FW-4	SA508/SA351	82/182
Loop B Piping to RPV Outlet Nozzle	RVNOZBO-N-02SE 1-RC-2-FW-1	SA508/SA376	82/182
Loop C Piping to RPV Inlet Nozzle	RVNOZCI-N-05SE 1-RC-3-FW-4	SA508/SA351	82/182
Loop C Piping to RPV Outlet Nozzle	RVNOZCO-N-04SE 1-RC-3-FW-1	SA508/SA376	82/182

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(e) Previous 10-Year Interval Approval:

Relief Request 2R1-016 (SERIAL: HNP-05-130), submitted November 16, 2005, for Harris Nuclear Plant (HNP's) Second 10-Year Inservice Inspection Interval. NRC approval letter (TAC NO. MC8961) and associated Safety Evaluation dated April 7, 2006, for Relief Request 2R1-016.

2.0 APPLICABLE CODE EDITION AND ADDENDA

American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, 2001 Edition through the 2003 Addenda. In addition, as required by 10 CFR 50.55a, ASME Section XI, 2001 Edition is used for Appendix VIII.

3.0 APPLICABLE CODE REQUIREMENT

ASME Section XI, IWB-2500, "Examination and Pressure Test Requirements," specifies: "(a) Components shall be examined and tested as specified in Table IWB-2500-1. The method of examination for the components and parts of the pressure retaining boundaries shall comply with those tabulated in Table IWB-2500-1...."

Table IWB-2500-1, "Examination Categories," Examination Category B-F (Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles), requires that all welds in Item No. B5.10, "Reactor Vessel NPS 4 or Larger Nozzle-to-Safe End Butt Welds," meet the volumetric and surface examination requirements of Fig. No. IWB-2500-8. The Acceptance Standard is IWB-3514.

IWA -2232, "Ultrasonic Examination," requires that ultrasonic (UT) examinations be conducted in accordance with Appendix I, "Ultrasonic Examinations." Appendix I, I-2220, "Welds in Piping," requires that ultrasonic examination procedures, equipment, and personnel used to detect and size flaws in piping welds shall be qualified by performance demonstration in accordance with Appendix VIII with no other I-2000 applicable requirements.

HNP will be using NRC approved Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds," as an alternative to the qualification requirements for dissimilar metal piping welds specified in Appendix VIII, Supplement 10.

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4.0 REASON FOR REQUEST

This request is to allow the use of an alternative root mean square error (RMSE) value when depth sizing flaws that may be found during examination of the reactor vessel nozzle-to-piping welds from the inside surface. Appendix VIII, Supplement 10 and Code Case N-695 specify that examination procedures, equipment, and personnel are qualified for depth sizing when the RMSE of the flaw depth measurements, as compared to the true flaw depths, do not exceed 0.125 inches (3 mm).

This alternative is needed because:

a. To date, the examination vendor for HNP has not achieved the required RMSE of 0.125 inches for depth sizing.

b. The examination vendor for the HNP reactor vessel nozzle-to-pipe weld examinations has qualified for detection of axial flaws in accordance with Appendix VIII, Supplement 10, as demonstrated through the Electric Power Research Institute (EPRI) Performance Demonstration Initiative (PDI) Program, for Dissimilar Metal (DSM) nozzle-to-piping welds examined from the inside diameter (ID) surface provided the surface is machined or ground smooth with no exposed root reinforcement or counter-bore. However, the presence of surface roughness could result in uncertainty in the UT qualifications demonstrated for detection of axial flaws.

Note: The examination vendor has qualified for detection of circumferential flaws in accordance with Appendix VIII, Supplement 10, as demonstrated through the EPRI PDI Program, for DSM nozzle-to-piping welds examined from the ID surface.

5.0 PROPOSED ALTERNATIVE

5.1 Variation to 0.125 RMSE

HNP proposes to use a RMSE of 0.189 inches instead of the 0.125 inches required for Appendix VIII, Supplement 10 and Code Case N-695. In the event an indication is detected that requires depth sizing, the difference between the required RMSE and the demonstrated RMSE will be added to the measured through-wall extent for comparison with applicable ASME Section XI acceptance criteria and documented in the vendor summary report. If the examination vendor qualifies an improved depth sizing RMSE prior to the examination, the excess of that improved RMSE over the 0.125 inch RMSE requirement, if any, will be added to the measured value for comparison with applicable acceptance criteria.

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5.2 Inside Diameter UT Examinations Supplemented by Eddy-Current

HNP proposes using surface geometry profiling software (profilometry), in conjunction with a focused immersion ultrasonic transducer positioned to permit accurate profile data across the examination volume, to help the examiner confirm locations where the raw data indicates lack of transducer contact due to problematic surface geometry. Subsequently, eddy current examination will be used to supplement UT examinations where sufficient surface roughness could result in uncertainty in the applicability of the UT examination qualification to detect axial flaws.

These UT examinations, as supplemented by eddy current examinations and profilometry, will be conducted to the maximum extent practical and are subject to third party review by the Authorized Nuclear Inservice Inspector. It is anticipated that all six DSM nozzle-to-piping welds will be examined using this process.

The following eddy current techniques will be utilized:

- Up to two plus point probes applied circumferentially on the inside surface in scan increments of 0.08 inches circumferentially (for axial flaws) and 0.25 inches axially. Data will also be collected at 0.080 inch intervals on circumferential scans

- Automated systems for data collection and analysis

The target flaw size for the eddy current procedure is 0.28 inches long. This is within the ASME Code linear flaw acceptance standards of 0.45 inches for austenitic material and 0.625 inches for ferritic material as defined in the Code Tables for the outside surface.

6.0 BASIS FOR USE

6.1 Variation to 0.125 RMSE

The proposed alternative assures that the DSM nozzle-to-piping welds will be fully examined by procedures, personnel and equipment qualified by demonstration in all aspects except depth sizing. In the event that an indication is detected that requires depth sizing, a process will be used where the difference between the required RMSE and vendor demonstrated RMSE will be added to the measured through-wall depth for comparison with the Section IWB-3500 acceptance criteria. Since this process provides a reasonable assurance of structural integrity, an acceptable level of quality and safety are maintained.

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6.2 Inside Diameter UT Examinations Supplemented by Eddy Current

The eddy current technique was first used in the V. C. Summer reactor vessel primary nozzle examinations in 2000. The procedure was refined after its first use in 2000 by applying it to the V. C. Summer hot leg dissimilar metal weld section removed from service. The removed section had a number of primary water stress corrosion cracking flaws along with non-relevant indications resulting from metallurgical interface and surface geometry. Using these actual flaws and geometric conditions in the removed section to refine the technique, the vendor developed reliable flaw-screening criteria which allowed for the successful use of the procedure in the V. C. Summer 2002 and 2003 examinations.

Subsequently, the technique was successfully blind tested at the Swedish NDT Qualification Centre (SQC Kvalificeringscentrum AB) under the program, "Qualification of Equipment, Procedure and Personnel for Detection, Characterization and Sizing of Defects in Areas in Nozzle to Safe End Welds at Ringhals Unit 3 and 4," Hakan Soderstrand 7-10-03. The important qualification parameters for eddy current in the SQC blind tests (Ref. SQC Qualification Report No. 019AN03) were as follows:

- Defect types: fatigue and stress corrosion cracks, surface initiated
- Tilt: +/-10 degrees; Skew: +/-10 degrees
- Detection target size: IDSCC 6mm (0.25 inches) long
- Flaw Location: within l0mm (13/32 inch)
- Length of the planar flaw within a 70% confidence interval: +/-9mm (3/8 inch)
- False call rate: less than or equal to 20% for the personnel qualification tests

The use of ultrasonic profilometry and eddy current examination, with procedures and personnel qualified through the SQC blind tests to supplement Appendix VIII qualified ultrasonic procedures and personnel, provides additional assurance that any surface-breaking flaws that may be present will be detected in the presence of potential surface roughness. Since this process provides a reasonable assurance of structural integrity, an acceptable level of quality and safety are maintained.

7.0 DURATION OF PROPOSED ALTERNATIVE

This relief request is applicable to HNP's Third Ten-Year Inservice Inspection Interval, effective from May 2, 2007, through and including May 1, 2017.

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8.0 PRECEDENT

HNP received approval of this 10 CFR 50.55a request for the Second Ten-Year Inservice Inspection Interval on April 7, 2006 (ML060870043).

Initial approval for V.C. Summer's request to add the difference between the Code required RMSE value and the demonstrated accuracy to the measured indication depth was dated February 3, 2004 (ML040340450).

Approval for V. C. Summer's proposed alternative to use profilometry and eddy current testing to supplement the UT testing was dated November 21, 2006 (ML063070540).

This alternative is similar to and closely models the Farley Unit 2 request, as approved March 02, 2010 (ML100560334).

8.1 Changes in Circumstances

The subject welds are identified as Category B-F, Code Item B5.10 (Nozzle-to-Safe End Butt Welds) in the second interval relief request and in the current request. Although recent research has indicated that these are not safe-ends, the description is used for consistency in accordance with standard industry nomenclature.

Recent research has also identified typographical errors on some of the weld values provided in the second interval relief request (ML053290159), which were then included in the associated Safety Evaluation (ML060870043). The original weld data reports for all six of the welds addressed by this submittal have been reviewed to verify that the weld information presented in Section 1.0 (d) of this current submittal is accurate.