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September 11, 2014

10 CFR 50.55a

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC (Duke Energy)  
Catawba Nuclear Station, Units 1 and 2  
Docket Numbers 50-413 and 50-414  
Relief Request Serial Number 14-CN-001, Relief Request for Limited Volumetric  
Examination of Class 1 Welds

- References:
1. Letter from Duke Energy to NRC, same subject, dated February 20, 2014
  2. Letter from NRC to Duke Energy, Catawba Nuclear Station, Units 1 and 2 - Request for Additional Information Regarding Relief Request 14-CN-001 (TAC Nos. MF3527 and MF3528), dated August 15, 2014

The Reference 1 letter submitted Relief Request 14-CN-001 which requested relief from the volumetric examination coverage requirements of the ASME Code, Section XI. Reference 2 constitutes NRC Requests for Additional Information (RAIs) associated with the Reference 1 relief request.

The purpose of this letter is to formally respond to the Reference 2 RAIs. The response is included in the enclosure to this letter. The format of the response is to re-state each NRC RAI, followed by its associated response.

There are no regulatory commitments contained in this RAI response.

If you have any questions or require additional information, please contact L.J. Rudy at (803) 701-3084.

Very truly yours,

Kelvin Henderson  
Vice President, Catawba Nuclear Station

LJR/s

Enclosure

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LJR

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xc (with enclosure):

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## ENCLOSURE

REQUEST FOR ADDITIONAL INFORMATION REGARDING  
RELIEF REQUEST SERIAL NUMBER 14-CN-001  
LIMITED VOLUMETRIC EXAMINATION OF CLASS 1 WELDS  
DUKE ENERGY CAROLINAS, LLC  
CATAWBA NUCLEAR STATION, UNITS 1 AND 2  
DOCKET NOS. 50-413 AND 50-414

By letter dated February 20, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14052A387), Duke Energy Carolinas, LLC (Duke Energy) submitted relief request 14-CN-001. Pursuant to Title 10 of the *Code of Federal Regulations* Part 50.55a(g)(5)(iii), the request sought relief from the volumetric examination coverage requirements of the ASME Code, Section XI. In order for the NRC staff to complete its review of the relief request, the following additional information is requested.

### **RAI 1**

The NRC reviewed the volumetric examination coverage amounts obtained during the third 10-year inservice inspection (ISI) interval for the nine welds identified in Table 1 in Duke Energy's Relief Request 14-CN-001, and compared them to the coverage amounts obtained during the second 10-year ISI interval examinations. The NRC noted significant differences in the coverage amounts for the Catawba Nuclear Station (CNS), Units 1 and 2, pressurizer surge nozzle to head welds, as summarized in Table 1 below.

- a. Explain the rationale for using the different scan angles to examine the pressurizer surge nozzle to head welds for both CNS units that led to the significantly different amount of coverage observed for these welds.

### **Duke Energy Response**

The 2001 examinations were performed using procedure NDE-620 which utilized 60° and 70° refracted longitudinal wave beams. This technique is the same as qualified under ASME Section XI Appendix VIII PDI procedure PDI-UT-6 even though there is no requirement for this procedure to be qualified under Appendix VIII rules. These transducers used were large and the scanning area is obstructed by the Heater Tubes. The 60° dual 24mm X 42mm, and 70° dual 25mm X 15mm transducers are wide and long. The obstruction caused by the Heater Tubes was 64 square inches for the 60° transducer and 46 square inches for the 70° transducer.

During 2005, 2010, and 2011, examinations were performed using procedure NDE-820 which utilized smaller 0.375" X 0.75", 0.5" X 1.0" and 1" diameter transducers along with additional lower 35° and 45° beam angles. The lower beam angles increase coverage in the area close to the search unit when the scanning surface is restricted due to contacting the Heater Tubes with the rear of the transducer. The combination of lower beam angles and smaller transducers allows more coverage of the examination volume to be achieved.

In both cases the procedures are qualified and are acceptable based on ASME requirements. The rationale is that where more coverage can be achieved using qualified techniques, the improvements to coverage should be made with the use of alternate beam angles, as allowed in procedure NDE-820.

- b. Explain the capability of the 35 degree scan angle to adequately detect flaws in the pressurizer surge nozzle to head welds compared to the standard 45 degree and 60 degree scan angles.

### **Duke Energy Response**

Even though ASME Section XI does not require the PDI / ASME Section XI Appendix VIII performance demonstration qualification process for these non-reactor vessel examinations, the Appendix VIII process has qualified procedures with primary detection beam angles of 35° and less. These lower beam angles have been proven to be useful in detecting flaws in vessels and piping including dissimilar metal weld examination procedures.

These lower beam angles have been useful in increasing and improving examination coverage where restrictions to the scanning surface require their application. Many dissimilar metal weld procedures utilize beam angles as low as 30° for shear waves and 25° for longitudinal wave modes.

- c. The figures in 14-CN-001 associated with this component indicate welds that have been ground flush. Clarify the surface condition of the welds and whether credit was taken for scans performed over the welds.

### **Duke Energy Response**

As indicated in the figures in the original relief request, the subject welds have been ground flush. Credit was taken for scans performed over the welds as described below.

The ASME Section XI requirements for vessels other than Reactor Vessels greater than 2" thickness are that the procedures are to be demonstrated in accordance with ASME Section V Article 4 as supplemented by Table I-2000-1, 1998 edition with Addenda through 2000. There are no restrictions to examination coverage credit specified in ASME Section V Article 4 or Table I-2000-1, when scanning across the examination surface.

Examination coverage is addressed by ASME Section V Article 4 paragraph T-424.1, requiring that the volume is examined by moving the search unit over the examination area.

T-441.1.4 requires that the examination volume is scanned, wherever feasible, in two directions, approaching the weld from opposite directions, and parallel to the weld from opposite directions.

T-441.1.5 requires the angle beam search units to be aimed at right angles to the weld axis, with the search unit manipulated so that the ultrasonic beams pass through the entire volume of weld metal. The adjacent base metal in the examination volume must be completely scanned by two angle beams, but need not be completely scanned by both angle beams from both directions. Any combination of two angle beams will satisfy this requirement.

T-441.1.6 requires the angle beam search units shall be aimed parallel to the axis of longitudinal and circumferential welds so that the ultrasonic beams pass through all of the examination volume. Areas blocked by geometric conditions shall be examined from at least one direction.

Table 1. Pressurizer Surge Nozzle to Head Weld Examination Coverage Amounts

| CNSUnit | Weld     | 3 <sup>rd</sup> ISI Interval Coverage and Scan Angles <sup>(1)</sup> | 2 <sup>nd</sup> ISI Interval Coverage and Scan Angles [Date of Exam, Source]                               | Change in Coverage |
|---------|----------|--|--|--------------------|
| 1       | 1-PZR-W1 | 81.4 %<br><br>Scan angles used:<br>35°, 45°, 60°                     | 77.2 %<br><br>[2005, September 8, 2005 Relief Request (ML052590564)]<br><br>Scan angles used:<br>35°, 45°  | + 4.2 %            |
| 2       | 2-PZR-W1 | 81.2 %<br><br>Scan angles used:<br>35°, 45°, 60°                     | 42.8 %<br><br>[2001, December 20, 2001 Relief Request (ML0203300121)]<br><br>Scan angles used:<br>60°, 70° | + 38.4 %           |

Note: (1) Source: Relief Request 14-CN-001 (ML14052A387).