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May 20, 2010

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station, Unit 2
Docket Number 50-414
Steam Generator In-service Inspection Summary
Report for End of Cycle 16 Refueling Outage
Response to NRC Requests for Additional
Information (RAIs)

On July 14, 2009, Duke Energy provided a report summarizing the results of the steam generator inspection associated with the subject outage. On April 5, 2010, the NRC electronically provided a set of RAIs in response to this report. The purpose of this letter is to respond to these RAIs.

The RAI responses are contained in the attachment to this letter. The format of the response is to restate each NRC question, followed by our response.

There are no regulatory commitments contained in this letter or its attachment.

If you have any questions concerning this material, please call L.J. Rudy at (803) 701-3084.

Very truly yours,

James R. Morris

LJR/s

Attachment

A047
NRK

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NCMPA-1
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Attachment

**Catawba Unit 2 End of Cycle 16 Steam Generator In-service Inspection Summary
Report NRC RAI Response**

By letter dated July 14, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092010498), Duke Power Company, LLC (the licensee), submitted information summarizing the results of the 2009 steam generator (SG) tube inspections at Catawba Nuclear Station (CNS) Unit 2. These inspections were performed during refueling outage 16 (RFO 16).

The staff of the Steam Generator Tube Integrity and Chemical Engineering Branch of the Division of Component Integrity has reviewed the information the licensee provided and determined that additional information is required in order to complete the evaluation.

1. The report states that one tube in SG C was preventively plugged for a bulge at the top of the hot-leg tubesheet, but no such tube is listed in the indication tables at the end of the report. Please identify the tube, discuss the size of the bulge, and clarify whether the bulge was service-induced. If the bulge was service-induced, please discuss the cause and any corrective actions taken in response to this finding.

Duke Energy Response:

Tube R39C41 was plugged for a bulge. The bulge was reported at the top of the hot leg tubesheet plus 0.78 inches; therefore, by definition, the bulge was 0.78 inches long. The bulge is not believed to be service-induced.

2. It was reported that eight indications of axial outside diameter stress corrosion cracking were observed at the hot-leg tube support plate intersections of three tubes. These three tubes were high row tubes (i.e., their U-bends were not stress relieved). Please discuss whether these tubes were considered to have higher residual stresses (i.e., -2 sigma tubes). Based on previous information submitted to the NRC staff, it appears that 27 tubes are -2 sigma tubes in the CNS Unit 2 SGs. Please confirm this number or clarify the number of -2 sigma tubes. If some of these tubes have been plugged, identify the tube and discuss the reason for tube plugging.

Duke Energy Response:

Tube R24C62 in SG B is considered a high stress tube (-2 sigma on both legs). Tube R41C59 in SG D is considered a high stress tube (-2 sigma on both legs). Tube R41C55 in SG D is an LAR tube (-2 sigma on one leg). There are 65 tubes (130 legs) that have been identified as -2 sigma tubes, four of which have been plugged. Two of these tubes were plugged for indications at tube support plate locations, one tube was plugged for a tube end indication, and one tube was plugged for an indication in the preheater region.

3. In reviewing the table summarizing the indications, it appears that the tube in row 24, column 62 (R24C62) in SG B had one indication (located at 02H), that the tube

in R41C55 in SG D had four indications (located at 3H, 4H, and 5H (2 indications)), and that the tube in R41C59 in SG D had three indications (located at 3H (2 indications) and 5H). Please confirm the staff's understanding or clarify the tube support elevations where the eight indications are located. Please discuss whether the multiple indications were at one tube support plate land or at different lands at the same tube support plate elevation. Please clarify whether all of the indications detected with a rotating probe were also detected with the array probe, since it appears that the array probe did not detect all of the indications in the tube in R41C55 in SG D.

Duke Energy Response:

The staff's understanding of the above indications is correct. In tube R41C59, the multiple indications at 3H are at different lands. In tube R41C55, the multiple indications at the 5H elevation are at different lands. The multiple indications at the 5H elevation in tube R41C55 were called by both the rotating coil and the array probe. The array probe had them called MAI (multiple axial indications). The rotating coil distinguished them into two SAIs (single axial indications).

4. Please confirm that the following six tubes were plugged in SG B: R1C25, R1C37, R1C56, R1C57, R1C63, and R26C81.

Duke Energy Response:

The following six tubes were plugged in SG B: R1C25, R1C37, R1C56, R1C57, R1C63, and R26C81.

5. A wear indication appears to have been detected at the fifth hot-leg tube support in the tube located at R8C25 in SG B. This wear indication appears to extend 180-degrees in circumferential extent. Please discuss the nature of this indication. If the indication is the result of interaction with the tube support plate lands, please discuss whether the indication is one continuous indication or two distinct indications (associated with different tube support plate lands). If one continuous indication, please discuss any insights on the cause of the indication.

Duke Energy Response:

The single indication in R8C25 was attributed to a loose part outside the bottom edge of the tube support plate. The indication extended less than 60° in circumferential extent based on the review of an eddy current plot from the outage. There were no parts detected.

6. Indications near the tube end on the hot-leg side of the SG were detected in each of the SGs. Many of these indications appear to have been detected during both RFO 15 and RFO 16. Please discuss whether these indications are increasing in

size (since the staff compared the RFO 15 and RFO 16 voltages for some of the indications, which indicated that the RFO 16 voltages are larger than the RFO 15 voltages, indicating that the indications are flaws and are growing). A few indications near the tube ends in RFO 15 were not reported in RFO 16 (e.g., R2C11 and R2C80 in SG B). Please confirm that these tubes had no indications. Please discuss whether your procedures require any special review of indications identified in a prior outage that are not reported during the current outage.

Duke Energy Response:

A detailed growth study has not been performed. A qualitative review of the results indicates that some of the indications have increased in voltage, some have decreased in voltage, and some have remained essentially the same. There has not been a significant increase in the population of indications in the last four cycles. The indications in tubes R2C11 and R2C80 were not reportable in RFO 16. Duke Energy procedures require a review of indications identified in a prior outage.

7. During RFO 15, indications were detected near the cold-leg tube ends in several tubes. Please discuss whether these locations were re-inspected during RFO 16. Since none of these indications were reported in RFO 16, please discuss how these tubes were dispositioned.

Duke Energy Response:

All of the indications reported in RFO 15 were re-inspected in RFO 16 and were reported as PVN (permeability variations) for future tracking purposes. They were all left in service.

8. As a result of some of the historic reviews discussed above, the staff noticed that in your February 11, 2008 letter (ADAMS Accession No. ML080500179), you specified that inside diameter indications were found in the tack expansions in SG B and that inside diameter indications were found at the tube end in SGs A, C, and D. Please clarify why this distinction was made (clarify the difference between indications at the "tack expansion" and indications at the "tube end" since the indications in all four SGs seem to be located in the same region of the tube).

Duke Energy Response:

The distinction was made because at that time Duke Energy used the tack roll location for an axial location to determine if the indication was in the tube (i.e., part of the pressure boundary and thus repairable) or in the tube end (non-repairable). Current knowledge would suggest that the tube ends cannot be distinguished.

9. Please discuss the results of the visual inspection of the plugged tubes (e.g., all plugs present and no degradation detected).

Duke Energy Response:

All plugs were present and no degradation was detected.

10. Please discuss the scope and results of any secondary side SG inspections. Include in this response the extent to which any degradation was detected (e.g., at the waterbox cap plate, steam drum, feedring, J-tubes), and whether any loose parts were left in the SG. If any loose parts were left in the SGs, please discuss whether an analysis was performed to confirm that tube integrity would be maintained until the next SG tube inspection.

Duke Energy Response:

Secondary side visual inspections were performed at the upper tube support plate elevation in SG A to evaluate the extent of broach blockage. Some lips have formed at the lower edges of broaches, but no evidence of significant blockage was observed.

Preheater FOSAR inspections were performed in all four SGs. Some loose parts were left in service. An engineering analysis was performed to confirm that tube integrity would be maintained for two inspection cycles for parts left in service.

11. Please clarify the meaning of the "IV" and "OR" codes used in the listing of the service-induced indications.

Duke Energy Response:

The "IV" code indicates Independent Verification (IV) was performed for tubes or indications where the data may have been acquired more than once. The "OR" code indicates a manual review of the automated data quality failure was performed and the data was determined to be acceptable.