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February 10, 2004

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

Subject: Duke Energy Corporation  
Catawba Nuclear Station, Unit 2  
Docket Number 50-414  
Steam Generator Outage Summary Report for End of Cycle  
12 Refueling Outage  
Reply to Request for Additional Information  
(TAC Number MC0957)

Reference: Letter from NRC to Duke Energy Corporation, dated  
January 5, 2004

Please find attached Catawba's reply to the reference Request for  
Additional Information. The format of the reply is to restate the  
NRC question, followed by Catawba's 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) 831-3084.

Very truly yours,

Dhiaa M. Jamil

LJR/s

Attachment

A047

Document Control Desk  
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xc (with attachment):

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REQUEST FOR ADDITIONAL INFORMATION

DUKE POWER COMPANY

CATAWBA NUCLEAR STATION, UNIT 2

DOCKET NO. 50-414

The Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittals dated April 7, 2003, and June 18, 2003, regarding the End of Core (EOC) 12 steam generator tube inservice inspection for Catawba Unit 2. The NRC staff has identified the following information that is needed to enable the continuation of its review.

1. Of the 33 tubes taken out of service during the EOC 12 outage, you plugged 29 tubes for preventative reasons. The eddy current result for approximately one-half of these 29 tubes was denting with a volumetric indication. In an RAI response for questions regarding the previous (EOC 11) outage report (report dated November 21, 2002, ADAMS Report No. ML023380276), you stated that the volumetric term was used to include several types of indications, including manufacturing burnish marks, intergranular attack, and wear. You also stated that any eddy current indication given the volumetric description was subject to a dispositioning process that considered the previous history of the tube and the signature of the eddy current signal, and that the information required to disposition these indications was contained in neither the database nor the report.
  - a. Provide a more descriptive technical basis explaining why tubes with denting and volumetric indications were taken out of service during the EOC 12 outage. Include the disposition for each of these volumetric indications (e.g., wear, intergranular attack, etc.).

**Duke Energy Corporation Response:**

These tubes were removed from service as a result of operating experience at Oconee. Oconee found a crack in an overlapping dent and volumetric (manufacturing burnish mark) indication which made detection of the crack very difficult. The tubes at Catawba Unit 2 were removed from service for the same type precursor indications, dent with volumetric indication. All of the tubes were taken out of service for

indications containing a dent and manufacturing burnish mark.

- b. NRC staff examination of the eddy current data sheets disclosed several tubes, not taken out of service, also with denting and volumetric indications (three examples are tubes 2B-8-103, 2C-4-78, and 2D-42-64). Discuss the technical basis for why these three tubes with denting and volumetric indications were not taken out of service, given that other tubes with similar indications were removed from service.

**Duke Energy Corporation Response:**

The criterion for removing tubes from service was that the dent and volumetric indication must overlap. If the indications are separate, then there is better detection.

2. The NRC staff compared the eddy current data from the EOC 12 outage inspection report with the data from the EOC 11 outage inspection report (report dated October 24, 2001, ADAMS Report No. ML013410150). This exercise identified several tubes, reported in both outage reports, with indications where the percent wall thickness penetration value was greater than 30 percent. In nearly every case, no growth of these indications was noticed. However, tube 2D-48-78 (location AV4) was noted as having a 33 percent wall thickness penetration value in the EOC 12 outage report, but was not noted in the EOC 11 outage report. Therefore, it is assumed that no tube wall degradation was detected in tube 2D-48-78 during the EOC 11 outage inspection and that the majority of the degradation detected during the EOC 12 outage inspection occurred since the EOC 11 outage inspection. According to the EOC 12 outage inspection report, tube 2D-48-78 was not plugged. Since the degradation occurred at an antivibration bar, it is assumed that the degradation was caused by wear. The wear rate for tube 2D-48-78 at AV4 appears to be significantly higher than that typically seen at Catawba, Unit 2.

Discuss your predictions for tube 2D-48-78 in terms of future wear rates as well as the condition of tube 2D-48-78 during the next planned steam generator inspection.

**Duke Energy Corporation Response:**

The indication was reported by bobbin as wear at the AVB in March 2003. During that outage, the indication was also

inspected by the rotating plus point and no degradation was found. The indication was reported in the baseline data as an undefined signal. The signal has been reported in almost every inspection since the baseline. The indication is not considered wear. Previous indications are monitored each inspection for degradation.

No predictions will be made, as the indication is not wear.

3. The NRC staff noted that you plugged tubes 2A-1-100 and 2A-1-106 due to an "anomalous U-bend indication." Describe what is meant by anomalous U-bend indication and the reason for preventative plugging of these tubes. Clarify whether service-induced degradation was present in these tubes.

**Duke Energy Corporation Response:**

Both tubes contain volumetric indication at 9.4 inches above the top tube support plate by rotating plus point. Since the indications are volumetric, they are not believed to be cracked. Since they are freespan and located in the U-bend, they probably are not wear. They are most likely an artifact of the plus point inspection. Since there was uncertainty as to the cause of the indications, they were removed from service as a conservative measure. Low row U-bends are monitored each inspection for degradation.

4. The NRC staff noted that you preventatively plugged tube 2C-4-77 due to "U-bend voltage offset." Describe what is meant by U-bend voltage offset and the reason for preventative plugging of this tube. Clarify whether service-induced degradation was present in this tube.

**Duke Energy Corporation Response:**

This tube was conservatively removed from service as a result of operating experience from Seabrook. Seabrook identified a group of low row tubes showing an eddy current signal offset. The offset was thought to be a result of the tube being straightened and not thermally treated. Catawba Unit 2 had only one tube showing this offset. Since it may have different cracking potential than the rest of the bundle, it was removed from service.

5. The NRC staff's comparative examination of the eddy current data from the EOC 12 and EOC 11 outage inspection reports showed that, for a given tube, an indication may have been

noted as HNI (defined as "has not changed indication") in the EOC 11 outage report and noted as VOL (defined as "volumetric") in the EOC 12 outage report. One example is tube 2A-1-64.

Explain why different codes were used for the same indication for the EOC 11 and EOC 12 outage reports. Clarify whether the indication is changing over time. If so, discuss whether this is indicative of a service-induced degradation mechanism.

**Duke Energy Corporation Response:**

Tube 1-64 did have a HNI reported by bobbin in the EOC 11 outage. During the EOC 12 outage, it was reported by bobbin as an ADI. According to our guideline, that means it changed in voltage or phase by 0.5 volts or 10 degrees. In this case, it looked like it changed in phase. Since it tripped the threshold, it was inspected by rotating plus point and was found to be a volumetric indication. The indication is traceable to the first inservice inspection. The indication is not believed to be service induced degradation, but rather a manufacturing burnish mark.

6. The EOC 11 outage inspection report noted that no tubes were plugged. During the EOC 12 outage, you plugged 33 tubes, 20 of which were for reasons other than loose parts or wear. In the preceding questions, the NRC staff has requested additional information regarding the reasons for the preventative plugging of specific tubes, since it is not obvious from the information provided in the report if the plugging was initiated due to the presence of service-induced degradation.

Discuss why there was an increase in the number of tubes plugged during EOC 12. If the tube plugging was performed due to service-induced degradation, discuss whether the tubes are experiencing degradation from mechanisms which are new to, and previously unaccounted for, in the Catawba, Unit 2 steam generator tubes.

**Duke Energy Corporation Response:**

As discussed in the preceding questions, all tubes have been removed from service as a conservative measure. There are no new service induced mechanisms. Catawba Unit 2 still only has loose parts and wear as its service induced degradation. Catawba Unit 2 is one of the lead 600 TT

plants with respect to operating time and temperature. Its inspection plans are designed to identify cracks as soon as they occur.