Duke Power®
A Duke Energy Company

RON A. JONES
Vice President
Oconee Nuclear Site

Duke Power
ON01VP / 7800 Rochester Highway
Seneca, SC 29672

864 885 3158
864 885 3564 fax

September 22, 2004

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

Subject: Duke Power Company, Oconee Nuclear Station, Unit 3
Docket Number 50-287
EOC-20 Refueling Outage, May 2003
Steam Generator Inservice Inspection
Response to Request for Additional Information

By letters dated May 29, 2003, June 23, 2003 and on August 28, 2003, Duke Energy submitted reports on the results of the Steam Generator Tube Inservice Inspection performed during the Oconee Unit 3 End of Cycle 20 refueling outage.

Subsequently, on February 2, 2004, the NRC transmitted by e-mail a Request for Additional Information (RAI) which included seven (7) specific questions. The questions and the Duke Energy responses are attached as an enclosure.

If there are any additional questions you may contact R. P. Todd at (864) 885-3418.

Very truly yours,

R. A. Jones,
Site Vice President,
Oconee Nuclear Station

Enclosure

A047

xc w/attachments:

Mr. W. D. Travers
Regional Administrator, Region II

xc w/o attachments:

Mr. M. C. Shannon
NRC Senior Resident Inspector

Mr. L. E. Olshan
ONRR, Senior Project Manager

Mr. Henry Porter
DHEC

ENCLOSURE

1. Question: In the licensee's letter dated August 28, 2003, several tubes were identified with possible loose part (PLP) indications. Discuss the location of the PLP indications and the actions taken to disposition these indications. Was a visual examination performed at these locations and if so, were any loose parts identified? If any loose parts were identified, were they removed? If not, provide the technical basis for leaving them in service.

   Response: The PLP indications at Oconee Unit 3 are indicative of debris on top of the support plates. Debris is either deposit that has spalled from the tube or small sludge rocks as determined from previous visual inspections. Based on previous visual inspections, no visual inspection was performed this outage. There is no wear associated with the PLP indications. However, impingement degradation can be caused by debris or deposits. Other PLP indications at the 15th tube support plate are associated with the lock nuts at the stay rods.

2) Question: Bobbin coil examination identified 70 Absolute Drift Indications (ADI) in the Unit 3 SGs. Presumably all these indications were included in the rotating probe Special Interest exam of bobbin coil indications. +Point^{tm} probe inspection of the ADI location resulted in a volumetric indication for some of these tubes, (e.g., SG A, row 87, tube 130; SG B, row 55, tube 79). Describe the disposition process and criteria for the ADI's. Please clarify the number of tubes with a bobbin coil ADI which were plugged due to +Point^{tm} interrogation of the ADI location and the nature of the +Point^{tm} indication. Discuss ADI's history in the Unit 3 SGs and identify any steps taken to investigate the root cause of these indications.

   Response: ADIs are typically characterized as no defect found (NDF) by the +Point^{tm} examination. A small number of the indications are considered volumetric indications which are manufacture burnish marks. Also, a small number of the ADIs are indicative of freespan axial cracks. For this reason all ADI indications are examined with +Point^{tm}. ADIs have been identified and examined in the past in Unit 3 steam generators.

   Tubes have been pulled in the past to investigate freespan cracks. ADI's can be typical of small cracks that do not have clear edges and therefore do not give a clear differential response.

   A total of seven tubes were plugged during the Unit 3 EOC 20 outage due to ADI's.

3) Question: According to the SG Inservice Inspection Report, the +Point^{tm} probe was used in the sludge pile region of the lower tubesheet to provide enhanced detection versus the bobbin probe. Please discuss the inspection challenges that exist in the lower tubesheet region. For indications detected in the lower tubesheet region, discuss whether the +Point^{tm} probe detected indications that were not detected by the bobbin probe. In addition, describe the severity of any indications detected in this region.

Response: Tubes in the kidney region require the use of rotating coil for better detection of IGA due to sludge build up in the upper portion of the tubesheet crevice. The sludge in the tubesheet crevice makes identifying small patches of IGA difficult. In other areas of the lower tubesheet and the upper tubesheet the bobbin probe is adequate for detection. Typically, indications in the kidney region are not detected by the bobbin coil.

Because of the small size of the IGA defects, they are predicted to have a negligible effect on the burst strength of tubes. This has been supported by tube pull examinations.

4) Question: The licensee indicated all dents detected by bobbin coil were inspected with the rotating probe. Please discuss what is considered a dent at the Oconee Units (e.g., is a dent reported when the voltage of the dent exceeds a certain voltage?). Compare the voltage normalization scheme that you use for sizing dents to the standard industry approach. For the flaw like indications detected in dents, please discuss the size and orientation of the indication, the size of the dent, and discuss whether these indications were detected with the bobbin coil probe, with the rotating probe, or both probes.

Response: All dents 6 volts or greater are examined with + Point. This is approximately equivalent to 2.0 to 2.5 volts if using the standard industry normalization. Two flaw like indications were identified in dents. The first indication was in a 47.9 volt dent. The indication was circumferential with an extent of 0.23 inches with a PDA of 13%. The indication was not detected by the bobbin coil. The second indication was in an 11.1 volt dent. The indication was circumferential with an extent of 0.96 inches and PDA of 35%. The indication was not detected by the bobbin coil.

5) Question: The staff notes that 3 of 22 tubes in SG A and 1 of 28 tubes in SG B were plugged subsequent to the re-rolling process. A similar experience has been observed at other Oconee Units during the past outages. Please describe the reason for tube plugging following the re-rolling process (e.g., roll processing problems, eddy current indications in the re-roll region). Provide the details of any eddy current indications detected after re-rolling. In addition, please discuss your operating experience with re-rolled tubes. For example qualitatively describe the number and orientation (axial, circumferential, volumetric), location (e.g., lowest transition in the re-roll), and severity of indications detected in the re-roll region. Provide any general insights you may have on the time to crack initiation in the re-

roll locations. Also, indicate if any "denting" has been observed between the rolls in tubes with re-roll repair.

Response: In the 3A steam generator there were 3 tubes with re-rolls installed that were subsequently plugged, all due to ECT indications elsewhere in the tube. In the 3B steam generator there was 1 tube with a re-roll installed that was subsequently plugged due to an ECT indication elsewhere in the tube. The reason this occurs is because of the large inspection and repair scopes at Oconee. Re-roll repair is preformed prior to completing all of the other eddy current test.

We have plugged tubes for indications in the re-roll after several cycles of operating time. These indications are short axial cracks located with in the upper roll transition of the re-roll. No denting between the rolls has been seen to date.

6) Question: The licensee's SG Inspection Report states (Enclosure B, page 3) that tubes with degradation in the sleeves are removed from service and that no tubes were removed from service due to indications in the sleeve roll. In Enclosure C, the Sleeve Roll Examination Table (page 8) identifies a single axial indication (SAI) in SG A and 3 volumetric indications in SG B. Please clarify the nature, size, and location of indications found in the sleeve roll examinations. Compare the characteristics (e.g., length, depth) of the SAI in SG A with the SAI reported in Unit 2 during the fall 2002 SG inspection. Clarify the difference between "VOL" indications as compared to an "SVI" indication listed in the fall 2002 Unit 2 inspection report.

Response: The sleeve SAI identified in Unit 3 was 0.17 inches long in the transition of the lowermost roll. The indication was inadvertently listed with the freespan axial indications in Enclosure B. The tube was removed from service. The SAI in Unit 2 was in the tube at the sleeve end. The sleeve + Point examination extends below the end of the sleeve to ensure adequate inspection of this area. The tube was removed from service.

The VOL indications in Unit 3 are most likely a geometry effect of the probe entering the sleeve. The indications are at the sleeve end above the uppermost roll and not in the pressure boundary. The SVI indication in Unit 2 was located in the tube at the sleeve end. The tube was removed from service

7) Question: Confirm that the SG B tube de-plugged in the lower channel head during the outage was re-plugged prior to startup.

Response: This plug was replaced with an Alloy 690 rolled plug prior to unit start-up.