

# CATEGORY 1

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SUBJECT: Submits rept on classification of SG insp results for Unit 1 end of cycle 17 refueling outage. Addl info related to tubes plugged or repaired in each SG will be reported in later submittal.

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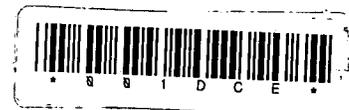
Subject: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287  
Steam Generator Tubing Surveillance Results

Pursuant to Technical Specification 4.17.6.c, Duke Energy Corporation (Duke) is supplying the following report on the classification of the steam generator inspection results for the Oconee Unit 1 end of cycle 17 refueling outage. The 100 percent upper tubesheet roll inspection results of the "B" steam generator on Oconee Unit 1 have been classified as Category C-3.

During the recent Oconee Unit 1 end of cycle 17 refueling outage, the upper tubesheet roll transitions were inspected for possible degradation with a Plus Point eddy current probe. Pure water stress corrosion cracking (PWSCC) had previously been discovered at the Oconee Unit 3 "B" steam generator and other once through steam generators in the industry. The initial inspection plan included a 20 percent random sample of the upper tubesheet roll transitions in both steam generators. Once a single axial indication of PWSCC was discovered in each steam generator, the inspection plan was increased to 100 percent for both steam generators.

As the 100 percent inspection plan progressed, hundreds of ambiguous volumetric indications were discovered in the "B" steam generator. In order to determine if these indications were indicative of degradation, five upper tubesheet sections were removed from the "B" steam generator for destructive examination. Three of the upper tubesheet sections contained nine volumetric indications, one upper tubesheet section contained an axial indication, and the

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remaining upper tubesheet section contained a circumferential indication. The last two upper tubesheet sections, which are discussed above, are considered to be examples of PWSCC and were archived for future examination. Two of the upper tubesheet sections containing volumetric indications were destructively examined. The final upper tubesheet section with volumetric indications was archived for future examination.

The destructive examinations revealed that the volumetric indications were inside diameter intergranular attack (ID IGA). After flattening, the samples were polished from the ID in 4 to 6 mil increments to determine the IGA depth. The destructive analysis indicates that in two IGA patches the maximum observed depth is 35 percent through wall with a maximum possible depth of 46 percent through wall. All other indications were less than or equal to 35 percent through wall. The largest IGA patch was 0.21 inches long in the axial direction and 0.14 inches long in the circumferential direction.

The 100 percent inspections of the upper tubesheet roll transitions in both steam generators are complete. In the "A" steam generator, 35 tubes with indications of PWSCC and IGA were identified. In the "B" steam generator, 1936 tubes with indications of PWSCC and IGA were identified. Of these, 1837 tubes contained volumetric indications which have been classified as ID IGA per the destructive results discussed above.

The root cause evaluation of the ID IGA is still in progress. Duke expects that a single root cause for the indications will not be identified. Previous tube exams have shown that it is extremely difficult to trace degradation back to a single root cause. Based on previous inspections and pulled tube results from Oconee Unit 3 during the last refueling outage, Duke does not believe that this degradation is significantly active on all Oconee units. Review of the primary side chemistry data has not identified any significant chemistry transients which would account for the degradation. The eddy current results from the current Oconee Unit 1 inspection indicate that the cause would be limited to the "B" steam generator on Oconee Unit 1. This is based on the expectation that chemistry transients during operation would affect both steam generators. Since both steam generators are not affected to the same degree, Duke suspects that the IGA initiated from

some form of contamination that is not directly associated with plant operation. It is also conceivable that the contamination event could have occurred during manufacturing of the steam generators. A review of manufacturing documentation is currently underway.

The volumetric indications are at the roll transition within two and a half inches of the tube end. Since the tubesheet is 24 inches deep, these indications are captured in the tubesheet which will prevent the tubes from bursting. Therefore, the indications in the roll transition do not present a structural concern.

Helium leak tests have been performed on the five pulled tubes with no leakage identified. In situ pressure tests were also performed on twelve tubes representing the deepest degradation with no leakage identified. No leakage is expected at the accident conditions given the leak test results and the degradation depths identified during destructive examination.

The growth rate of the ID IGA appears to be low as inferred by the inspection results. The inspection using rotating coil technology observed approximately 2000 indications. The bobbin inspection has not identified a large population of these indications in the current refueling outage or previous refueling outages. If the growth rates were high, a population of these indications would have been expected to reach the bobbin detection threshold. IGA that has been observed on the ID and outside diameter has been shown to have little growth during operation. Even if a conservative assumption is made that IGA initiation and growth occurred in one cycle, projected growth rates (approximately 2 percent per effective full power month) are still bounded for next cycle operation.

The current inspection results on Oconee Unit 1 do not present a concern for the safe operation of the Oconee steam generators on any Oconee unit. The degradation does not represent a concern for tube burst or significant leakage rates. Any similar degradation on the other Oconee units will be identified and repaired during planned inspections. Therefore, ID IGA should not present an operability concern for the next cycle.

Additional information related to the tubes plugged or repaired in each steam generator shall be reported in a later submittal in accordance with Technical Specifications 4.17.6.a and 4.17.6.b. If there are any questions regarding this submittal, please contact Michael Bailey at (864) 885-4390.

Very truly yours,



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