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ACCESSION NBR: 9510020189 DOC. DATE: 95/10/02 NOTARIZED: NO DOCKET #
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50-270 Oconee Nuclear Station, Unit 2, Duke Power Co. 05000270 R
50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
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SUBJECT: Forwards responses to NRC 950901 RAI re GL 95-03,
"Circumferential Cracking of SG Tubes."

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DUKE POWER

October 2, 1995

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

Subject: Oconee Nuclear Station Units 1, 2, & 3
Docket Nos. 50-269, 270, 287
Response to Request for Additional Information Concerning Generic Letter
95-03

Gentlemen:

By letter dated June 27, 1995, Duke Power Company submitted a response for Catawba, McGuire and Oconee Nuclear Stations to Generic Letter 95-03, Circumferential Cracking of Steam Generator Tubes. The NRC staff issued a request for additional information (RAI), dated September 1, 1995, for Oconee Nuclear Station. Attached are the responses to the questions posed in the RAI for Oconee Nuclear Station.

I declare under penalty of perjury that these statements are true and correct to the best of my knowledge.

Should you have any questions regarding this submittal, please contact D.B. Mayes at (704) 382-4211.

Very truly yours,

M.S. Tuckman
Senior Vice President
Nuclear Generation

Attachment

9510020189	951002
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Handwritten initials: A001

U.S. NRC
October 2, 1995
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xc: S.D. Ebnetter
Regional Administrator, Region II

L.A. Weins, ONRR

P.E. Harmon
Senior Resident Inspector

ATTACHMENT

OCONEE NUCLEAR STATION
RESPONSE TO RAI FOR GL 95-03

Response to Request for Additional Information Regarding Circumferential Cracking of Steam Generator Tubes - Oconee, Unit 1, 2, and 3

1. The B&W generic response indicated that all of the TSP's had broached holes. This information is correct except that there are drilled holes around the periphery of the 15th TSP as shown in figure 1.

2. The Oconee Units have dents at the 10th TSP (broached), lower tubesheet secondary face, and upper tubesheet secondary face. These dented locations in the OTSG's are not currently believed to be susceptible to circumferential cracking. Circumferential stress corrosion cracking has not been observed in OTSG's. The tubing in OTSG's is Alloy 600 sensitized. The dents at the 10th TSP mimic the shape of the broached TSP, and therefore have a complex stress state that will probably have both axial and circumferential cracks. They also occur at lower temperature area. The lower tubesheet dents are at the lowest temperature in the OTSG's. The upper tubesheet dents are in an area of high temperature in dry steam. These locations are routinely monitored by MRPC for cracking and other degradation because the distortions may mask degradation.

As indicated in the question 1 response, the drilled holes are located at the 15th TSP. The denting at TSP's has been limited to broached hole locations.

3. A 0.115 inch diameter pancake coil was utilized on the rotating probe to inspect the rerolled joints at each of the last Oconee refueling outages. The cold leg rerolled joints were not tested at the last Oconee Unit 1 refueling outage. There are 132 rerolled transitions inservice in Oconee Unit 1, 4 in Unit 2, and 4 in Unit 3.

4. Oconee examines two rows outside the sleeved region. The criterion to determine if the area is bounded will be based on the location of the crack, the crack morphology, and the thermal hydraulic characteristics of OTSG's.

5. During the late 1970's and early 1980's tubes were pulled from the Oconee units to investigate the cause for leaks at the untubed lane. These pulled tubes confirmed that the leaks were due to circumferential cracks caused by corrosion assisted high-cycle fatigue. No other circumferential cracks were reported.

Seven tubes were pulled from Oconee Unit 1 in 1994. All roll transition areas were destroyed to facilitate tube removal. No other areas where circumferential cracking may occur were pulled.

6. The MRPC (0.115 inch diameter pancake) probe utilized at Oconee is qualified per appendix H of the EPRI guidelines for detection of circumferential cracks.

FIGURE 1

DRILLED ONLY 15th TSP TUBE HOLES

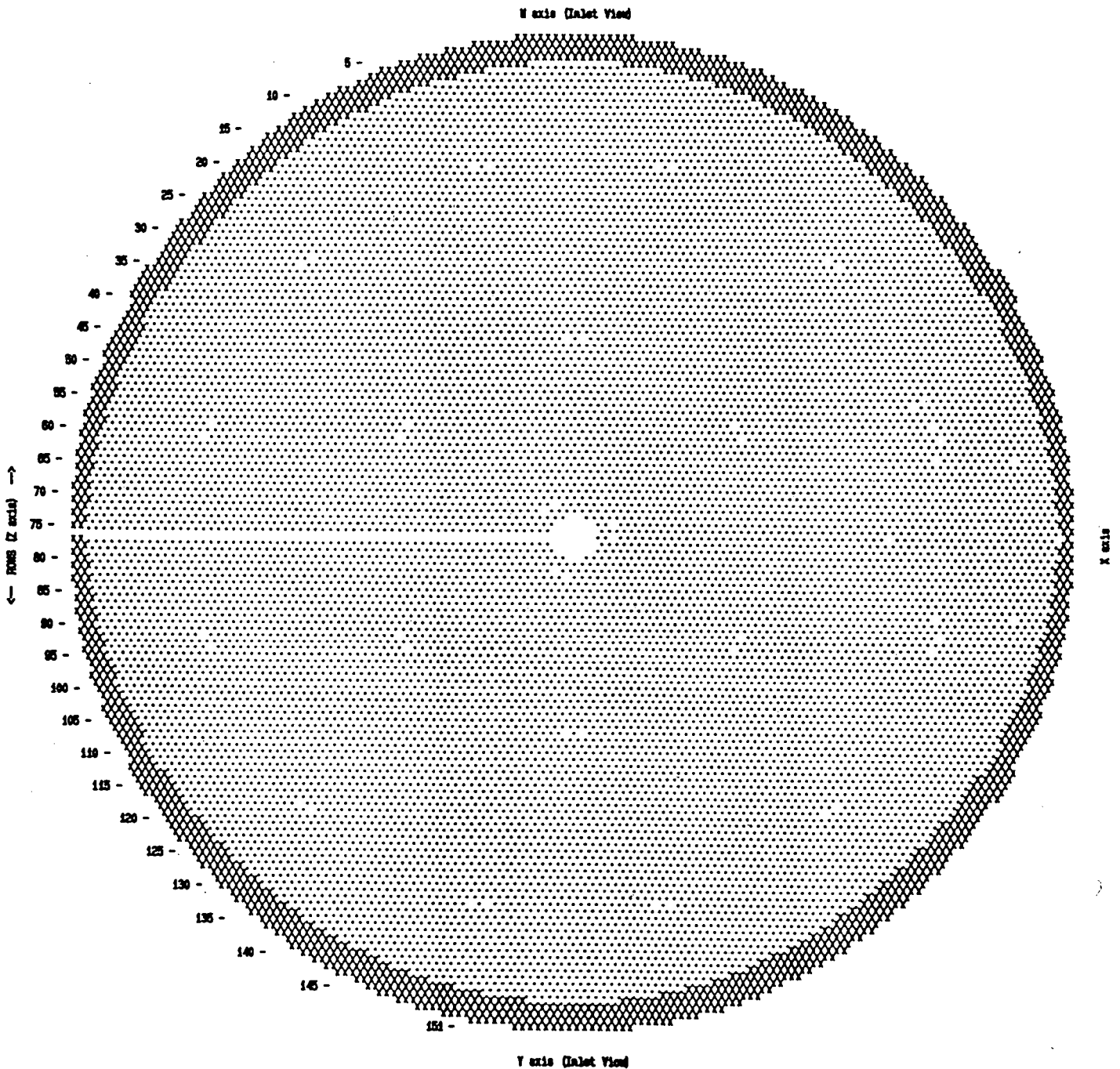
PLANT: OCONEE UNIT 1

GENERATOR: A&B

x = 15th TSP DRILLED ONLY (1621)

TOTAL TUBES : 15531
SUPPORT RODS () : 48

TOTAL TUBES ASSIGNED : 1621



REQUEST FOR ADDITIONAL INFORMATION

GENERIC LETTER 95-03

1. Discuss the design differences between the Oconee steam generators and the generic design information provided in the B&W Owners Group response, if any.
2. Dented Regions including dented tube support plates.

In the Electric Power Research Institute (EPRI) report NP-6201 "PWR Steam Generator Examination Guidelines: Revision 3", dated November 1992, it indicated that B&W plants have experienced denting at tube support plates and in the lower tubesheet. In your submittal it was indicated that larger voltage dents were inspected with a rotating pancake coil probe. Circumferential indications have been observed at dented areas in recirculating steam generators. If the dented locations in your steam generators are potentially susceptible to circumferential cracking, please submit the information requested in Generic Letter (GL) 95-03 per the guidance contained in the GL. If a voltage threshold is used for determining the threshold for examining dents, provide the calibration procedure used (e.g., 4.0 volts on 4-20% through-wall ASME holes at 550/130 mix).

EPRI report NP-6201 indicates that the fifteenth tube support plate contains both broached holes and drilled holes. The drilled holes have been prone to denting. Please clarify whether all of the tube support plates are of the broached hole designs or whether a number of them contain drilled holes. Discuss whether denting has been limited to the drilled hole locations, if applicable, or if it has been observed at other support plate intersections (i.e., broached holes).

3. Expansion transition examinations.

Clarify the type of probe that was used during the last inspection of the rerolled tubesheet joints at Oconee Units 1, 2, and 3. Provide the number of tubes currently in service that were rerolled after the furnace stress relief.

4. Lane/Wedge Region.

Provide the criteria to be used for determining whether the expanded inspection scope around any identified indications adjacent to the sleeved lane/wedge region is bounded.

5. Recently, several tubes have been pulled from B&W once through steam generators (OTSGs). Discuss any analyses performed on these pulled tubes for monitoring the development of circumferential cracking. For example, discuss the destructive and non-destructive examinations performed on these pulled tubes in the laboratory at the expansion transition area.

ENCLOSURE

6. Clarify whether the inspection method to be used at Oconee is qualified for the detection of circumferential cracks per Appendix H of Electric Power Research Institute (EPRI) report NP-6201 or whether a site specific qualification program will be used. If using site specific qualification procedures, state the differences and provide the justification for these criteria including a discussion of pulled tube data to support the detectability of circumferential cracks in the field.