

September 24, 2003

Mr. Joseph E. Venable  
Vice President Operations  
Entergy Operations, Inc.  
17265 River Road  
Killona, LA 70066-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - REQUEST FOR  
INFORMATION RELATED TO REVIEW OF THE REFUEL 11 STEAM  
GENERATOR TUBE INSERVICE INSPECTION REPORT SR-03-001-00,  
(TAC NO. MB9657)

Dear Mr. Venable:

By letter dated April 22, 2002, you submitted "15-Day Special Report SR-02-001-00 on the 11<sup>th</sup> Refueling Outage Steam Generator Tube Inservice Inspection," and by letter dated April 10, 2003, you submitted "12-Month Special Report SR-03-001-00 on the 11<sup>th</sup> Refueling Outage Steam Generator Tube Inservice Inspection," for Waterford Steam Electric Station, Unit 3. These reports provided the results of the Refuel 11 Steam Generator Tube Inservice Inspection.

During the course of review of these reports, the staff determined that additional information is necessary to complete our review. The enclosed request for additional information (RAI) was e-mailed to your licensing staff on September 12, 2002. As discussed in the September 16, 2003, telephone call, your staff agreed to respond within 90 days of the receipt of this RAI. If circumstances result in the need to revise the target date, please call me at the earliest opportunity.

Sincerely,

**/RAI**

N. Kalyanam, Project Manager, Section 1  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure: As stated

cc: See next page

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**ML032671349**

**NRR-088**

OFFICE	PDIV-1/PM	PDIV-1/LA	PDIV-1/SC
NAME	NKalyanam	DJohnson	RGramm
DATE	9/23/03	9/23/03	9/24/03

REQUEST FOR ADDITIONAL INFORMATION FOR  
WATERFORD STEAM GENERATOR  
TUBE INSPECTION REPORT FOR THE 2002 OUTAGE  
DOCKET NO. 50-382

1. In your April 10, 2003, request for review, you indicated that during refueling outage (RFO) 9, one tube was plugged for a circumferential indication at an eggcrate support. Please discuss whether there was a dent/ding at this location, the voltage magnitude (or severity) of the dent/ding, how the flaw was detected, the size (length, depth, percent degraded area, voltage) and nature (primary water stress corrosion cracking, outside diameter stress corrosion cracking, etc) of the flaw, and any additional testing performed to assess the integrity of the tube (e.g., ultrasonic testing, in-situ pressure testing).
2. In the letter, you also indicated that 2 tubes were plugged in RFO 11 as a result of freespan dings. Please clarify the nature of the eddy current signals at these locations. For example, please discuss the voltage magnitude (or severity) of the ding, whether a flaw was present at these locations, the size (length, depth, percent degraded area, voltage) and nature (primary water stress corrosion cracking, outside diameter stress corrosion cracking, etc) of any flaw at these locations, how the flaw was detected (i.e., rotating probe, bobbin probe), and any additional testing performed to assess the integrity of the tube (e.g., ultrasonic testing, in-situ pressure testing).
3. Further, in your letter dated April 22, 2002, you provide the number of tubes with single circumferential indications and single axial indications detected during RFO 11, at the top of the tubesheet for each steam generator. Similar information is provided in Table 3.2 and Tables 1 and 2 of letter dated April 10, 2003. In reviewing these tables, the staff noticed that the total number of tubes did not appear to match from one table to the next. For example, in the letter dated April 22, 2002, 9 tubes were reported as plugged in steam generator 1 for single axial indications at the top of the tubesheet, whereas in Table 3.2 of your letter dated April 10, 2003, 10 tubes were reported as having axial cracks at the top of the tubesheet. In Table 1 of your letter dated April 10, 2003, 11 tubes were identified as having axial cracks at the top of the tubesheet. Please clarify the number of axial and circumferential indications detected at the top of the tubesheet for each steam generator, and identify whether the tubes were plugged. If the tubes were not plugged, discuss your basis for leaving them in service. In addition, please update Tables 1 and 2 of your letter dated April 10, 2003, report to reflect all of the circumferential indications detected during the outage.
4. With respect to the inspections at dented/dinged locations, please address the following:  
  
Please discuss your voltage normalization scheme for determining the size of dents/dings and address whether it is consistent with the standard industry approach.

Please clarify whether the number of dents/dings reported in Table 3.2 of your letter dated April 10, 2003; include all dents/dings regardless of voltage amplitude or whether it represents all dents/dings above a certain voltage amplitude (e.g., above 2 volts). Please clarify whether the numbers include dents/dings on just the hot-leg or on both legs of the steam generator.

Given that degradation may have been detected at dings during the outage (refer to question 2), discuss the basis for the scope of your dent/ding examination. For example, please discuss whether the original scope of the rotating probe examinations at the dents/dings was expanded based on the results. The staff notes that both stress and temperature affect a tube's susceptibility to stress corrosion cracking. As a result, a larger dent at a lower temperature may be as severe (from a stress corrosion cracking standpoint) as a smaller dent at a higher temperature (material properties being equal). Discuss how your inspection scope accounted for this.

If all dents/dings above a certain threshold were not inspected with a rotating probe, discuss the extent to which the bobbin probe is qualified to inspect dented/dinged regions exceeding a specific voltage threshold (e.g., 5 volts).

For the dent/ding examinations, discuss how the tubes that were to be examined was determined. For example, was it a random sample or were all dings above 5 volts examined with a rotating probe and the remaining sample was random?

Please clarify the percentages of dings in Table 3.1, given that if the number of dings in Table 3.1 is divided by the total number of dings in Table 3.2, the percentage scope values do not match those reported in Table 3.1.

5. Given the potential for cracks to develop in wear scars, discuss the basis for only inspecting a subset of the wear indications with a rotating probe.
6. Please discuss the screening criteria used in assessing which indications are placed on Tables 1 and 2, and the screening criteria used to determine whether in-situ testing was required. Please provide a list similar to Tables 1 and 2 of all flaws found during the inspection (axial, circumferential, and volumetric). Wear flaws at tube supports (eggcrates, batwings, vertical straps) do not need to be included in this list.
7. Please clarify that all crack-like indications were plugged regardless of location.
8. Please discuss the maximum depth observed for the wear indications. The staff observed that the tube in Row 144 Column 106 of steam generator 2 was reported as having a 40% through-wall indication at Batwing 1. Please discuss whether this tube was plugged. If this tube was plugged, discuss why it wasn't included in your letter dated April 22, 2002. If this tube was not plugged, discuss why it was not plugged. Please provide a list of all tubes plugged during the outage.
9. Please provide a tubesheet map and your tube support naming convention.

Waterford Steam Electric Station, Unit 3

cc:

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