



Crystal River Nuclear Plant
Docket No. 50-302
Operating License No. DPR-72

Ref: 10CFR50.36

November 18, 2008
3F1108-02

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Crystal River Unit 3 – Special Report 08-01: Results of the Once-Through Steam Generator Tube (OTSG) Inservice Inspection Conducted During Refuel Outage 15 – Response to Request for Additional Information (TAC No. MD8918)

- References:
1. CR-3 to NRC letter dated May 30, 2008, “Crystal River Unit 3 – Special Report 08-01: Results of the Once-Through Steam Generator Tube (OTSG) Inservice Inspection Conducted During Refuel Outage 15”
 2. NRC to CR-3 letter dated October 20, 2008, “Request for Additional Information, Regarding the 2007 Steam Generator Tube Inservice Inspections During Refueling Outage 15 (TAC No. MD8918)”

Dear Sir:

On May 30, 2008, Florida Power Corporation (FPC), doing business as Progress Energy Florida, Inc., submitted the required Inservice Inspection (ISI) report for the tube inspections that were conducted on the Crystal River Unit 3 (CR-3) Once-Through Steam Generators (OTSG) during Refuel Outage 15 (Reference 1). By letter dated October 20, 2008, CR-3 received a formal request for additional information related to the ISI report (Reference 2). The attachment to this submittal provides the response to the request for additional information.

No new regulatory commitments are made in this letter.

If you have any questions regarding this submittal, please contact Mr. Dan Westcott, Supervisor, Licensing and Regulatory Programs at (352) 563-4796.

Sincerely,

Stephen J. Cahill
Engineering Manager
Crystal River Nuclear Plant

SJC/par

Attachment: Response to Request for Additional Information

xc: NRR Project Manager
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NRR

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT

Response to Request for Additional Information

Response to Request for Additional Information

By letter dated October 20, 2008, the Nuclear Regulatory Commission (NRC) requested additional information related to CR-3 Special Report 08-01, "Results of the Once-Through Steam Generator Tube (OTSG) Inservice Inspection Conducted During Refuel Outage 15." FPC hereby provides the following responses to these requests for additional information.

- 1. On page 7 and 8, you indicated that your normal operating differential pressure (NODP) is 1500 pounds per square inch (psi). However, you also indicated that 3 times your NODP is only 4300 psi. Please clarify. If you did not achieve your full 3 times NODP, please discuss the implications given that the flaws appeared to have been opening up (based on a comparison of the pre and post in situ eddy current inspection results).*

CR-3 Response

The Crystal River Unit 3 (CR-3) Once-Through Steam Generator normal operating differential pressure (NODP) is 1275 pounds per square inch gauge (psig). The test pressures include correction factors for temperature conditions and the pressure gauge accuracy. The differential pressures listed in the tables on pages 7 and 8 are the actual in-situ test pressures used. These corrections bring the NODP in-situ test pressure up to 1491 psig which was further increased up to 1500 psig for conservatism. The 3 times NODP test pressure is determined the same way. The resulting differential pressure is 4273 psig (3 x 1275 psig x temperature correction factor + gauge correction factor) which was also increased to 4300 psig for conservatism during testing. Therefore, each of the in-situ pressure tests did achieve the full 3 times NODP test pressure conditions and met all acceptance criteria.

- 2. Please confirm that all detected crack-like indications were plugged (except for those that were determined to be acceptable for service, based on an NRC-approved alternate tube repair criteria).*

CR-3 Response

The eddy current results from Refuel Outage 15 (15R), associated with crack-like indications (Eddy Current Analysis Codes Multiple Axial Indication (MAI), Multiple Circumferential Indication (MCI), Multiple Volumetric Indication (MVI), Single Axial Indication (SAI), Single Circumferential Indication (SCI), and Single Volumetric Indication (SVI)) inside the tube pressure boundary were reviewed. FPC verified that all tubes meeting the repair criteria have either been plugged or rerolled in accordance with an approved repair method, located in the CR-3 Improved Technical Specifications.

- 3. Please discuss whether any degradation of your tube supports was detected. If so, discuss the extent and the basis for dispositioning this degradation.*

CR-3 Response

Eddy current results were used to determine if any tube support plates had indications of erosion, damage, or were missing. Tube support degradation is screened at CR-3 by using specific screening instructions dictated within the Eddy Current Data Analysis Guidelines and the Examination Technique Specification Sheets. There was no tube support degradation detected during the CR-3 15R OTSG eddy current tube inspections.

4. *Please discuss the results of your visual and eddy current inspection of the plugs.*

CR-3 Response

A 100% visual inspection of all existing tube plugs was performed during the 15R outage. Plug locations were inspected to determine if they were missing, protruding, or wet/leaking. This included a total of 702 plugs examined in OTSG-A and 1724 plugs examined in OTSG-B. No plugs were observed to be degraded.

A 100% rotating coil examination of the existing Alloy 600 rolled plugs was performed during the 15R outage. A total of 19 plugs were inspected in OTSG-A and 43 plugs in OTSG-B. Analysis of the plug inspections showed no detectable degradation.

5. *Other than postulated leakage from tube-end cracking flaws, please discuss whether there are any other sources that contributed to your estimates of accident-induced primary-to-secondary leakage.*

CR-3 Response

In addition to the postulated tube-end cracking accident leakage, the as-found Condition Monitoring (CM) assessment included primary-to-secondary leakage from postulated Primary Water Stress Corrosion Cracking (PWSCC) circumferential indications at the upper and lower tubesheet expansion regions, rolled plugs, rerolls, and sleeves. The Operational Assessment (OA) for the current planned operating cycle also considered postulated leakage from circumferential PWSCC near and at expanded regions, rolled plugs, rerolls, and sleeves.

6. *Please discuss whether any indications were detected at dented locations. If so, please discuss the nature and size of the indication and the size of the dent. If any indications were found in dents whose voltage was near the threshold value for performing rotating probe examinations, please provide the basis for why no sample expansion was necessary.*

CR-3 Response

During CR-3's 15R OTSG eddy current testing, one (1) indication near a dented location was identified in OTSG "A". Zero (0) indications were identified in OTSG "B". The OTSG "A" indication was reported as a Single Axial Indication (SAI) in tube A58-75 and was located 0.66 inches below the Upper Tubesheet Secondary Face (UTS). The SAI indication was sized as 0.33 inches long and 89% through wall depth. This tube was plugged due to this indication. The dent was located 0.45 inches below the UTS with a voltage of 2.62 volts. All reportable dents located between the Upper Tube End (UTE) and one (1) inch below the 12th support plate were inspected using the plus point rotating probe in both Steam Generators during the 15R inspections. Since all reportable dents in both OTSG's were inspected in the area of interest, CR-3 determined that no sample expansion was necessary.

7. *Please discuss whether any indications were detected in the sleeves (including the parent tube at the joints) or in the lower tubesheet crevice. If any indications were detected, please discuss the nature of the indications.*

CR-3 Response

During CR3's 15R OTSG eddy current testing, no pluggable indications were reported in the sleeves or in the parent tubes at the rolled joint locations.

No pluggable indications were reported within the lower tubesheet crevice region of either OTSG during 15R. This area includes the crevice between the secondary (upper) face of the lower tubesheet to just above the lower roll transition area.

8. *Page 9 of 20 indicated that 293 re-roll repairs were performed in steam generator A and 703 re-roll repairs in steam generator B. These values do not appear to match the numbers on page 15 (263 tubes re-rolled in steam generator A and 566 tubes re-rolled in steam generator B). In addition, these numbers do not appear to match the number of indications re-rolled as identified in Appendix 4 (although these numbers do appear to match the number or re-rolled cited on page 5). Please clarify.*

CR-3 Response

The reroll numbers given on page 9 (293 in OTSG-A and 703 in OTSG-B) are the total number of new rerolls performed and left in-service during the 15R outage. The reroll numbers on page 15 (263 in OTSG-A and 566 in OTSG-B) are the number of rerolls performed, out of the total number, that were completed to reduce the as-left Tube End Crack (TEC) postulated Alternate Repair Criteria (ARC) leakage. The remaining rerolls were performed to remove upper tube end indications from service as opposed to TEC leakage reduction.

For example, OTSG-A had 30 rerolls performed to repair eddy current service induced Indication Codes (I-Codes) and 263 rerolls for TEC leakage reduction for a total of 293 rerolls. OTSG-B had 138 rerolls performed to remove I-Codes from service and 566 for TEC leakage reduction. Note that one of the rerolls performed in OTSG-B for TEC leakage reduction later failed the post maintenance reroll non-destructive examination (NDE) and was later plugged leaving a net 703 in-service rerolls.

Appendix 4 lists the specific I-Codes which were removed from service by rerolling during the 15R outage. Appendix 4 does not identify the specific tubes rerolled for TEC leakage reduction. A review of Appendix 4 confirms that there were 30 tubes rerolled in OTSG-A to remove various I-Codes at the upper tube end from service. It was also confirmed that there are 138 unique tubes rerolled in OTSG-B to remove various I-Codes at the upper tube end from service.

15R Reroll Summary

Reason for Reroll & Applicable 180 Day Report Section	OTSG-A	OTSG-B
Repair I-Code (Appendix 4)	30	138
TEC Leakage Reduction (Page 15)	263	566
Total Inservice Rerolls (Page 9)	293	703 *

* 704 rerolls, but one reroll was later plugged leaving 703 rerolls in service

9. *Please discuss the source and nature of the "general volumetric degradation" identified on page 5. Please discuss whether any volumetric indications other than wear and first span intergranular attack in steam generator B were left in service. If so, discuss the basis for leaving these flaws in service.*

CR-3 Response

This degradation mechanism is attributed to Outer Diameter (OD) initiated Intergranular Attack (IGA). All of the "general volumetric degradation" indications discussed on page 5 of 20 of the 180-day OTSG report, have been removed from service by plugging, seven (7) in OTSG "A" and three (3) in OTSG "B". "General Volumetric Degradation" is reported as Single Volumetric Indication (SVI) or Multiple Volumetric Indication (MVI) during the analysis phase of the inspection. Except for volumetric indications associated with wear and first span intergranular attack in OTSG "B", none of the SVI or MVI indications reported within the pressure boundary during 15R were left in-service in either OTSG.

10. *Please discuss whether the foreign object inside tube 73-99 in steam generator A was removed.*

CR-3 Response

The object in tube A73-99 was physically removed during an upper bowl jump on November 16, 2007. It was manually removed using needle-nose pliers. The tube end where the piece was located was later inspected using bobbin and rotating coil probes and was found to be free of any degradation. The tube was left in service.