



Southern Nuclear Operating Company  
*the southern electric system*

Dave Morey  
Vice President  
Farley Project

February 14, 1995

Docket Nos.: 50-348  
50-364

10 CFR 50.90

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

Joseph M. Farley Nuclear Plant  
Technical Specification Changes Associated With  
Steam Generator Tube Support Plate Voltage-Based Repair Criteria

Gentlemen:

By letter dated December 7, 1994, Southern Nuclear submitted a proposed, permanent voltage-based repair criteria for outside diameter stress corrosion cracking (ODSCC) at steam generator tube support plates for both units at Farley Nuclear Plant. The Unit 2 submittal is being revised to consist of a one cycle, interim plugging criteria as has previously been approved by the Staff. The Unit 1 submittal will be revised later this year and submitted so as to support the Fall 1995 Unit 1 refueling.

NRC approval of the Farley voltage-based criteria is requested by March 10, 1995, based on starting the Unit 2 outage on that date.

The safety analyses to support this amendment have been previously docketed. These analyses include:

1. WCAP-12871, Revision 2, J. M. Farley Units 1 and 2 Steam Generator Tube Plugging Criteria for ODSCC at Tube Support Plates, February 1992;
2. EPRI Report TR-100407, Revision 1, PWR Steam Generator Tube Repair Limits- Technical Support Document of Outside Diameter Stress Corrosion Cracking at Tube Support Plates; and
3. Southern Nuclear to NRC letter dated December 9, 1993, and associated technical specification amendment and NRC safety evaluation dated April 5, 1994.

Additional analyses exist in draft Generic Letter 94-XX, Voltage-Based Repair Criteria for the Repair of Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking.

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Attachment 1 contains responses to and exceptions taken to the draft Generic Letter. Attachment 2 contains the proposed changed technical specification pages in support of the voltage-based plugging criteria. A significant hazards evaluation for the proposed voltage-based repair criteria was submitted with the December 7, 1994 submittal. This evaluation remains valid for this revision.

Southern Nuclear Operating Company has performed an assessment of the impact of the proposed revision to the technical specifications on the environment and has determined that there is no impact on the environment. The proposed revision does not affect the types or amounts of any radiological or non-radiological effluents that may be released offsite. No increase in individual or cumulative occupational radiation exposures will result from this revision. Additionally, the revision does not involve the use of any resources not previously considered in the Final Environmental Statement related to the operation of Farley Nuclear Plant.

A copy of these proposed changes is being sent to Dr. D. E. Williamson, the Alabama State Designee, in accordance with 10 CFR 50.91(b)(1).

If there are any questions, please advise.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

*D. E. Williamson*  
Dave Morey

REM/clt.NRCVBRC4.DOC

Attachments

cc: Mr. S. D. Ebner  
Mr. T. A. Reed  
Mr. B. L. Siegel  
Mr. T. M. Ross  
Dr. D. E. Williamson

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 14<sup>th</sup> DAY OF February 1995

*Martha Gayle Dow*  
Notary Public

My Commission Expires: November 1, 1997

Attachment 1

Responses/Exceptions to Draft Generic Letter 94-XX Guidance

## Responses/Exceptions to Draft Generic Letter 94-XX Guidance

Southern Nuclear will implement the requested actions of the draft Generic Letter with the following comments/exceptions:

(1) The inspection guidance discussed in Section 3 of Enclosure 1 of the draft Generic Letter will be implemented with the following responses/exceptions:

- 3.b.2 / 3.b.3 - Both Farley units were built with copper in the secondary systems. As such, it is difficult to argue that copper is not present in the tube support plate (TSP) deposits; however, as described in Appendix A Inspection Guidelines submitted by letter dated February 23, 1994, no plated copper has been found on the tube outside diameter within the support plate crevice. As noted in the guidelines, no pulled tubes have been identified with copper deposits on the tube at TSP intersections. Therefore, it is not expected that copper interference will significantly influence the TSP signals in the Farley steam generators. If copper interference is observed at either Farley unit, the existing rules and procedures for complying with the technical specifications plugging limit based on depth of wall penetration will apply.
- 3.b.5 - The definition of "large mixed residuals", i.e., those that could cause a 1-volt bobbin signal to be missed or misread, is broad and difficult to implement in inspection guidelines. Farley will continue to include large mixed residuals in the sample plan implemented under paragraph 3.b.6 of the draft Generic Letter to ensure that unacceptable flaws are not left in service. This is a continuation of the practice first submitted in a letter to the NRC dated February 20, 1992 and is included in the latest Appendix A Guidelines submitted to the NRC by letter dated February 23, 1994.
- 3.c.2 - In order to perform data acquisition in a manner consistent with the methodology utilized to develop the voltage limits, bobbin coil probes will continue to be calibrated against the 20% holes in the ASME calibration standard instead of the 100% through wall holes. The NRC Staff has concurred with calibration on the 20% holes.
- 3.c.3 - Due to time constraints for the Spring '95 Unit 2 outage, new probes certified to a 10% variability are not available. It is anticipated that probes meeting the variability requirement will be available within 6 months of the final Generic Letter being issued and will be used when available when necessary.
- 3.c.4 - The requirement to re-inspect all tubes if the wear measurement exceeds 15% is unnecessary. As acknowledged in the draft Generic Letter, a 5.6 volt repair criterion is justified; however, the repair criterion is limited to 2.0 volts. To require re-inspection of all tubes inspected with a specific bobbin probe if probe wear reaches 16% is not necessary from a safety standpoint and could affect critical path outage time.

An indication will be re-inspected with a probe meeting the  $\pm 15\%$  wear limit if it exceeds 75% of the repair limit, i.e., 1.5 volts for 7/8" tubes. Field data supporting the use of this criterion was recently submitted by NEI.

- 3.c.6 - Quantitative noise criteria has been and will continue to be used in data collection. Data analysts will use qualitative guidelines in the evaluation of the data. However, it is expected that these criteria will be evolving over the inspection and, as a result, are subject to change.

Inspections will be performed in accordance with the Appendix A guidelines last submitted to the NRC by letter dated February 23, 1994.

- (2) Calculations of the leakage will be per the guidance of Section 2.b of Enclosure 1 of the draft Generic Letter with the following responses/exceptions:

- 2.b - The latest description of the calculation of the total leak rate during a steam line break was submitted in the "Farley 1 Cycle 12 Assessment and Projected EOC-13 SLB Leakage" document docketed by letter dated October 4, 1994.

- 2.b.3(1)/2.b.3(2) - As a result of discussions with the NRC Staff, data exclusion under criteria 2a and 2b of Reference 1 has been approved. The NRC Staff has also concurred with all data excluded under criteria 1b and 1c. Data will not be excluded under 3a, 3b, or 3c unless approved by the NRC Staff.

- 2.b.4 - In order to preclude the possible need for rapid turn around of a technical specification amendment for reactor coolant system specific iodine activity, Farley has revised its technical specification to 0.5  $\mu\text{Ci/gram}$ .

- (3) Calculation of the conditional burst probability will be per the guidance of Section 2.a of Enclosure 1 of the draft Generic Letter with following responses/exceptions:

- 2.a - The latest description of the calculation of the probability of burst during a steam line break was submitted in the "Farley 1 Cycle 12 Assessment and Projected EOC-13 SLB Leakage" document docketed by letter dated October 4, 1994. The analysis methods are Monte Carlo analyses that account for parameter uncertainties.

- 2.a.1 - As a result of discussions with the NRC Staff, data exclusion under criteria 2a and 2b of Reference 1 has been approved.

- (4) The operational leakage limits identified in Section 5 of Enclosure 1 of the draft Generic Letter are implemented by the proposed technical specification amendments. (Note: Unit 1 will remain at 140 gallons per day through only one steam generator as previously approved by the NRC.)

(5) Farley leakage monitoring measures provide guidance on trending and response to rapidly increasing leaks. Guidance is provided not only for the absolute leakage measured, but also on the rate of change of the leak rate. Timely detection of leaks is ensured by the N-16 monitors on both units.

Farley continues to participate in the industry effort for developing primary-to-secondary leakage guidelines. Upon NRC concurrence with the industry guideline document on leakage monitoring, Farley will implement the industry guidelines.

(6) Tube pull guidance of Section 4 of Enclosure 1 of the draft Generic Letter will be followed with the following responses/exceptions:

- 4.a - Our understanding is that the NRC Staff feels it is necessary for Unit 2 of Farley Nuclear Plant to remove and analyze three steam generator tube support plate (TSP) intersections in order to receive approval of the TSP voltage-based repair criteria. As we understand it, the NRC position is based on 3 things: (1) the pulled tube recommendations provided in draft Generic Letter 94-XX; (2) the staffs' concern that there may be changes in degradation morphology which only pulled tube examinations will detect; and (3) that additional leakage and burst test data is required to supplement the industry data base for 7/8 inch diameter tubing. We concur that pulled tube data provides valuable information; however, based on our understanding of the issues, the current Staff position appears to be neither technically nor economically justified for Farley Unit 2.

The 7/8 inch data base with the most limited number of data points is the leak rate data base, i.e., voltage versus leak rate datapoints. Based on past experience, 7/8 inch tubes have not leaked at steam line break differential pressures at voltages less than 2.5 volts. Based on the growth rates expected on Unit 2 and the fact that the last inspection was conducted with a 1.0 volt repair criteria, it is unlikely that a tube with a significant voltage, e.g., greater than 3.5 volts, would be available to be pulled. In fact, we estimate that there will be only 5 tubes with TSP intersection flaws greater than 2.0 volts in the upcoming Unit 2 outage. Of these 5, some will be in the periphery of the steam generator where tube pulls are not possible or in the higher support plate elevations where the likelihood of a successful tube pull is extremely low. While pulling intersections with voltages less than 2.5 volts does add data points to the burst and probability of leakage data bases, it does not add datapoints to the most limited database, the voltage versus leakage database.

From a morphology standpoint, a total of 5 steam generator tube intersections from Farley Unit 1 and 13 from Farley Unit 2 have been pulled and evaluated since 1985. Included in the alternate repair criteria's databases are 3 intersections from Farley Unit 1 and 6 intersections from Farley Unit 2. Two intersections from Unit 1 with relatively high voltages, i.e., 3.3 and 3.2 volts, were removed in 1992 and destructively examined to support Farley interim plugging criteria/alternate repair criteria applications. The existing tube pull results substantially confirm that the dominant flaw feature affecting the integrity at Farley is axially oriented outside diameter stress corrosion cracking. There have been no known chemistry

excursions in the Farley steam generators; consequently, changes in morphology or high growth rates are not expected.

Furthermore, any tube pull exposes a utility to the problems inherent with such a difficult operation. As an example, steam generator tubes have been known to break when being pulled through the TSPs. If a tube breaks and the tube remnant in the steam generator can not be pulled or stabilized, the surrounding eight tubes could require plugging to ensure there is no possibility of tube penetration during the following cycle. To require a utility to be exposed to these risks when the probability of obtaining significant data is so low is not justifiable.

Finally, the cost associated with tube pulls are high. Southern Nuclear estimates that a tube pull on Unit 2 would result in the following costs:

	1 tube	Additional tubes
Mobilization	\$330,000	\$29,000/tube
Analysis	\$250,000	\$100,000/tube
Critical Path Schedule	3 days	1 day/tube
Dose (no unexpected problems)	3.0 REM	2.6 REM/tube

Based on this discussion, Southern Nuclear does not intend to pull tubes from Unit 2 during the Spring '95 outage. However, Southern Nuclear will pull a tube during the upcoming Unit 1 outage in Fall '95. Unit 1 will be completing its first operating cycle after implementing a 2.0 volt repair criteria. As a result, the likelihood of being able to pull a tube which will add significantly to the voltage versus leak rate database is much greater on Unit 1 than on Unit 2.

As always, if unusual indications are found in the Farley steam generators, tube pulls will be considered.

(7) Results will be reported per the guidance of Section 6 of Enclosure 1 of the draft Generic Letter with the following exceptions approved by the NRC Staff:

- 6.a - The calculation of leakage and of conditional burst probability to be performed prior to returning the steam generators to service (Mode 4) will use the as-found end-of-cycle voltage distribution (as opposed to the projected distribution).
- 6.b(a) - The results of any metallurgical examinations performed for tube intersections removed from the steam generator will be submitted to the NRC Staff within 120 days.

(8) The paragraph associated with mid-cycle inspection limits has been deleted pending issuance of the final Generic Letter and revised repair limit formulas.

The voltage based repair criteria has been revised to indicate that the 2.0 volt repair criteria are applicable for the Eleventh Operating Cycle only.



Additional requested information:

- 1.b.1 - Concerning the deformation or collapse of steam generator tubes following a loss of coolant accident plus a safe shutdown earthquake event, a Farley specific analysis was docketed under WCAP-12871, Revision 2 dated February 1992. As a result of this analysis, no tubes will be excluded from using the voltage repair criteria.

Reference:

1. Letter dated April 22, 1994, to Jack Strosnider, NRC, from David A. Steininger, EPRI, "Exclusion of Data for Alternate Repair Criteria (ARC) Databases Associated with 7/8 inch Tubing Exhibiting ODS-CC".