December 18, 1997

Mr. Garry L. Randolph
Vice President and Chief Nuclear Officer
Union Electric Company
Post Office Box 620
Fulton, Missouri 65251

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING UNION ELECTRIC COMPANY'S REQUEST FOR AMENDMENT TO THE TECHNICAL SPECIFICATIONS FOR CALLAWAY PLANT, UNIT 1 (TAC NO. M95204)

Dear Mr. Randolph:

The NRC staff has reviewed Union Electric Company's April 12, 1996 application, and supplements, to change the Technical Specifications and Bases to allow the installation of Framatome Electrosleeves in the Callaway Plant, Unit 1 steam generators. As a result of the review, the staff has determined that additional information is needed to complete the review. The information needed is detailed in the enclosure.

To assist the NRC staff in meeting its review schedule, we request that you respond to the RAI in writing as soon as possible, with priority placed on Questions 1 through 6.

If you have any questions, please contact me at (301) 415-1362.

Sincerely,

Original Signed By

Kristine M. Thomas, Project Manager
Project Directorate IV-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

DFO1

Docket No. 50-483

Enclosure: Request for Additional Information

cc w/encl: See next page

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cc w/encl:
Professional Nuclear
Consulting, Inc.
19041 Raines Drive
Derwood, Maryland 20855

Gerald Charnoff, Esq.
Thomas A. Baxter, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, N.W.
Washington, D.C. 20037

Mr. H. D. Bono
Supervising Engineer
Quality Assurance Regulatory Support
Union Electric Company
Post Office Box 620
Fulton, Missouri 65251

U.S. Nuclear Regulatory Commission
Resident Inspector Office
8201 NRC Road
Steedman, Missouri 65077-1302

Mr. J. V. Laux, Manager
Quality Assurance
Union Electric Company
Post Office Box 620
Fulton, Missouri 65251

Manager - Electric Department
Missouri Public Service Commission
301 W. High
Post Office Box 360
Jefferson City, Missouri 65102

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
Harris Tower & Pavilion
611 Ryan Plaza Drive, Suite 400
Arlington Texas 76011-8054

Mr. Ronald A. Kucera, Deputy Director
Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102

Mr. Otto L. Maynard
President and Chief Executive Officer
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, Kansas 66839

Mr. Dan I. Bolef, President
Kay Drey, Representative
Board of Directors Coalition
for the Environment
6267 Delmar Boulevard
University City, Missouri 63130

Mr. Lee Fritz
Presiding Commissioner
Callaway County Court House
10 East Fifth Street
Fulton, Missouri 65151

Mr. Alan C. Passwater, Manager
Licensing and Fuels
Union Electric Company
Post Office Box 66149
St. Louis, Missouri 63166-6149

REQUEST FOR ADDITIONAL INFORMATION

REGARDING REVIEW OF LICENSE AMENDMENT REQUEST

TO ALLOW FRAMATOME ELECTROSLEEVING OF STEAM GENERATOR TUBES

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

The staff has reviewed Union Electric Company's license amendment request to allow installation of Framatome Electrosleeves in the Callaway Plant, Unit 1 steam generators and has determined that the following additional information is needed to proceed with the review.

1. Attachment 3 of the September 10, 1997, submittal contains a discussion of the lab grown ODSCC data sub-set. Fourteen of the samples contained flaws that were essentially 100 percent through the parent tube. Half of these samples were undersized more than the proposed 12 mil NDE uncertainty value. The other half were not. During the December 9, 1997 meeting, a technical basis was provided to the NRC staff for the UT sizing differences between the two subsets. Document the technical basis along with all supporting data. Be sure to include destructive examination data for all fourteen samples such as flaw extents (e.g., axial or circumferential) and descriptive photographs of etched samples that support the technical basis.

2. Two examples of incorrect data being supplied to the NRC staff were recently identified. The NRC staff identified errors in Table 1.2 of the September 10, 1997 submittal. In addition, the licensee notified NRC staff in the September 10, 1997, submittal that some data previously submitted to NRC staff was incorrect. Discuss the quality assurance process (for both the licensee and the vendor), and how it meets 10 CFR 50, Appendix B criterion. Discuss whether you have identified the cause of these errors. Submit a copy of your corrective action program relative to these issues. What are the implications this has for other electrosleeve submittals or other parts of the program?

3. Section 4.3.2, "Structural Margin for Circumferential Part-TW Flaw," of Document 32-1264476-00 submitted on September 5, 1997, discusses the approach utilized to determine the structural limits for circumferentially-oriented flaws in electrosleeve repairs. The text cites two references as the source of an equation and associated empirical constants listed in the section. The staff has reviewed Reference 2.6 (Ranganath and Mehta, "Engineering Methods for the Assessment of Ductile Fracture Margin in Nuclear Power Plant Piping") and Reference 2.9 (Kurihara et al, "Estimation of the Ductile Unstable Fracture of Pipe with a Circumferential Surface Crack Subjected to Bending") and concluded that the equation and associated empirical constants referenced in Section 4.3.2 do not come from the noted references. Clarify the source of the equation and constants listed in this section, or provide the associated technical basis for the part through-wall circumferential flaw limit.

4. FTI procedure 54-ISI-168, Rev. 1 states that angle beam scanning for reflectors shall be performed from two opposing beam directions, where practical, or from one direction, as a minimum. FTI stated at the December 8, 1997, meeting that they did collect data from tube specimens used in their September 10, 1997 submittal from two directions. However, the submittal contained the examination results from only one direction examinations. The data from seven tubes with lab generated flaws exhibited a large number of flaw under calls. Experience in UT indicates that examinations conducted from two directions provide more accurate results than one sided examinations. Provide a table that contains comparisons between destructive examination depths and UT examination depths derived from analyzing the data from two directions for the seven tubes.

5. In the September 10, 1997 submittal, FTI discusses the use of corner trap signals for depth sizing flaws. The submittal also mentions using tip diffraction signals for discerning flaws. Tip diffraction is considered an effective depth sizing technique. In the meeting on December 8, 1997, FTI stated that they have been unsuccessful with tip diffraction for depth sizing. Instead, for depth sizing, FTI relies on corner trap signals that walk up the flaw face. Provide an explanation with supporting physical data, if available, to explain the ineffectiveness of tip diffraction in sizing flaws in SG tubes. The explanations should include what techniques are available or being developed for discerning multiple tip signals (SCC) and low sound-to-noise ratios (tip vs corner trap).

6. NRC has concluded that an electrosleeve tube pull program will be needed to provide confirmatory data to address potential degradation and NDE uncertainties. The tube pull program should be based both on length of "time-in-service" and condition-based (i.e., based on NDE indication of Electrosleeve degradation). Union Electric should propose a program for NRC staff review and commit to it through a TS change or license condition.

7. Union Electric Company's proposed technical specifications currently reference Revision 1 of the electrosleeving topical report. A substantial amount of additional work has been completed in support of the electrosleeving process since Revision 1 was issued in March 1996. Update the topical report to reflect new data and any necessary changes to Revision 1. For example:

   - Types of parent tube degradation electrosleeves are or are not qualified to repair (e.g., IGA, stress corrosion cracking, pitting, etc.) and summary of respective UT qualification data.

   - Limitations on locations electrosleeves can be applied (e.g., no application to UBends, dented intersections greater than a predetermined size [see Question 9 below], etc.).

- Additional discussion on flaw specific structural limits (i.e., the discussion of Issue 2 in the September 10, 1997, submittal describes flaw specific structural limits which differ from the structural limits described in Table 8.5.1 of Revision 1 of the topical report).

- Any changes to the topical report regarding material properties required to support the flaw specific structural limits.

- Summaries of UT qualification work (e.g., depth sizing qualification) updated since Revision 1 of the topical report was written.

In addition, modify the technical specifications accordingly to reference the updated version of the topical report.

8. The initial inspection scope, as described in Table 4.4-3 of the Technical Specifications, for future ISI inspections of SG sleeves should consist of a minimum of 20 percent of <u>each</u> <u>type</u> of installed sleeve. Revise the proposed technical specifications to reflect this.

9. The February 5, 1997, submittal discusses the ability to inspect dented intersections containing electrosleeves. It implies that there may be limits on the size of dents that can be reliably inspected. Please clarify if there are limits, what those limits are, and the size of dents which will be electrosleeved. Summarize the technical basis for these limits and how these limits were verified in the NDE qualification. Portions of previous submittals may be referenced if applicable. These limits and a summary of the technical basis should be documented in the next revision of the topical report (as discussed in Question #7 above).

10. The response to Issue #1 in the September 10, 1997, submittal indicates that six tubes from the Salem Unit 1 SG contained dents. Please describe the size of these dents and whether they are within the dent size limits as discussed in response to Question #9 above.

11. It is not clear whether the licensee intends to repair tubes containing IGA with electrosleeves. Please clarify. If electrosleeves will be applied to tubes with IGA, provide a summary of the inspection qualification data that supports this application. In addition, the revised topical report (discussed in Question #7) should state whether electrosleeving will be applied to SG tubes with IGA. If electrosleeving is to be applied to SG tubes with IGA, the summary of the inspection qualification data requested above should also be included in the revised topical report.

12. Table 1.0 of the submittal dated February 5, 1997, states that the sleeve structural limit for locked tubes in the peripheral TSP wedge regions is lower than that for unlocked tubes. Clarify whether electrosleeving will be permitted in the peripheral TSP wedge regions where locking may be present. If electrosleeve repairs will be applied

in these areas, discuss the basis for the structural limits for the Callaway plant. Otherwise, discuss how the currently proposed technical specifications exclude repairs for potentially locked tubes. Per discussions held in the meeting on November 20, 1997, the licensee indicated that the locking phenomenon did not apply to Westinghouse Model F steam generators. If this is the basis for not utilizing locked tube structural limits, provide the basis in writing for this assumption. Include in the response a discussion on the potential for secondary side corrosive degradation that could lead to tube support plate locking. Also discuss the results of secondary side steam generator inspections completed in these areas to verify these assumptions.

13. At the meeting on December 9, 1997, it was stated that additional work was being performed as a result of feedback from the peer review of the UT process and qualification. Provide the results of the additional work (e.g., additional pit and unbond samples, etc.).

14. In recent years, UT techniques have made large improvements in detecting and sizing flaws. FTI selected a basic 45 shear UT technique with computer assisted flaw analysis. This UT technique, however, exhibited limited effectiveness in sizing deep lab grown flaws. Explain FTI's evaluation/review (in more detail than FTI's February 5, 1997 submittal) of other UT techniques (divergent transducers, convergent transducers with narrow band frequencies, computer focusing, surface waves with the detail on surface roughness discussed at the December 9, 1997 meeting), higher frequencies, and different transducer angles. Where test results supporting the above discussion are known, they should be summarized and referenced in the submittal. Note: the staff has no questions on the technique used for depth sizing with the 0 degree transducer.

15. The procedure 54-ISI-168 Rev 1, dated January 28, 1997, was in the process of being updated with the findings from the peer review. Provide the NRC staff with a copy of the updated procedure and the report containing the peer review findings and/or recommendations.