50-482



UNITED STATES NUCLEAR REGULATORY COMMISSION WASHINGTON, D.C. 20555-0001

July 16, 1998

LICENSEE: Union Electric Company

FACILITY: Callaway Plant, Unit 1

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SUBJECT: MEETING WITH UNION ELECTRIC COMPANY REGARDING THE PROPOSED AMENDMENT TO THE TECHNICAL SPECIFICATIONS TO ALLOW THE INSTALLATION OF ELECTROSLEEVES IN THE STEAM GENERATORS AT THE CALLAWAY PLANT, UNIT 1 (TAC NO. M95204)

On Wednesday, July 7, 1998, a meeting was held between Union Electric Company (UE) and the NRC to discuss the status of the NRC's review of UE's proposed technical specification amendment to allow the installation of electrosleeves in the Callaway Plant steam generators. Attachment 1 is a list of attendees. Attachment 2 is the licensee's presentation material used during the meeting.

In a May 20, 1998 letter to UE, in which the staff discussed concerns regarding UE's responsiveness to requests for information pertaining to the review, the staff indicated it was interested in meeting with UE to understand UE's plans relative to the electrosleeving amendment, including UE's views of the alternatives discussed in the letter. The staff has determined that to date, UE has not provided the technical basis required to approve the use of the electrosleeve technology, primarily due to problems of inspectability of the reactor coolant pressure boundary once the sleeves are installed. Representatives from Framatome Technologies, the developer of the electrosleeve process, and representatives from TVA (Sequoyah) and Duquesne Light (Deaver Valley) were also present and participated in the meeting. Duquesne Light has requested approval to install electrosleeves in the Beaver Valley steam generators and is working with UE and Framatome Technologies in addressing the staff's questions on this new technology.

UE indicated that it, as well as Duquesne Light, planned to pursue an alternative amendment that would limit the period of time electrosleeves would be installed and in service to two operating cycles while the issue of inspectability is being resolved. In addition to providing a supplement to the proposed amendment, specifically requesting the limited use of the electrosleeves, UE and Duquesne Light indicated that they will submit an updated topical report, which will fully respond to the staff's questions applicable to a two cycle amendment and include a risk assessment for a two cycle amendment. In addition, UE will provide an analysis of the root cause(s) of the quality assurance issues contained in the submittals provided to the staff for review, and the corrective actions taken to prevent recurrence. UE will include in the analysis, summaries of (1) the reports from the audits performed at Frammome Technologies, (2) UE and Framatome Technologies procedures that permitted the problement sto occur, and (3) a revised or new procedure that will prevent recurrence. Duquesne Light will also respond to the quality assurance issues as they apply to Framatome Technologies. UE and Duquesne Light indicated that the above information will be submitted to the staff for review by August 31, 1998.

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To date, the Callaway Plant has been the lead plant pursuing approval for the installation of electrosleeves, with installation planned for Fall 1999. However, Duquesne Light indicated they would like to install electrosleeves in the Beaver Valley Unit 2 steam generators in early 1999. The utilities will notify the staff in the near future if a change in the lead plant is made.

At the conclusion of the meeting, Framatome Technologies presented a summary of its effort in pursuing techniques for inspection of the reactor coolant pressure boundary following installation of electrosleeves.

Original Signed By

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

Docket No. 50-482

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Attachments:	1.	List of Nieeting Attendees
	2.	Meeting Presentation Material

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

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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 Post Office 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

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

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

MEETING WITH UNION ELECTRIC COMPANY

LIST OF MEETING ATTENDEES

July 7, 1998

Union Electric Company

E. Kahl

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- D. Shafer
- T. Herrmann

Framatome Technologies

- J. Helmey
- J. Galford
- J. Fleck
- C. England
- R. Edwards

ABB-Combustion Engineering

L. Collins

Southern California Edison

J. Fox

McGraw-Hill

D. Stelfox

Argonne National Laboratory

B. Shack

Duquesne Light

G. Kammerdeiner

Tennessee Valley Authority

D. Goetchens

i. Cothron

NRC

1	Κ.	Thomas
1	R .	Smith
1	D.	Brinkman
1	Α.	Dromerick
1	F.	Lyon
1	Γ.	Sullivan
(G.	Hornseth
(С.	Beardslee
1	D.	Jackson
1	В.	Sheron
۱	N.	Bateman
1	И.	McNeil
	L.	Lund
	-	A de com las e

- E. Murphy
- P. Rush
- R. Hernan

Attachment 1

Agenda

- Introduction and Background
- 2-Cycle Amendment issues
- Risk Assessment
- · Follow on actions
- Conclusions
- Introduction to new UT methodologies

Background

- Callaway Amendment Request- April '96
- Follow-on Plant Submittals
- Calvert Cliffs
- South Texas
- Maine Yankee
- Beaver Valley

Background (cont.)

- Main Review Issue
- NDE Techniques
- May 20, 1998 Letter
- 2-cycle approval
- Beaver valley need for approval Dec. '98

Electrosleeve 2-cycle Approval

Proposed Responses to NRC Issues

RAI #2: QA Issues

- FTI corrective action request (CAR) actions
- Review all RAI responses for accuracy
- Correct any errors found
- Determine causes of submittal errors
- Provide corrective training of personnel
- Completed by 7/30
- FTI internal QA audit performed

RAI #2: QA Issues (Con't)

- AmerenUE Supplier Quality audit of FTI performed
- NUPIC audit of FTI in July
- Callaway Admin. Procedure (APA-ZZ-0108) for License Amendments revised to address general submittal quality and to be revised for implementation issues.

RAI #7: Topical Report

- Topical Revision
- In Progress
- Completed by 8/14/98
- Revision Method
- All RAIs through 2/24/98 will be incorporated
- Record of revision will be provided

RAI #8: Tech Spec Changes

- Callaway providing new markups for discussion
- Mark-ups incorporate previously approved amendment
- 2-cycle approach incorporated
- Sample size clarification incorporated.
- Beaver Valley Tech Spec changes are similar

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

4.4.5.4 Acceptance Criteria

- a. As used in this specification:
 - Imperfection means an exception to the dimensions, finish or contour of a tube from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube wall thickness, if detectable, may be considered as imperfections;
 - <u>Degradation</u> means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube;
 - Degraded Tube means a tube containing imperfections greater than or equal to 20% of the nominal wall thickness caused by degradation;
 - <u>% Degradation</u> means the percentage of the tube wall thickness affected or removed by degradation;
 - Defect means an imperfection of such severity that it exceeds the plugging or repair limit. A tube or sleeve containing a defect is defective;
 - 6) <u>Plugging or Repair Limit</u> means the imperfection depth at or beyond which the tube shall be removed from service by plugging or repaired by sleeving and is equal to 40% of the nominal tube wall thickness. The plugging limit for laser welded sleeves is equal to 39% of the nominal sleeve wall thicknessx.
 - 7) Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a lossof-coolant accident, or a steam line or feedwater line break as specified in Specification 4.4.5.3c., above:
 - 8) <u>Tube Inspection</u> means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg. For a tube repaired by sleeving, the tube inspection shall include the sleeved portion of the tube;

The plugging limit for Electrosleeves is equal to 20% of the nominal sleeve well thickness;

CALLAWAY - UNIT 1

Amendment No. 116 (correction)

REACTOR COOLANT SYSTEM

SURVEILLANCE REQUIREMENTS (Continued)

- 9) Preservice Inspection means an inspection of the full length of each tube in each steam generator performed by eddy current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed prior to initial POWER OPERATION using the equipment and techniques expected to be used during subsequent inservice inspections; and
- 10) <u>Tube Repair</u> refers to a process that reestablishes tube serviceability. Acceptable tube repairs will be performed by the following processes:
 - a) Laser welded sleeving as described in Westinghouse Technical Report WCAP-14596-P, "Laser Welded Elevated Tube Sheet Sleeves for Westinghouse Model F Steam Generators." March 1996 (W Proprietary)

INSERT A HERE

b. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug or repair by sleeving all tubes exceeding the plugging or repair limit and all tubes containing through-wall cracks) required by Tables 4.4-2 and 4.4-3.

4.4.5.5 Reports

- a. Within 15 days following the completion of each inservice inspection of steam generator tubes, the number of tubes plugged or repaired in each steam generator shall be reported to the Commission in a Special Report pursuant to Specification 6.9.2;
- b. The complete results of the steam generator tube inservice inspection shall be submitted to the Commission in a Special Report pursuant to Specification 6.9.2 within 12 months following the completion of the inspection. This Special Report shall include:
 - 1) Number and extent of tubes and sleeves inspected,
 - Location and percent of wall-thickness penetration for each indication of an imperfection, and
 - Identification of tubes plugged or repaired.
- c. Results of steam generator tube inspections, which fall into Category C-3, shall be reported in a Special Report to the Commission pursuant to Specification 6.9.2 within 30 days and prior to resumption of plant operation. This report shall provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

CALLAWAY - UNIT 1

3/4 4-15

Amendment No. 116

INSERT A TO TS 4.4.5.4.a.10 (Page 3/4 4-15)

 b) Electrosleeving as described in Framatome Technical Report BAW-10219P, Revision 2, "Electrosleeving Qualification for PWR Recirculating Steam Generator Tube Repair." Any steam generator tube containing an Electrosleeve which has been inservice for 2 cycles of plant operation must be removed from service.

INSERT B TO TS BASES 3/4.4.5 (Page B 3/4 4-3)

The plugging or repair limit for the pressure boundary portion of Electrosleeves is determined to be 20% through wall of the nominal sleeve wall thickness (as determined by NDE).

TABLE 4.4-3

STEAM GENERATOR REPAIRED TUBE INSPECTION

1ST SAMPLE INSPECTION			2ND SAMPLE INSPECTION	
Semple Size	Result	Action Required	Result	Action Required
A minimum of 20% of repaired tubes (1) (2)	C-1	None	N.A.	N.A.
	C-2	C-2 Plug defective repaired lubes and inspect 100% of the repaired tubes in this S.G.	C-1	None
			C-2	Flug delective repaired tubes
			C-3	Perform action for C-3 result of first sample
	C-3	C-3 Inspect all repaired tubes in this S.G., plug defective tubes and inspect 20% of the repaired tubes in each other S.G. Notification to NRC pursuant to \$50.72 (b)(2) of 10 CFR Part 50	All other S.G.s are C-1	None
			Some S.G.s C-2 but no additional S.G. are C-3	Perform sclion for C-2 result of first sample
			Additional S.G. is C-3	Inspect all repaired tubes in each S.G. and plug defective tubes. Notification to NRC pursuant to [50.72 (b)(2) of 10 CFR Part 50

(1) Each repair method is considered a separate population for determination of scope expansion. (2) The injection of repaired tubes may be performed on tubes from 1 to 4 steam generators based on outage plans.

initial inservice inspection and

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CALLAWAY - UNIT 1

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Amendment No. 116

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REACTOR COOLANT SYSTEM

BASES

STEAM GENERATORS (Continued)



The plugging or repair limit for the pressure boundary portion of laser welded sleeves is determined to be 39% through-wall (by NDE). The laser welded sleeve repair limit applicable to the pressure boundary portion of the sleeve is established in WCAP-14596. Appropriate NDE techniques are also INCHET discussed in WCAP-14596.

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Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be reported to the Commission pursuant to Specification 6.9.2 prior to resumption of plant operation. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

3/4.4.6.1 LEAKAGE DETECTION SYSTEMS

The RCS Leakage Detection Systems required by this specification are provided to monitor and detect leakage from the reactor coolant pressure boundary. These Detection Systems are consistent with the recommendations of Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

3/4.4.6.2 OPERATIONAL LEAKAGE

PRESSURE BOUNDARY LEAKAGE of any magnitude is unacceptable since it may be indicative of an impending gross failure of the pressure boundary. Therefore, the presence of any PRESSURE BOUNDARY LEAKAGE requires the unit to be promptly placed in COLD SHUTDOWN.

Industry experience has shown that while a limited amount of leakage is expected from the RCS, the unidentified portion of this leakage can be reduced to a threshold value of less than 1 gpm. This threshold value is sufficiently low to ensure early detection of additional leakage.

The total steam generator tube leakage limit of 600 gpd for all steam generators not isolated from the RCS ensures that the dosage contribution from the tube leakage will be limited to a small fraction of 10 CFR Part 100 dose guideline values in the event of either a steam generator tube rupture or steam line break. The 600 gpd limit is conservative compared to the assumptions used in the analysis of these accidents. The 150 gpd leakage limit per steam generator ensures that steam generator tube integrity is maintained in the event of a main steam line rupture or under LOCA conditions.

The 10 gpm IDENTIFIED LEAKAGE limitation provides allowance for a limited amount of leakage from known sources whose presence will not interfere with the detection of UNIDENTIFIED LEAKAGE by the Leakage Detection Systems.

The CONTROLLED LEAKAGE limitation restricts operation when the total flow from the reactor coolant pump seals exceeds 8 gpm per RC pump at a nominal RCS pressure of 2235 psig. This limitation ensures adequate performance of the RC pump seals.

CALLAWAY - UNIT 1

Amendment No. 116

RAI #13: Pits and Disbonds

- Number of samples meet EPRI Appendix J EPRI ROMT PIT 39 DISBOND
- Uncertainties are unchanged

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Pit Depth, RMSE Disbond Length, RMSE

Risk Assessment Methodology

- Follow guidance of Draft Reg. Guide 1.174
- Use the 4 Element Approach
- Definition of Proposed Change
- Engineering Analysis
- Implementation and Monitoring Program
- Submittal
- Change in risk is small when Electrosleeves are installed over tube defects and left in service

Risk Assessment Engineering Analysis

- Defense-in-depth criteria is satisfied for defective tubes w/ sleeve installed
- Safety Margins are maintained for applicable Design Basis Events
- ASME Code calculations
- Fatigue testing
- Evaluation of risk compared to plugging
- Quantitative
- » Satisfy I x 10⁻² Threshold Against Tube Rupture
- Qualitative
- » Sleeve Material Assessment

Implementation/Monitoring Program **Risk Assessment**

- Inspect all sleeved tubes after one cycle
- Remove and destructively examine degraded sleeves per the EPRI guidelines
- (applicable to Beaver Valley, already in Callaway Lower Tech Spec Operating Leakage to 150 gpd (Consistent w/ GL 95-05 and DG-1074) Tech Specs)

Licensing Issues

- Beaver Valley Unit 2 outage in early '99
- Clarification on 2-cycle approval
- Schedule for approval
- Topical and 2-cycle RAI responses by Aug. 31, Callaway and Beaver Valley to submit revised 1998
- Dec. 31, 1998 approval to support Beaver Valley outage

Conclusions

- Staff Comments
- Follow-up Actions

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Review of New UT Methods

- Full Skip Normalization (FSN)
- GO / No-Go method to repair on detection
- Mode-Converted Sizing
- For use in Operational Assessment and condition monitoring.