



Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

May 20, 1994

Mr. William T. Russell, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Application for Amendment to Facility Operating Licenses:

Byron Station Units 1 and 2
(NPF-37/66; NRC Docket Nos. 50-454/455)

Braidwood Station Units 1 and 2
(NPF-72/77; NRC Docket Nos. 50-456/457)

"Steam Generator Tube F* Analysis Methodology"

Reference: Babcock & Wilcox Nuclear Technologies (BWNT) Topical Report
BAW-10196 P, Revision 1, "W-D4 F* Qualification Report"

Dear Mr. Russell:

Pursuant to 10 CFR 50.90, Commonwealth Edison Company (CECo) proposes to amend Appendix A, Technical Specifications of Facility Operating Licenses NPF-37, NPF-66, NPF-72, and NPF-77. The proposed amendment request revises Technical Specification 3/4.4.5, "Steam Generators", to allow for an alternate tube repair criteria, F*, for the Unit 1 SGs at both Byron and Braidwood Stations. The proposed changes clearly indicate that the F* criteria is only applicable to Unit 1. The License for Unit 2 at each station is affected only due to the fact that Units 1 and 2 utilize common Technical Specifications.

This alternate repair criteria qualification is documented in Babcock & Wilcox Nuclear Technologies (BWNT) Topical Report BAW-10196 P Revision 1, "W-D4 F* Qualification Report", included in Attachment 5.

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A detailed description of the proposed changes is presented in Attachment 1. Attachment 1 discusses the design differences between the Unit 1 and 2 steam generators and thus why the F* criteria is being requested only for the Unit 1 SGs.

The revised Technical Specification pages are contained in Attachment 2.

The proposed changes have been reviewed and approved by the On-site and Off-site Review Committees in accordance with CECo procedures. CECo has reviewed this proposed amendment in accordance with 10 CFR 50.92(c) and has determined that no significant hazards consideration exists as documented in Attachment 3. An Environmental Assessment has also been completed and is contained in Attachment 4.

As mentioned above, Attachment 5 contains Babcock & Wilcox Nuclear Technologies (BWNT) Topical Report BAW-10196 P, Revision 1, "W-D4 F* Qualification Report" (Proprietary) and accompanying affidavit.

Attachment 6 contains a non-proprietary version of the Topical Report.

As Topical Report BAW-10196 P, Revision 1, "W-D4 F* Qualification Report" contains information proprietary to BWNT, it is supported by an affidavit signed by BWNT, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.790 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to BWNT be withheld from public disclosure in accordance with 10 CFR Section 2.790 of the Commission's regulations.

CECo is notifying the State of Illinois of our application for these amendments by transmitting a copy of this letter and the associated attachments to the designated State Official.

CECo respectfully requests approval of the F* criteria amendment prior to the Byron Unit 1 refueling outage, B1R07, scheduled for April 1996. Should earlier approval be possible, implementation of the F* criteria could yield significant cost savings for CECo during the upcoming outage on Byron Unit 1 scheduled for September 9, 1994.

May 20, 1994

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by other CECo employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Please address any comments or questions regarding this matter to this office.



Respectfully,

A handwritten signature in cursive script that reads "Joseph A. Bauer".

Joseph A. Bauer
Nuclear Licensing Administrator

A handwritten signature in cursive script that reads "Mary Jo Yack" followed by the date "5-20-94".

JAB/gp

Attachments

cc: George F. Dick, Byron Project Manager - NRR
R. R. Assa, Braidwood Project Manager - NRR
H. Peterson, SRI - Byron
S. G. Dupont, SRI - Braidwood
B. Clayton, Branch Chief - Region III
Office of Nuclear Facility Safety - IDNS

**PROPOSED LICENSE AMENDMENT
"Steam Generator Tube F* Analysis Methodology"**

INDEX

Attachment 1	Detailed Description of Proposed Change
Attachment 2a	Proposed Changes to Appendix A, Technical Specifications for Facility Operating Licenses NPF-37 and NPF-66 (Byron)
Attachment 2b	Proposed Changes to Appendix A, Technical Specifications for Facility Operating Licenses NPF-72 and NPF-77 (Braidwood)
Attachment 3	10CFR50.92 Significant Hazards Consideration
Attachment 4	Environmental Assessment
Attachment 5	Babcock & Wilcox Nuclear Technologies (BWNT) Topical Report BAW-10196 P Revision 1, "W-D4 F* Qualification Report" (Proprietary), and accompanying affidavit
Attachment 6	Babcock & Wilcox Nuclear Technologies (BWNT) Topical Report BAW-10196 Revision 0, "W-D4 F* Qualification Report" (Non-Proprietary)

ATTACHMENT 1

DETAILED DESCRIPTION OF PROPOSED CHANGE

Description of Current Requirements:

The existing Technical Specification 4.4.5 provides the steam generator (SG) surveillance requirements for sample selection, inspection, inspection frequency, acceptance criteria, and required reports to the NRC. Currently at Byron and Braidwood, if a steam generator tube is found to be defective, the only remedial action allowed by the Technical Specification is to remove the tube from service by plugging it or repairing the tube with the use of a sleeve.

Bases for the Current Requirements:

The surveillance requirements for inspection of the SG tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of SG tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of SG tubes is essential to maintain surveillance of the condition of the tubes to detect evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or in service conditions that lead to corrosion. Inservice inspections of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken. The primary to secondary pressure boundary is maintained by plugging or sleeving all tubes with imperfections exceeding 40% of the tube nominal wall thickness.

Description of the Need for Amending the Technical Specifications:

At Byron and Braidwood, Unit 1 has four D-4 model SGs and Unit 2 has four D-5 SGs. The significant differences are that the D-4s have 0.75" thick carbon steel tube support plates with drilled hole tube supports. The D-5s have 1.125" thick stainless steel support plates with Quatrefoil tube supports. Both the D-4 and D-5 SGs have Inconel 600 tubes. The D-4 SG tubes were mill annealed and hard rolled into the tubesheet during initial assembly. Subsequently, the D-4 tubes were shot peened in the tubesheet area and stress relieved in the U-bend area to relieve residual stresses. The D-5 tubes were heat treated and hydraulically expanded into the tubesheet during initial assembly. Over the past several refueling outages the number of SG tubes plugged per outage has been increasing. At each site, Unit 1 has had more defective tubes than Unit 2 due primarily to the design differences between the D-4 and D-5 SGs as mentioned above.

The number of SG tubes requiring corrective action increased significantly at Byron Unit 1 during the spring 1993 refueling outage. It is anticipated that this trend will continue in the fall 1994 refueling outage. In order to minimize the number of tubes being plugged, increased flexibility is necessary to reduce the number of defective SG tubes. Consequently, an alternate repair criteria (ARC) previously accepted by the NRC at other sites is being requested for consideration. Designated as the F* criteria, this methodology establishes a means to justify leaving tubes in service which have indications within the rolled region of the tubesheet. Application of this ARC must restrict leakage to within station Technical Specification limits as defined in 3/4.4.6.2.c "Operational Leakage".

The alternate repair criteria designated as F* was qualified by Babcock & Wilcox Nuclear Technologies (BWNT) Topical Report BAW-10196 P, Revision 1, "W-D4 F* Qualification Report" contained in Attachment 5. A non-proprietary version of this report is included in Attachment 6.

Description of the Proposed Amendment:

The changes proposed in the amendment are contained in five inserts to the surveillance requirements for the Byron and Braidwood Technical Specifications. The inserts are applicable to Unit 1 but not Unit 2. The inserts reflect the option to allow tubes to remain in service using an alternate repair criteria designated as F*. Using the ARC also results in changes to the sample selection, inspection criteria, and reporting requirements. New terms, "F* Distance" and "F* Tubes", are defined to clarify the acceptance criteria to be used during the inservice inspections to allow the tube to remain in service.

Specification 4.4.5.2, Steam Generator Tube Sample Selection and Inspection

The change to this section of the surveillance requirements will require that all tubes specified as an F* Tube shall be included as part of the tubes to be inspected in addition to the sample selection made in accordance with 4.4.5.2.b.1 through 4.

Insert "A" adds section 4.4.5.2.b.5, requiring all in service tubes which have had the F* criteria applied to them be inspected in the tubesheet region each scheduled refueling outage. This requirement is in addition to the 3% sample selection specified in 4.4.5.2. Insert "A" reads as follows:

"In addition to the sample selection required in 1 - 4 above, all tubes which remain in service due to the application of the F* criteria will be inspected in the tubesheet region."

Specification 4.4.5.4, Acceptance Criteria

This specification has several changes which reflect the option to apply the alternate repair criteria, F*, to the applicable SG tubes for Unit 1. The existing plant Technical Specifications tube plugging criteria apply throughout the tube length and do not take into account the reinforcing effect of the tubesheet on the external surface of the tube. The presence of the tubesheet will constrain the tube and will complement its integrity in that region by precluding tube deformation beyond its expanded outside diameter. The resistance to tube rupture, tube pullout, and tube collapse is significantly strengthened by the tubesheet. In addition, the proximity of the tubesheet significantly affects the leak behavior of through wall tube cracks in this region.

Insert "B" clarifies that the plugging or repair limit imperfection depth does not apply to defects that satisfy the F* criteria by revising the plugging or repair limit definition. If the defect is within the tubesheet region below the F* distance for a Unit 1 steam generator, the tube is allowed to remain inservice. Insert "B" reads as follows:

"For Unit 1, this definition does not apply to defects in the tubesheet that meet the criteria for an F* Tube."

Insert "C" defines the F* distance and F* tube as follows:

"F* Distance is the distance into the tubesheet from the secondary face of the tubesheet or the top of the last hardroll, whichever is further into the tubesheet, that has been determined to be 1.7 inches."

"F* Tube is a Unit 1 SG tube that contains a defect below the F* distance and contains sound expanded tubing within the F* distance. Defects contained in an F* tube are not dependant on flaw geometry."

Specification 4.4.5.5. Reports

This specification is changed to include a reporting requirement for identification of F* Tubes and location of the degradation. Insert "D" adds a requirement to report the results of inspections of F* Tubes to the commission prior to the resumption of plant operation. Insert "D" reads as follows:

"The results of inspections of F* Tubes shall be reported to the Commission in a report prior to the resumption of plant operation. The report shall include:

- 1) Identification of F* Tubes, and
- 2) Location and size of the degradation."

Bases for 3/4.4.5. Steam Generators

The basis for steam generator tube surveillance and plugging/repair is to ensure that the structural integrity of the tubes is maintained. The F* criteria was developed to preclude the unnecessary plugging of tubes by allowing tubes with degradation below the F* distance to remain in service. A statement will be added to paragraph three of the bases to exclude plugging tubes with defects that meet the criteria for F* Tubes. Insert "E" also identifies the qualification report used as the technical bases for the alternate repair criteria, F*. Insert "E" reads as follows:

"Plugging or repair is not required for tubes with any type of degradation within the tubesheet area and below the F* distance with no degradation within the F* distance. The F* Criteria is based on Babcock & Wilcox Nuclear Technologies (BWNT) Topical Report BAW-10196 P, Revision 1.

F* tubes meet the structural integrity requirements with appropriate margins for safety as specified in Regulatory Guide 1.121 and the ASME Boiler and Pressure Vessel Code, Section III, Subsection NB and Division I Appendices, for normal operating and faulted conditions."

Impact of Proposed Change

The use of the F* criteria could have limited the number of tubes plugged due to degradation in the tubesheet region of the Byron and Braidwood Unit 1 SGs in previous outages. Of the 608 tubes plugged during the last Byron Unit 1 outage in 1993, approximately four percent (4.3%) or twenty six (26) of these tubes could have been left in service using the F* criteria. Tube degradation below the F* distance has been determined to have minimal impact on the tube integrity and leakrate because of the characteristics of the tube-to-tubesheet interface. A cost savings of approximately one hundred thousand dollars (\$100,000) would have been realized with the implementation of the F* criteria for the previous Byron Unit 1 outage.

The proposed Technical Specification change is requested to provide CECo with an alternative for dispositioning degraded steam generator tubes. Use of the F* criteria provides benefits by maintaining tube heat transfer capabilities and by reducing personnel radiation exposure obtained during plugging/sleeving operations.

Schedule Requirements:

Commonwealth Edison Company (CECo) respectfully requests approval of the F* criteria amendment prior to Byron Unit 1 refueling outage, B1R07, scheduled for the April, 1996 time frame. Should earlier approval be possible, implementation of the F* criteria could yield significant cost savings for Commonwealth Edison during the upcoming outage on Unit 1 (B1R06) scheduled for September 9, 1994.