



Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

September 17, 1994

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

Attention: Mr. William T. Russell, Director

Subject: Request for EXIGENT TECHNICAL SPECIFICATION AMENDMENT
Supplement to Application for Amendment to Facility Operating License:

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

"Steam Generator Interim Plugging Criteria"

- References:
1. Letter from J. A. Bauer to W. T. Russell transmitting Byron Station's request for a license amendment to implement an Interim Plugging Criteria, dated August 1, 1994.
 2. Letter from J. A. Bauer to W. T. Russell transmitting Byron Station's request for a license amendment to implement an Interim Plugging Criteria, dated September 7, 1994.
 3. Draft Generic Letter, "Voltage-Based Repair Criteria for the Repair of Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking," August 12, 1994.

Dear Mr. Russell:

Pursuant to 10 CFR 50.91(a)(6), Commonwealth Edison Company (ComEd) proposes to amend Appendix A, Technical Specifications of Facility Operating Licenses NPF-37 and NPF-66, and requests that the Nuclear Regulatory Commission (NRC) grant an EXIGENT amendment to Technical Specification Section 3/4.4.5 "Steam Generators."

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September 17, 1994

Reference 1 transmitted Byron Station's request to amend Technical Specification 3/4.4.5, "Steam Generators" to incorporate a 1.0 volt steam generators tube interim plugging criteria (IPC) beginning with Unit 1 Cycle 7. The proposed changes clearly indicate that IPC is only applicable to Unit 1. The License for Unit 2 is affected only due to the fact that Unit 1 and 2 use common Technical Specifications. This amendment request was supplemented in Reference 2. This supplement modified the proposed Technical Specification amendment to include information from the Draft Generic Letter, which was issued subsequent to the original submittal.

After the September 7, 1994, supplement, the amendment request was submitted to the Nuclear Regulatory Commission (NRC). Byron Station and the Staff have been involved in extensive conversations, regarding this submittal and how it relates to the Draft Generic Letter. As a result of those conversations Commonwealth Edison Company (ComEd) is submitting an additional supplement which will specify that the proposed amendment change is applicable for Unit 1 Cycle 7 only. Therefore, the enclosed attachments supersede the information that was previously transmitted in References 1 and 2.

Included in this package are:

Attachment A:	Description and Safety Analysis Of The Proposed Changes
Attachment E:	Revised Technical Specification Pages
Attachment F:	Evaluation of Significant Hazards Considerations

The following attachments, transmitted in Reference 1, remain applicable to this supplemental amendment request:

Attachment B:	Interim Plugging Criteria Methodology
Attachment C:	Corrective Actions to Address Steam Generator Degradation
Attachment D:	System Operational Measures/Defense In Depth
Attachment G:	Environmental Assessment
Attachment H:	WCAP-14046, "Braidwood 1 Technical Support for Cycle 5 Steam Generator Interim Plugging Criteria," dated May 1994, Proprietary and Non-proprietary versions
Attachment I:	Eddy Current Inspection Guidelines
Attachment J:	References

This exigent amendment request:

- is necessary to prevent a startup delay
- could not be avoided,
- was not created by ComEd's failure to make a timely application for the license amendment, and
- does not involve a significant hazards consideration.

The original amendment request submitted on August 1, 1994, requested an October 15, 1994, approval date. This date coincides with the reinstallation of the steam generator manways and approval at this time is necessary to minimize potential rework and scheduling impact on the outage. Should this amendment be issued after October 15, 1994, resumption of power operations may be delayed resulting in a significant financial impact.

This situation could not have been avoided by ComEd and was not created by a failure to make a timely application of the Technical Specification Amendment. The original amendment request was submitted on August 1, 1994, and was noticed in the Federal Register on August 31, 1994. Subsequently, on August 12, 1994, the Draft Generic Letter on IPC was issued which required additional revisions to the original submittal. These changes were incorporated in the supplement dated September 7, 1994. In further conversations with the NRC on September 13, 1994, ComEd agreed to submit an additional supplement to specify that application of the IPC criteria was limited to Unit 1 Cycle 7 only, as requested by the Staff.

This amendment request does not involve a significant hazards consideration as document in Reference 1 and Reference 2. Additionally, it is worthy to note that this supplement results in minimal changes to the original Significant Hazard Evaluation (noticed on August 31, 1994). These changes include limiting IPC application to one cycle and incorporation of the midcycle outage IPC criteria as specified in the Draft Generic Letter.

ComEd appreciates the Staff's consideration and efforts in processing this amendment request on an exigent basis.

Pursuant to 10CFR50.91(b)(1) a copy of this request has been forwarded to the designated State of Illinois Official.

Mr. William Russell

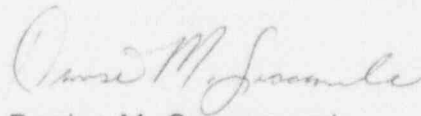
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To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by other ComEd employees, contractor employees, 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.

Sincerely,



Denise M. Saccomando
Nuclear Licensing Administrator

Attachments

cc: G. F. Dick, Byron Project Manager - NRR
H. Peterson, Senior Resident Inspector - Byron
J. B. Martin, Regional Administrator - Region III
Office of Nuclear Facility Safety - IDNS

Michelle Kowalkowski
9-16-94



ATTACHMENT A

DESCRIPTION AND SAFETY ANALYSIS OF PROPOSED CHANGES TO APPENDIX A TECHNICAL SPECIFICATIONS OF FACILITY OPERATING LICENSES NPF-37 AND NPF-66

DESCRIPTION OF THE PROPOSED CHANGE

Commonwealth Edison Company (ComEd) proposes to amend the following Technical Specification:

Specification 3/4.4.5 REACTOR COOLANT SYSTEM - STEAM GENERATORS

This proposed license amendment request will modify Specification 3/4.4.5 to allow an eddy current bobbin coil probe voltage-based steam generator (SG) tube support plate (TSP) interim plugging criteria (IPC) to be applied for Byron Unit 1 beginning with Cycle 7.

Technical Specification Bases Section 3/4.4.5, STEAM GENERATORS, will also be modified to reflect these changes.

DESCRIPTION OF THE CURRENT REQUIREMENT

Specification 3/4.4.5

The Technical Specification Surveillance Requirements (TSSRs) associated with Specification 3.4.5 currently require that any SG tube with an imperfection depth at or exceeding the plugging or repair limit of 40% of the nominal wall thickness be removed from service by plugging or repaired by sleeving in the affected area.

BASES OF THE CURRENT REQUIREMENT

Specification 3/4.4.5

The TSSRs 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 (RG) 1.83, "Inservice Inspection of PWR Steam Generator Tubes," Revision 1, July 1975. Inservice inspection of SG tubing is essential in order to maintain surveillance of the condition of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of SG tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

NEED FOR REVISION OF THE REQUIREMENT

At both Byron and Braidwood, Unit 1 has four Westinghouse Model D-4 SGs and Unit 2 has four Westinghouse Model D-5 SGs. The significant differences between the SG models are in the tube material and tube support materials and design. 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. The D-4 SG tubes are mill annealed Inconel 600 which were 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. The D-5 tubes are heat treated Inconel 600 which were hydraulically expanded into the tube sheet 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 primarily due to the design differences between the D-4 and D-5 SGs as mentioned above.

In the most recent Byron Unit 1 Refueling Outage (B1R05), conducted in the spring of 1993, a SG tube inservice inspection was performed in accordance with the current TSSR 4.4.5.0. The results of this inspection identified a total of 1105 bobbin coil indications at the tube support plate locations. Using a rotating pancake coil to confirm these indications, 556 indications were flawed due to ODSCC at the TSPs in 530 SG tubes. The 530 tubes were removed from service by plugging. This increased the overall plugging total for Byron Unit 1 to 847 tubes or 4.6% of the tubes. Of the 847 tubes plugged to date, 671 were plugged due to ODSCC at the tube support plate locations.

For the upcoming Byron Unit 1 Refueling Outage (B1R06), predictions on the number of pluggable indications using the current TSSR 4.4.5 acceptance criteria are approximately 1950 tubes. With the approval to use the Interim Plugging Criteria for Cycle 7 as proposed, the predicted number of tubes requiring removal from service by plugging or repair by sleeving would be reduced to 600.

DESCRIPTION OF THE REQUESTED REVISION

The changes proposed in the amendment are contained in six inserts to the surveillance requirements for the Byron Technical Specifications and Bases. The inserts are applicable to Unit 1 but not Unit 2, as indicated. The inserts reflect the option to allow tubes to remain in service using a voltage-based IPC for ODSCC indications in the tube support plate region for Cycle 7. Using IPC also results in changes to the sample selection, inspection criteria, and reporting requirements. A new term, "Tube Support Plate Interim Plugging Criteria Limit", is defined to identify the acceptance criteria to be used during the SG inservice inspections to allow a tube to remain in service. Clarifications are made to existing definitions to reference IPC, as appropriate.

Please note that INSERT D was intentionally deleted from the original submittal dated August 1, 1994 in the September 7, 1994 supplement.

Specification 4.4.5.2. Steam Generator Tube Sample Selection and Inspection

Changes to this section of the surveillance requirements will require that all tubes remaining in service due to application of IPC shall be included as part of the tubes to be inspected as an addition to the sample selection made in accordance with existing criteria. Also, the surveillance requirements will specify how IPC will be implemented.

Insert "A" adds a section to Specification 4.4.5.2.b, requiring all tubes in which the tube support plate IPC plugging limit is applied be inspected in each scheduled refueling outage. Insert "A" reads as follows:

"For Unit 1, tubes left in service as a result of application of the tube support plate plugging criteria shall be inspected by bobbin coil probe during all future outages."

Insert "B" adds section 4.4.5.2.d to describe the inspections associated with the implementation of IPC. Insert "B" reads as follows:

"For Unit 1 Cycle 7, implementation of the tube support plate interim plugging criteria limit requires a 100% bobbin coil probe inspection for all hot leg tube support plate intersections and all cold leg intersections down to the lowest cold leg tube support plate with outer diameter stress corrosion cracking (ODSCC) indications. The determination of tube support plate intersections having ODSCC indications shall be based on the performance of at least a 20% random sampling of tubes inspected over their full length."

Specification 4.4.5.4, Acceptance Criteria

Insert "C" adds to the definition of "Plugging or Repair Limit", Specification 4.4.5.4.a.6, to identify that this definition does not apply for Unit 1 in the region of the tube subject to the TSP IPC limit, i.e. the TSP intersections, and that Specification 4.4.5.4.a.11 describes the repair limit for use within the TSP intersection of the tube. Insert "C" reads as follows:

"For Unit 1 Cycle 7, this definition does not apply to tube support plate intersections for which the voltage-based plugging criteria are being applied. Refer to 4.4.5.4.a.11 for the repair limit applicable to these intersections;"

Insert "E" adds Specification 4.4.5.4.a.11 to define the TSP IPC limit. Insert "E" reads as follows:

"11) For Unit 1 Cycle 7, the Tube Support Plate Interim Plugging Criteria Limit is used for the disposition of a steam generator tube for continued service that is experiencing outer diameter stress corrosion cracking confined within the thickness of the tube support plates. At tube support plate intersections, the repair limit is based on maintaining steam generator tube serviceability as described below:

- a) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with bobbin voltage less than or equal to 1.0 volt will be allowed to remain in service.
- b) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with bobbin voltage greater than 1.0 volt will be repaired or plugged except as noted in 4.4.5.4.a.11)c) below.

- c) Indications of potential degradation attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with a bobbin voltage greater than 1.0 volt but less than or equal to 2.7 volts may remain in service if a rotating pancake coil inspection does not detect degradation. Indications of outside diameter stress corrosion cracking degradation with bobbin voltage greater than 2.7 volts will be plugged or repaired.
- d) Certain intersections as identified in WCAP-14046, Section 4.7, will be excluded from application of the voltage-based repair criteria as it is determined that these intersections may collapse or deform following a postulated LOCA + SSE event.
- e) If, as a result of leakage due to a mechanism other than ODSCC at the tube support plate intersection, or some other cause, an unscheduled mid-cycle inspection is performed, the following repair criteria apply instead of 4.4.5.4.11)c). If bobbin voltage is within expected limits, the indication can remain in service. The expected bobbin voltage limits are determined from the following equation:

$$V < \frac{\frac{\Delta t}{CL} (V_{SL} - V_{BOC}) + V_{BOC}}{1 + (0.2) \left(\frac{\Delta t}{CL} \right)}$$

where:

- V = measured voltage
- V_{BOC} = voltage at BOC
- Δt = time period of operation to unscheduled outage
- CL = cycle length (full operating cycle length where operating cycle is the time between two scheduled steam generator inspections)
- V_{SL} = 4.5 volts

Specification 4.4.5.5, Reports

Insert "F" adds reporting requirement 4.4.5.5.d to identify the reports, including content and time period, to be submitted to the Commission associated with the implementation of IPC. Insert "F" reads as follows:

- "d. For Unit 1 Cycle 7, implementation of the voltage-based repair criteria to tube support plate intersections, reports to the Staff shall be made as follows:
 - 1) Notify the Staff prior to returning the steam generators to service should any of the following conditions arise:
 - a) If estimated leakage based on the actual measured end-of-cycle voltage distribution would have exceeded the leak limit (for postulated main steam line break utilizing licensing basis assumptions) during the previous operation cycle.
 - b) If circumferential crack-like indications are detected at the tube support plate intersections.
 - c) If indications are identified that extend beyond the confines of the tube support plate.
 - d) If the calculated conditional burst probability exceeds 1×10^{-2} , notify the NRC and provide an assessment of the safety significance of the occurrence.
 - 2) The final results of the inspection and the tube integrity evaluation shall be reported to the Staff pursuant to Specification 6.9.2 within 90 days following restart."

Bases 3/4.4.5, Steam Generators

Insert "G" adds a discussion to the Bases section of Technical Specifications to refer to the dispositioning of tubes in accordance with IPC. Also, a discussion of adjustment of the operating period to meet projected MSLB leakage limitations is included. Insert "G" reads as follows:

" For Unit 1, tubes experiencing outer diameter stress corrosion cracking within the thickness of the tube support plates will be dispositioned in accordance with Specification 4.4.5.4.a.11. The operating period may be adjusted to less than the full operating cycle to meet the maximum site allowable primary-to-secondary leakage limit for End of Cycle Main Steam Line Break conditions. The leakage limit, 12.8 gpm, includes the accident leakage from a faulted steam generator and the operational leakage of the three remaining intact steam generators equal to the Specification 3.4.6.2.c leakage limit."

The specific changes to these Technical Specifications and associated bases are included in Attachment E.

BASES FOR THE REVISED REQUIREMENT

Byron is requesting this revision based on the following considerations:

- The August 1994 issuance of a draft Generic Letter, "Voltage-Based Repair Criteria For the Repair of Westinghouse Steam Generator Tubes Affected By Outside Diameter Stress Corrosion Cracking," for comment.
- The May 1994 approval of the Braidwood request of a 1.0 volt Interim Plugging Criteria for 3/4" diameter SG tubing.
- The approval of similar requests for IPC for other plants with 3/4" and 7/8" diameter SG tubing.
- The NRC's ongoing review of Electric Power Research Institute (EPRI) Draft Report TR-100407, "PWR Steam Generator Tube Repair Limits - Technical Support Document for Outside Diameter Stress Corrosion Cracking at Tube Support Plates," Revision 1, August 1993, and EPRI Draft Report NP-6864-L, "PWR Steam Generator Tube Repair Limits: Technical Support Document for Expansion Zone PWSCC in Roll Transitions - Rev. 2," Revision 2, August 1993.
- An understanding of the NRC and industry desire to improve the basis for steam generator tube repair.
- The completion of a satisfactory review assuring the structural integrity of Byron SG tubing during the next cycle operation.

To support this request for amendment, Byron will remove tubes, as appropriate, from Unit 1 SGs for laboratory examination, leak, and burst testing. For scheduling and planning purposes, three tubes are expected to be removed during B1R06. It is the intent that each tube removed will include three support plate intersections plus the flow distribution baffle intersection. The tubes will be selected for removal based on the size and distribution of indications which they contain. The results of the Braidwood Unit 1 tube pulls will be incorporated into the Byron evaluation upon completion of Braidwood tube pull analyses.

Analysis required by the IPC methodology will be completed to demonstrate leak and burst capabilities using B1R06 inspection results and Cycle 6 growth rates. The bases of the IPC approach includes, in part:

- Determination of a beginning of cycle (BOC) voltage distribution for Cycle 7 with application of a POD of 0.6 in accordance with draft NUREG-1477.
- Prediction of an end of cycle (EOC) voltage distribution by applying Cycle 6 growth rates to the BOC distribution through Monte Carlo simulations.
- Application of a log-logistic probability of leakage (POL) function.
- Application of the EPRI leak rate versus voltage correlation (conditional leak rate model).
- Calculation of the EOC leak rate and comparison with the site allowable leak rate for off-site dose consideration.
- Calculation of the EOC tube burst probability and comparison with the allowable burst probability per NUREG-0800.

IMPACT OF THE PROPOSED CHANGE

With the implementation of this proposed license amendment request for Cycle 7, the Byron Unit 1 SGs will continue to satisfy the requirements of Regulatory Guide 1.121. There will be no significant reduction in the margin of safety to protect the health and safety of the public. Based on current projections, approximately 1950 tubes with ODSCC would require repair under current repair criteria during B1R06. Implementation of a 1.0 volt IPC at Byron Unit 1 will save approximately 1350 tubes from repair. This represents a savings of approximately \$5.2M in plugging and sleeving repair costs alone. In addition, IPC implementation saves a minimum of 24 days in critical path outage time and eliminates the associated replacement power costs. RCS loop asymmetries and the loss of rated thermal power due to excessive plugging and sleeving are minimized through IPC application and RCS flow and available heat transfer area are maximized.

H. SCHEDULE REQUIREMENTS

ComEd requests that this proposed license amendment request be approved to permit IPC application during B1R06. Approval of this proposed license amendment request is required in order to declare the Byron Unit 1 SGs operable prior to entering Mode 4, Hot Shutdown. Based on the current outage schedule, Byron Unit 1 is predicted to be ready to enter Mode 4 on Wednesday, October 26, 1994. It is worthy to note that the steam generator manways are scheduled for reinstallation on Saturday, October 15, 1994. In order to minimize potential rework and scheduling impact, ComEd respectfully requests that this amendment be approved on or before October 15, 1994.