Commonwealth Edison
Braidwood Nuclear Power Station
Route #1, Box 84
Braceville, Illinois 60407
Telephone 815/458-2801

March 5, 1995
BW/96-0033

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

Subject: Braidwood Station Unit 1
Steam Generator Interim Plugging Criteria 90 Day Report
NPF-72; NRC Docket No. 50-456

References: 1. November 9, 1995 letter from M. D. Lynch, Office of Nuclear Reactor Regulation to D. L. Farrar, Issuance of Amendments (TAC NOS. M91671, M91672, M91673 AND M91674)

2. September 1, 1995 letter from Denise M. Saccomando to U.S. Nuclear Regulatory Commission, Supplement to Application for Amendment to Facility Operating Licenses: Byron Nuclear Power Station, Units 1 and 2, NPF-37/66: NRC Docket Nos. 50-454/455, and Braidwood Nuclear Power Station, Units 1 and 2, NPF-72/77: NRC Docket Nos. 50-456/457

3. September 20,1995 letter from Harold D. Pontious, Jr. to the Office of Nuclear Reactor Regulation, Teleconference between Commonwealth Edison Company and the Nuclear Regulatory Commission dated September 13, 1995, Regarding the Increase in the Interim Plugging Criteria for Byron Unit 1 and Braidwood Unit 1, NRC Docket Numbers: 50-454 and 50-456.

4. NRC Generic Letter 95-05, Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking.

5. November 13, 1995 letter from T. J. Tulon to U.S. Nuclear Regulatory Commission, ComEd Braidwood Station Unit 1 Fifth Refuel Outage Steam Generator Inservice Inspection Report, Docket No. STN 50-456

Reference 4 requires the results of the Steam Generator (SG) tube eddy current inspection be issued to the staff within 90 days following restart. In Reference 3, Braidwood Station committed to issue the final results of the Steam Generator Internals Inspection Program within 90 days following restart. Restart from the Braidwood Unit 1 fifth refuel outage (A1R05) was on December 9, 1995.

A001

Pursuant to these requirements, ComEd is submitting the enclosed reports from the Braidwood Unit 1 A1R05 steam generator inspection.

A summary of the inspection results and evaluations required by References 1, 2, and 4 is as follows:

1. The bounding Probability of Burst (POB) for the End-of-Cycle 6 (EOC-6) was found to be in the 1A SG. The 1A SG POB is less than $1x10^{-2}$. The bounding SG changed from the previous evaluations due to the contribution of the Hot Leg indications becoming negligible due to implementation of Tube Support Plate (TSP) locking as required by a 3.0 volt Interim Plugging Criteria (IPC).

2. The bounding Main Steam Line Break (MSLB) leak rate was found to be in the 1C SG. The 1C SG MSLB leak rate is less than the 26.8 gpm limit.

3. No circumferential crack-like indications were detected at the tube support plate intersections. Circumferential crack-like indications were detected in the tube roll transition region at the top of the tubesheet. None of the circumferential crack-like indications and none of the axial crack-like indications in the tube roll transition region were in tubes that were expanded at the Tube Support Plates.

4. No Primary Water Stress Corrosion Cracking (PWSCC) was detected at TSP intersections.

5. No indications were found to extend beyond the confines of the tube support plates.

6. No corrosion induced dents were identified in tubes adjacent to the tube intersections that were expanded at the Tube Support Plates.

7. A 0.610 inch bobbin coil probe was used to inspect all TSP intersections except one. This one was in the 1C SG Row 28 Column 10 at the 10C TSP (Cold Leg). This TSP intersection had a large dent that has been present since initial startup, therefore, this indication was determined not to be a corrosion induced dent. This intersection is not adjacent to an expanded tube. IPC was not appled to this TSP intersection.

8. The Upper Voltage Repair Limit only applies to the Cold Leg indications. The Upper Voltage Repair Limit was 1.99 volts. There were no Cold Leg indications greater than the Upper Voltage Repair Limit. There was only one Cold Leg indication greater than 1 volt, but it was not confirmed by a Rotating Pancake Coil probe.

9. No tubes were removed from the Steam Generators, therefore, no metallurgical results of pulled tubes are available.

Attachment A to this letter contains the results of the Steam Generator Internals Inspection. No indications detrimental to the integrity of the load path necessary to support the 3.0 volt IPC were identified.

Attachment B to this letter contains the 90 day Steam Generator tube eddy current inspection report for Braidwood Unit 1.

Please direct any questions regarding this submittal to Doug Huston, Braidwood Licensing Supervisor, (815) 458-2801, extension 2511.

Very truly yours,

for

T. J. Tulon
Station Manager
Braidwood Station

TJT/LA\grv
l:\shared\admin\bw960033.doc

Attachments

cc: Senior Resident Inspector - Braidwood
Braidwood Project Manager, NRR
Regional Administrator - RIII

Attachment A

Braidwood Unit-1

Steam Generator Internals Inspection Program Results

March 1996

Steam Generator Internals Inspection Program Results

During the Braidwood Unit 1 fifth refuel outage (A1R05) a 3.0 volt Interim Plugging Criteria (IPC) was implemented for predominately axially oriented indications at the hot-leg Tube Support Plates (TSP). In order to implement an IPC with a voltage limit greater than the Generic Letter 95-05 1.0 volt IPC, ComEd had to demonstrate that the indications in the Steam Generator (SG) tubes would remain within the bounds of the TSP's during a Main Steam Line Break (MSLB) accident. During a MSLB accident, the TSP's will move. ComEd demonstrated that the TSP movement could be limited by taking credit for the existing structural supports inside the SG along with adding supports by converting SG tubes to additional stayrods. In order to take credit for the existing structural supports inside the SG, inspections were performed to demonstrate that these load path carrying supports have not degraded during plant operation (plant life is at 5.522 Effective Full Power Years).

Two types of inspections were performed; eddy current and visual. The eddy current inspections were performed to demonstrate the integrity of the TSPs. An eddy current examination specially developed to identify cracks in the TSPs was performed in areas susceptible to cracking and in the area of the Patch Plate Seams. Eddy current examinations also verified the presence of the TSP at all tube/TSP intersections.

A majority of the visual inspections was performed in the 1A SG, although some inspections were performed in all Unit 1 SGs. A representative sample of the load-path carrying components was inspected. These load carrying components included the TSP Vertical Support Bars, the TSP Wedges, and the Vertical Stayrods including the Spacer between the TSPs and the nut at the top of the Stayrod. In addition to this, the SG Tube Bundle Wrapper was verified to not have moved off its support structure. A summary of each inspection is given below.

Eddy Current Inspections

Inspection Near the Anti-Rotation Devices

EPRI developed a SG tube eddy current inspection method that could be used to investigate the integrity of the TSP. The eddy current method used a bobbin coil eddy current probe pulled through the SG tube at a maximum speed of 12 inches per second. This is slower than the present speed of 24 inches per second used to inspect the SG tubing. Fifty SG tubes around each of the three Anti-Rotation Devices were inspected by this method. This satisfies one of the acceptance criteria. No operation induced degradation of the TSPs was identified. This satisfies one of the acceptance criteria. The eddy current method used to demonstrate the integrity of the TSPs was used on the full length of the SG tube. Therefore, although the 3.0 Volt IPC only applies to the hot-leg SG tubing, the integrity of the cold-leg TSPs was demonstrated.

Inspection Near the Patch Plate Seam

The 12 inch per second eddy current method mentioned above was also used to inspect the TSP at the Patch Plate Seams. Five tubes on each side of the seam were inspected in the 1A SG. No degradation was identified.

Presence of the Tube/TSP Intersection

The normal SG tube bobbin coil eddy current inspection verified the presence of each SG tube/TSP intersection. No missing intersections were identified. This satisfies one of the acceptance criteria.

Visual Inspection

Vertical Support Bars

A total of 89 Vertical Support Bars (VSB) and 157 VSB welds were visually inspected from the four Unit 1 SGs. Of the VSB welds visually inspected, 24 were mechanically cleaned prior to inspection to ensure a VT-1 quality inspection. The remaining VSBs and VSB welds were inspected following a SG tube Bundle Flush which performed limited cleaning. No corrosion or distortion of the VSBs was identified in the visual inspection. No indications in the VSB welds that would prevent the VSB from performing its load-path carrying function were identified. This satisfies the acceptance criteria.

Stayrod Nuts

The Stayrod is screwed into the tubesheet at one end, and bolted on top of the 11th TSP at the other. To ensure the Stayrod has not unscrewed from the tubesheet and that the nut on top of the 11th TSP has not loosened, nine of the eleven Stayrod nuts were visually inspected in the 1A SG. The Stayrod nut is tack welded to the TSP in two locations and tack welded to the Stayrod in one location. Ten of the eleven nuts are within the bundle. The other nut is in the tubelane. No mechanical cleaning of the welds could be performed to improve the inspection. The nuts and welds were found to be scaled with an iron coating typical of the coating seen on SG tubing. The visual inspection verified the welds were present, that the nut was in contact with the 11th TSP, and that the nut could not unscrew from the Stayrod. This satisfies the acceptance criteria.

Wedges

No credit was taken for the TSP Wedges to limit the movement of the TSP during a MSLB. Therefore, the inspection of the Wedges is not critical. If during other visual inspections, a Wedge was observed, the presence of the Wedge and the presence of the weld connecting the Wedge to the SG Tube Bundle Wrapper was documented. Five

TSP Wedges were observed while inspecting the top of the 11th TSP. Four of the welds connecting the Wedge to the Wrapper could be verified. The fifth weld could not be verified since the weld was under an inspection port. The presence of 32 other Wedges was verified while inspecting the VSBs on the bottom of the Flow Distribution Baffle. Since the inspection was from the bottom of the Flow Distribution Baffle, the presence of the weld connecting the Wedge to the Wrapper could not be identified. The inspection of these TSP Wedges satisfies the acceptance criteria.

Wrapper Alignment

The SG Tube Bundle Wrapper is supported by the SG shell. The Wrapper provides support for the TSPs. Therefore, it is important to verify the Wrapper is properly supported. To verify the Wrapper is properly supported, the Wrapper was verified to be aligned at the four inspection ports just above the tubesheet. Visual inspections and the ability to install the SG Sludge Lancing equipment ensured no misalignment between the SG shell and the SG Tube Bundle Wrapper. This satisfies the acceptance criteria.

Stayrod Spacers

Visual inspections of the Stayrod Spacers were performed between the 8th TSP and the 9th TSP. Seven of the eleven Stayrod Spacers were inspected. No degradation of the Stayrod Spacers was observed. This satisfies the acceptance criteria.

TSP Visual Inspection

Visual inspections of the 11th TSP were performed near each of the three Anti-Rotation Devices and along the Patch Plate Seam in the 1A SG. Visual inspections were performed five row deep within the SG tube bundle. No cracking of the TSP ligaments was observed. This satisfies the acceptance criteria.

Conclusion

The structural integrity of the load-path carrying components inside the Braidwood Unit 1 SGs was demonstrated through eddy current inspections and visual inspections. No degradation of these components was identified. This supports the implementation of the 3.0 Volt hot-leg IPC for Braidwood Unit 1.

Attachment B

Braidwood Unit-1

Cycle 6 Interim Plugging Criteria 90 Day Report

February 1996