



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

August 19, 2009

Mr. Charles G. Pardee
President and Chief Nuclear Officer
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNIT 2 - REVIEW OF SPRING 2008 STEAM
GENERATOR TUBE INSERVICE INSPECTION REPORT (TAC NO. ME1029)

Dear Mr. Pardee:

By letter to the Nuclear Regulatory Commission (NRC) dated November 11, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML083220444), as supplemented by letter dated May 15, 2009 (ADAMS Accession No. ML091380475), Exelon Generation Company, LLC submitted information pertaining to the steam generator tube inspections conducted during the 2008 refueling outage A2R13 at Braidwood Station (Braidwood), Unit 2, in accordance with the plant's technical specifications (TSs).

The NRC staff has completed its review of these reports and concludes that you have provided the information required by Braidwood, Unit 2 TSs, and that no additional follow-up is required at this time. A copy of the NRC staff's evaluation is enclosed.

Sincerely,

A handwritten signature in black ink, appearing to read "Marshall J. David", written over a circular stamp or seal.

Marshall J. David, Senior Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. STN 50-457

Enclosure:
Review of the Spring 2008 Steam Generator Tube Inservice Inspections

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OFFICE OF NUCLEAR REACTOR REGULATION

REVIEW OF THE SPRING 2008 STEAM GENERATOR TUBE

INSERVICE INSPECTIONS

BRAIDWOOD STATION UNIT 2

DOCKET NO. 50-457

By letter to the Nuclear Regulatory Commission (NRC) dated November 11, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML083220444), Exelon Generation Company, LLC (the licensee), submitted information summarizing the results of the spring 2008 steam generator (SG) tube inspections at Braidwood Station (Braidwood), Unit 2. The licensee provided additional information in a letter dated May 15, 2009 (ADAMS Accession No. ML091380475). These inspections were performed during the 13th refueling outage (A2R13). Additional details of these inspections are documented in a conference call summary letter dated July 16, 2008 (ADAMS Accession No. ML081640265).

Braidwood, Unit 2, has four Westinghouse Model D5 SGs. There are 4570 thermally-treated Alloy 600 tubes in each SG, with an outside diameter of 0.750 inches and a nominal wall thickness of 0.043 inches. The tubes are hydraulically-expanded for the full depth of the tubesheet at each end and are welded to the tubesheet at the bottom of each expansion. The tubes are supported by a number of Type 405 stainless steel supports with quatrefoil shaped holes.

The licensee provided the scope, extent, methods, and results of their SG tube inspections in the documents cited above. In addition, the licensee described corrective actions, such as tube plugging, taken in response to the inspection findings. The tubes in all four SGs were inspected during this outage.

After reviewing the information provided by the licensee, the NRC staff has the following comments/observations:

1. A total of 23 tubes were removed from service by mechanical plugging, six tubes were plugged due to anti-vibration bar wear, 16 due to tube-end primary water stress-corrosion cracking (PWSCC) indications, and one due to foreign object wear.
2. A total of 288 tubes with axial and circumferential tube-end PWSCC indications were found in the four SGs. Of the 288 tubes, 16 were plugged due to PWSCC indications that exceeded the limits of the interim alternate repair criteria. All 16 tubes were located in SG 2A.
3. One tube, located at row 3 column 85, was preventatively plugged and stabilized in SG 2C due to foreign object wear. The wear was located above the 5th support plate and the secondary side was inaccessible for visual confirmation that the foreign object which had caused the damage was no longer present.

ENCLOSURE

4. At the time of the 2008 inspections, the replacement SGs had been in service for 204.60 effective full power months (EFPM) of operation. The A2R13 outage was the second-to-last outage in the 90 EFPM inspection period.
5. The licensee performed visual inspections of the secondary side moisture separators in all four SGs during A2R13. Ultrasonic thickness measurements were taken of eroded areas, with an emphasis on re-inspection of the eroded areas identified in SG 2D during the previous (A2R12) inspection, and initial inspection of all accessible areas in the 2A, 2B and 2C SGs. While continued erosion of components in the 2D SG was identified, no indications of through-wall erosion were identified. The extent of erosion found in all four SGs was similar, but the most wear was identified in SG 2C, which showed a maximum wall loss of 48 percent compared to the manufacturing nominal value. Engineering analysis determined that significant margin remained in the eroded areas, prior to the erosion penetrating through-wall and affecting SG performance or possibly generating loose parts. The erosion was not projected to penetrate through-wall over the next operating cycle. Monitoring of the condition is planned over subsequent operating cycles in order to develop a degradation growth rate and take corrective actions if they become necessary.
6. Braidwood, Unit 2, had identified 71 tubes as potentially having higher residual stress prior to the start of A2R13. As a result of the hot-leg tubesheet inspections performed on these 71 tubes, two tubes in SG 2C were identified with axial PWSCC indications, which represents 2.8 percent of the 71 tubes. The 288 tubes with axial and circumferential PWSCC indications identified during the hot-leg tubesheet inspections represent 1.6 percent of the approximately 18,000 tubes without high residual stress that were in service prior to the start of A2R13.
7. Portions of tube support plates 8, 9, 10, and 11 in SG 2C were visually inspected during A2R13. Most plates had accumulated a layer of soft sludge and/or soft scale deposits that ranged from 0.120 to 0.300 inches thick. Flow holes and quaterfoils were clear and open, but trace amounts of deposits were forming around the edges. The hot-leg tube bundle deposits were noticeably more developed than the cold-leg.

Based on a review of the information provided by the licensee, the NRC staff concludes that the licensee provided the information required by their technical specifications. The SG tube inspections at Braidwood, Unit 2, appear to be consistent with the objective of detecting potential tube degradation, and the inspection results appear to be consistent with industry operating experience at similarly-designed and operated units.

Principal Contributor: A. Johnson

Date: August 19, 2009

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Sincerely,

/RA/

Marshall J. David, Senior Project Manager
Plant Licensing Branch III-2
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ADAMS Accession No.: ML092240032 ***SE Memo Date** **NRR-106**

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