December 21, 2004

Mr. Christopher M. Crane, President
and Chief Nuclear Officer
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNIT 1 - SUMMARY OF CONFERENCE CALL REGARDING STEAM GENERATOR TUBE INSPECTIONS FROM FALL 2004 OUTAGE (TAC NO. MC4914)

Dear Mr. Crane:

On October 19, 2004, a conference call was held between representatives of the Exelon Generation Company, LLC (Exelon) staff, and Nuclear Regulatory Commission (NRC), Office of Nuclear Reactor Regulation and NRC, Region III staff to discuss the results of steam generator tube inspections conducted during the fall 2004 refueling outage for Braidwood Station, Unit 1. The NRC follows the results of the industry's steam generator tube inspections in order to maintain an awareness of the condition of the steam generators and the types of tube degradation mechanisms that are active.

The enclosed documentation of the phone call is provided to Exelon for information. Also, included is a copy of the information provided by Exelon in support of the conference call. If there are any questions, please contact me at (301) 415-3019.

Sincerely,

/RA/

George F. Dick, Jr., Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. STN 50-456

Enclosures: 1. Summary of Conference Call
2. Supporting Information

cc w/encls: See next page

Braidwood Station Units 1 and 2

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OCTOBER 19, 2004 CONFERENCE CALL SUMMARY

2004 STEAM GENERATOR TUBE INSPECTION RESULTS

BRAIDWOOD STATION, UNIT 1

DOCKET NO. STN 50-456

INTRODUCTION

On October 19, 2004, the Nuclear Regulatory Commission (NRC) staff participated in a conference call with Braidwood Station (Braidwood), Unit 1 representatives to discuss selected results of the steam generator (SG) tube inspections performed at Braidwood, Unit 1 during their fall 2004 refueling outage. A summary of the information provided during the call is provided below.

BACKGROUND

Braidwood, Unit 1 replaced their original SGs during the fall 1998 refueling outage. The four replacement SGs were fabricated by Babcock and Wilcox International (BWI) and each had 6,633 thermally treated Alloy 690 tubes with an outside diameter of 11/16-inch and a nominal wall thickness of 0.040-inch. The tubes are hydraulically expanded for the full depth of the tubesheet at each end and are arranged in a triangular pitch. The tubes are supported by a number of stainless steel lattice grid tube supports and fan bars.

During the spring 2000 outage, the first inservice inspection of the replacement SGs was performed. During this outage, 100 percent of the tubes in each of the four SGs were inspected full length with a bobbin coil probe. As a result of these inspections, one indication of wear, measuring 10 percent through-wall, was detected at a fan bar. During RFO9 (fall 2001 outage), no SG tube inspections were performed. During RFO10 (spring 2003 outage), 100 percent of the tubes in SG A and 54 percent of the tubes in SGs B, C, and D were inspected full length with a bobbin coil probe. In SGs B, C, and D, 100 percent of the tubes in the periphery were inspected. As a result of these inspections, 21 tubes were plugged. These tubes were plugged as a result of wear caused by foreign objects (15 tubes) or to surround foreign objects that could not be removed from the SG (6 tubes). During this outage, the 1B feedwater pump strainer was found to be damaged and was repaired prior to plant startup (refer to Agencywide Documents Access and Management System accession numbers ML031620955 and ML041140380 for additional details).

Prior to the current outage, there were 25 tubes plugged in the SGs: 10 in SG A, 12 in SG B, 3 in SG C, and none in SG D.

RESULTS OF FALL 2004 INSPECTION

During the current (fall 2004) outage, 100 percent of the tubes in SG B and 22 percent of the tubes in SGs A, C, and D were inspected full length with a bobbin coil probe. The inspections performed in SGs A, C, and D were performed in response to the findings in SG B. No secondary side inspections or tubesheet sludge lancing were performed.

As a result of the inspections in SG B, four indications of wear at the fan bars were detected and one indication of wear at a lattice grid was detected. The depth of the fan bar wear indications measured 3 percent to 7 percent through-wall and the depth of the lattice grid wear indication measured 3 percent through-wall. In addition, two volumetric indications were detected. One of the volumetric indications measured 42 percent through-wall and was located at the sixth cold-leg lattice grid tube support in the tube at Row 1 Column 116. This tube borders the tube free lane. The second volumetric indication measured 27 percent through-wall and was located at the sixth hot-leg lattice grid tube support. This tube is in the interior of the tube bundle. These two indications had depths less than the structural limit of 64.7 percent through-wall; therefore, these two tubes had adequate structural and leakage integrity.

The volumetric indications in these two tubes were attributed to wear from loose parts rather than to indications of lattice grid wear. The indications were not located at the tube-to-lattice grid contact points and were located in the high flow region of the tube bundle. These areas are currently inaccessible for visual inspection. The bobbin and rotating probe did not provide any indication that the loose part was still present. The indications were not present in the 2003 inspection data.

As a result of the above findings, SG B was classified as category C-2, as defined in the Braidwood, Unit 1, Technical Specifications (TSs). Since 100 percent of the tubes in SG B were inspected, no expansion of the inspection was required by the TS. However, the licensee decided to inspect selected tubes in SGs A, C, and D based on the results from the inspections in SG B. The inspections in SGs A, C, and D focused on the two regions of high flow in the BWI SGs as determined using the ATHOS computer code (a thermal hydraulic computer code). These two areas of high flow include tubes in the periphery of the tube bundle on both the hot-leg and cold-leg sides of the SG and tubes in the interior of the tube bundle on the hot-leg. The inspections in SGs A, C, and D included 22 percent of the tubes in the SG. The 22 percent sample included 100 percent of the tubes in the periphery of the tube bundle and 20 percent of the tubes in the high flow region of the interior of the tube bundle.

As a result of the inspections in SG A, no wear due to foreign objects was detected. As a result of the inspections in SG C, two indications were detected. One of the indications measured 17 percent through-wall and was located at the first hot-leg lattice grid tube support in the tube at Row 66 Column 13, a peripheral tube. This indication was not present in the 2003 data. An inspection of the adjacent tubes was performed, and these tubes did not have any indications nor were any foreign objects detected. This tube was plugged and stabilized. The second indication in SG C was located in the tube at Row 69 Column 150, an interior tube. The indication measured 9 percent through-wall and was located at the fourth hot-leg lattice grid tube support. This indication was present in the 2003 inspection data and was classified as lattice grid wear. There was no change in the signal from 2003 to 2004. This tube was plugged in 2004. Bobbin and rotating probe examinations of adjacent tubes did not result in identifying any additional indications or foreign objects. This indication was in the high-flow region of the tube bundle.

As a result of the inspections in SG D, no wear due to foreign objects was found in any of the peripheral tubes inspected; however, one indication was found in an interior tube. This indication measured 25 percent through-wall and was located at the second hot-leg lattice grid tube support in the tube at Row 70, Column 2. The indication at this location was present during the 2003 inspection and was attributed to wear from a foreign object. There was no

change in the signal between 2003 and 2004. Bobbin and rotating probe examinations of adjacent tubes did not result in identifying any additional indications or foreign objects. This indication was in the high-flow region of the tube bundle. This tube was plugged.

CONCLUSIONS AND FUTURE INSPECTION PLANS

As a result of the 2004 inspections, a total of 5 tubes were plugged: 2 in SG B, 2 in SG C, and 1 in SG D.

At the time of the call, all inspections and tube plugging were complete. The manways for SGs B and C were installed and the manways for SGs A and D were in the process of being installed.

During the next refueling outage, scheduled for Spring 2006, the current plans are to inspect 100 percent of the tubes in all four SGs full length with a bobbin coil probe. In addition, a rotating probe is scheduled to be used to inspect the top of hot-leg tubesheet region of 20 percent of the tubes in each of the four team generators. Secondary side sludge and foreign object search and retrieval is scheduled to be performed in all four SGs.

The licensee indicated that the foreign objects causing the wear could be spiral wound gasket material (e.g., the stainless steel windings of flexitallic gaskets). This material could cause tube wear. This material may also subsequently degrade (e.g., by fatigue) with time such that it could break up and move to another location in the SG and not be present during the SG tube inspections. No indications of possible loose part signals were detected during the eddy current inspections; however, one possible loose part indication was initially identified with a bobbin coil, but based on rotating probe examinations, was reclassified as sludge.

Based on the scope and results of the inspection, the licensee concluded that they would have adequate integrity until their next SG tube inspections.

Principal Contributor: K. Karwoski

Date: