June 18, 2003

Mr. John L. Skolds, President
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: SUMMARY OF CONFERENCE CALL WITH EXELON NUCLEAR REGARDING THE 2003 STEAM GENERATOR INSPECTIONS AT BRAIDWOOD UNIT 1 (TAC NO. MB8475)

Dear Mr. Skolds:

On April 25, 2003, the U.S. Nuclear Regulatory Commission (Commission) participated in a conference call with Exelon Nuclear representatives regarding the ongoing steam generator tube inspection activities at Braidwood Unit 1.

The licensee provided previous inspection history on these steam generators and discussed the steam generator (SG) tube inspection scope, results and other related SG activities. The licensee also provided several diagrams in support of the call. At the time of the call, all inspections of the steam generator tubing were complete. NRC staff did not identify any issues requiring follow-up at this time.

Attached is a summary of the conference call and the diagrams used in support of the call. If you have any further questions, please contact me at (301) 415-8371.

Sincerely,

/RA/

Mahesh Chawla, 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 the conference call
2. SG Diagrams

cc w/encls: See next page

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cc:

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Illinois Department of Nuclear Safety
Office of Nuclear Facility Safety
1035 Outer Park Drive
Springfield, IL 62704

Document Control Desk-Licensing
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Ms. C. Sue Hauser, Project Manager
Westinghouse Electric Corporation
Energy Systems Business Unit
Post Office Box 355
Pittsburgh, PA 15230

Joseph Gallo
Gallo & Ross
1025 Connecticut Ave., NW, Suite 1014
Washington, DC 20036

Ms. Bridget Little Rorem
Appleseed Coordinator
117 N. Linden Street
Essex, IL 60935

Howard A. Learner
Environmental Law and Policy
Center of the Midwest
35 East Wacker Dr., Suite 1300
Chicago, IL 60601-2110

U.S. Nuclear Regulatory Commission
Braidwood Resident Inspectors Office
35100 S. Rt. 53, Suite 79
Braceville, IL 60407

Ms. Lorraine Creek
RR 1, Box 182
Manteno, IL 60950

Illinois Emergency Management
Agency
Division of Disaster Assistance &
Preparedness
110 East Adams Street
Springfield, IL 62701-1109

Chairman
Will County Board of Supervisors
Will County Board Courthouse
Joliet, IL 60434

Attorney General
500 S. Second Street
Springfield, IL 62701

George L. Edgar
Morgan, Lewis and Bockius
1800 M Street, NW
Washington, DC 20036-5869

Braidwood Station Manager
Exelon Generation Company, LLC
35100 S. Rt. 53, Suite 84
Braceville, IL 60407-9619

Site Vice President - Braidwood
Exelon Generation Company, LLC
35100 S. Rt. 53, Suite 84
Braceville, IL 60407-9619

Senior Vice President, Nuclear Services
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Vice President
Mid-West Operations Support
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Chairman, Ogle County Board
Post Office Box 357
Oregon, IL 61061

Regulatory Assurance Manager - Braidwood
Exelon Generation Company, LLC
35100 S. Rt. 53, Suite 84
Braceville, IL 60407-9619

Senior Vice President
Mid-West Regional Operating Group
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Director Licensing
Mid-West Regional Operating Group
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Senior Counsel, Nuclear
Mid-West Regional Operating Group
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Vice President - Licensing and Regulatory Affairs
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

Manager Licensing
Braidwood and Byron
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUMMARY OF CONFERENCE CALL
WITH
EXELON NUCLEAR
REGARDING STEAM GENERATOR INSPECTION RESULTS
AT BRAIDWOOD UNIT 1

On April 25, 2003, the U.S. Nuclear Regulatory Commission (NRC) staff participated in a conference call with Exelon Nuclear (Exelon, the licensee) representatives regarding the steam generator (SG) tube inspection activities at Braidwood Unit 1 during the ongoing 10th refueling outage, 1R10.

The issues discussed included the steam generator (SG) tube inspection scope, results and other related SG activities. The licensee provided several diagrams in support of the call. At the time of the call, all inspections of the steam generator tubing were complete. The licensee provided the following details related to their steam generator inspections.

Exelon replaced the Braidwood Unit 1 steam generators in 1998 during Refueling Outage 7, 1R07. There are 6633 Alloy 690 thermally treated tubes in each of the four steam generators. The tubing is 11/16 inches in diameter and 0.040 inches thick and are arranged in the tubesheet in a triangular pitch. The tubes contain hydraulic expansions for the full length of the tubesheet. The tubes are supported along their length by stainless steel lattice grid assemblies. The tubes are supported in the U-bend region by a stainless steel fan bar assembly.

The licensee provided previous inspection history on these steam generators. During the 1R08 refueling outage in the Spring 2000, the licensee performed an inspection of 100 percent of the tubes in all four steam generators with the bobbin coil probe. Rotating probe inspections were performed on certain bobbin signals. The licensee identified one indication of tube wear located at a tube to fan bar intersection. The indication was less than 10 percent throughwall and was preventively plugged. Visual inspections in Steam Generator A resulted in identification and removal of one piece of flexitallic gasket. No SG tube inspections were performed during Refueling Outage 9.

During the 1R10 refueling outage, the licensee performed the following SG inspections:

- 100 percent of the peripheral tubes (2 tubes in from the periphery) were inspected full length with the bobbin coil probe in all four SGs. The main concern related to this inspection was the potential presence of foreign objects and tube wear due to foreign objects. (Twenty-eight tubes were excluded from this inspection scope due to interference with the SG tube inspection equipment.)

- 50 percent of the in-bundle tubes were inspected full length with the bobbin coil probe in all four SGs.

- 100 percent of the SG tube plugs were inspected visually from the primary side.

- Foreign object search and retrieval (FOSAR) was performed in the periphery and free lanes of all four SGs. In-bundle visual inspections were performed in two SGs.

The licensee described the results of the SG tube and FOSAR inspections as follows:

Steam Generator A

- One indication of wear, 12 percent throughwall, was identified at a lattice grid intersection. Two indications of wear, 5 percent and 7 percent throughwall, were identified at fan bar intersections. The tubes with these three indications were left in service.

- Based on the FOSAR examination, one foreign object was identified near the top of the tubesheet on the periphery of the cold leg side. It was determined to be a piece of flexitallic gasket and could not be retrieved because it was fixed in-place between 6 tubes. The gasket was 2.3 inches long, 0.08 inches wide and 0.031 inches deep. This object was not detected in the eddy current data from the bobbin probe inspection, which the licensee believes is because the flexitallic gasket is a small piece of stainless steel material which is not readily visible on eddy current.

  Exelon performed an inspection with a rotating probe containing a +Point™ coil on 37 tubes surrounding the object. The tubes were inspected from 3 inches above to 3 inches below the top of the tubesheet. The licensee determined that seven tubes contained degradation due to wear, which ranged from 5 percent to 48 percent throughwall. Only the two deepest flaws (48 percent and 25 percent throughwall) were detected with the bobbin probe. A review of the prior inspection data (bobbin coil data) for the location with the 48 percent throughwall indication indicated that a flaw was not detected at that time. The licensee concluded that they would plug all tubes with wear (regardless of depth) and all tubes in contact with the object would be plugged and stabilized. A total of 8 tubes were plugged in SG A, of which 6 were stabilized.

  Based on the identification of one tube which exceeded the technical specification repair criteria of 40 percent throughwall, the licensee expanded the scope of the inspection with the bobbin probe. One hundred percent of the active tubes in SG A were inspected full length with the bobbin probe. No indications of possible loose parts (PLPs) or tube wear were detected in the additional tubes inspected.

Steam Generator B

Two foreign objects were detected in SG B during the FOSAR examination.

- One foreign object was identified near the top of the tubesheet on the periphery of the hot leg side. It was determined to be a piece of flexitallic gasket and could not be retrieved because it was fixed in-place. The gasket was 1.6 inches long, 0.12 inches wide and 0.12 inches deep. This object was not detected in the eddy current data from the bobbin probe inspection, which the licensee believes is because the flexitallic gasket is a small piece of stainless steel material which is not readily visible on eddy current.

  Exelon performed an inspection with a rotating probe containing a +Point™ coil on 37 tubes surrounding the object. The tubes were inspected from 3 inches above to 3 inches below the top of the tubesheet. The licensee determined that three tubes contained degradation due to wear, which ranged from 7 percent to 17 percent throughwall. None of these flaws were detected with the bobbin probe. The licensee concluded that they would plug all tubes with wear (regardless of depth) and all tubes in contact with the object would be plugged and stabilized. A total of 5 tubes were plugged in SG B due to this foreign object, all of which were stabilized.

- The second foreign object in SG B was identified near the top of the tubesheet on the periphery of the hot leg side. It was determined to be a piece of weld splatter and was removed. The object was oval and was 2.0 inches long, 1.25 inches wide and 0.062 inches deep.

  Exelon performed an inspection with a rotating probe containing a +Point™ coil on 36 tubes surrounding the object. The tubes were inspected from 3 inches above to 3 inches below the top of the tubesheet. The licensee determined that five tubes contained degradation due to wear, which were no deeper than 13 percent throughwall. One of these flaws, 11 percent throughwall, was detected with the bobbin probe. The licensee concluded that they would plug all tubes with wear (regardless of depth). A total of 5 tubes were plugged in SG B due to this foreign object.

Steam Generator C

- One foreign object was identified near the top of the tubesheet on the periphery of the hot leg side. It was determined to be a piece of flexitallic gasket which could not be retrieved. However, the licensee was able to move the foreign object in-bundle to a low flow area, and the licensee determined it would not be expected to cause wear in this location. The gasket was 0.75 inches long, 0.1 inches wide and 0.1 inches deep.

  Exelon performed an inspection with a rotating probe containing a +Point™ coil on 18 tubes surrounding the original location of the object. The tubes were inspected from 3 inches above to 3 inches below the top of the tubesheet. The licensee determined that none of the tubes had detectable degradation. No tubes were plugged as a result of this foreign object.

- A second foreign object was identified in-bundle near the top of the tubesheet on the hot leg side. It was determined to be a piece of flexitallic gasket which was retrieved. The gasket was 1.25 inches long and 0.063 inches deep.

- Another foreign object was introduced to the SG during the current refueling outage when a tooling collet fell off the loose part retrieval equipment and became lodged between three tubes in-bundle on the hot leg side of the SG. All three tubes surrounding the object were plugged and stabilized.

- Several indications of wear, all less than 10 percent throughwall, were identified at lattice grid and fan bar intersections. The tubes with these indications were left in service.

Steam Generator D

- One indication of wear was identified at a lattice grid intersection, and one indication of wear was identified at a fan bar intersection. The indications were less than 10 percent throughwall and the tubes with these two indications were left in service.

- No foreign objects were identified in this SG.

The licensee concluded that the condition monitoring structural and leakage integrity performance criteria were met. All degradation had been expected as potential degradation

mechanisms. The licensee concluded that the foreign objects appear to mainly be a concern in the outer periphery of the SG.

The licensee discussed their evaluations performed in an attempt to determine the source of the flexitallic gaskets. The flexitallic gaskets have stainless steel metal faces which are spot welded to the gasket. In some cases, the stainless steel face on the gasket extrudes into the flow stream and pieces break off and become foreign objects/loose parts. They believe this issue is caused by a misapplication of the gasket. The licensee indicated that some of these gaskets were located upstream from the 1A, 1B and 1C feed pump strainers (which are upstream from the SGs). The 1C strainer had recently been inspected and cleaned. Pieces of flexitallic gasket were identified in the strainer, but otherwise, the strainer was in good condition (i.e., no tears that might enable loose parts to be carried downstream and into the SGs). The licensee also planned to clean and inspect the 1A and 1B feed pump strainers during the current refueling outage. The licensee also indicated that flexitallic gaskets are also used in locations downstream of the feed pump and the licensee was performing the following additional corrective actions to address this issue: 1) identifying an acceptable alternative gasket; 2) performing an inventory of all gaskets in the feedwater system; and 3) investigating the need to revise work packages related to the installation of these gaskets. The licensee indicated that they recently determined that another plant with recently replaced SGs identified a dozen pieces of flexitallic gasket during a recent SG inspection. Exelon indicated that this lessons learned would be disseminated Exelon-wide. In addition, they planned to communicate this information with the Nuclear Energy Institute Steam Generator Management Project group and were considering informing the Institute of Nuclear Power Operations. NRC staff is evaluating this further for potential generic implications.

In response to an NRC question, the licensee indicated that they took two formal exceptions to the EPRI SG Examination Guidelines. The first exception was that they extended the inspection interval between inspections of the hot leg top of tubesheet region with a rotating probe. This exception was justified based on site specific and industry experience with replacement SGs and thermally treated Alloy 690 SG tubing. The second exception dealt with how much manual analysis versus automated analysis of eddy current data was performed. The licensee performed less manual analysis of the eddy current data than that recommended by Revision 5 of the EPRI SG Examination Guidelines (which are the current guidelines in use at Braidwood Unit 1). However, the licensee indicated that their actions during the current outage are consistent with Revision 6 of the EPRI SG Examination Guidelines which were recently finalized.

NRC staff did not identify any issues requiring follow up at this time.