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Byron Station, Unit 1
Facility Operating License Nos. NPF-37
NRC Docket No. 50-454

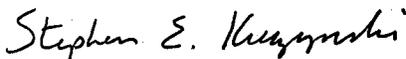
Subject: Response to Request for Additional Information Regarding the Byron Station,
Unit 1 Spring 2005 Steam Generator Inspection

- References: (1) Letter from S. E. Kuczynski (Exelon Generation Company) to U. S. NRC,
"Byron Station Unit 1 Steam Generator Inservice Inspection Summary
Report," dated June 3, 2005 (ML051600185)
- (2) E-mail from R. F. Kuntz (U. S. NRC) to D. J. Chrzanowski (Exelon
Generation Company), "Byron Unit 1 Steam Generator Tube Inspection
Summary Report for the Spring 2005 Outage," dated December 15, 2005

Based on the review of the Reference 1 submittal, the NRC determined that additional information was required in order to complete their evaluation of the Byron Station Unit 1 Spring 2005 steam generator inspection report. The NRC requested a response to three questions contained in the Reference 2 correspondence. The attachment to this letter provides the Exelon Generation Company response to these NRC questions.

Should you have any questions concerning this letter, please contact W. Grundmann, Regulatory Assurance Manager, at (815) 406-2800.

Respectfully,



Stephen E. Kuczynski
Site Vice President
Byron Nuclear Generating Station

SEK/DJC/TLF/rah

Attachment: Additional Information Regarding the Byron Station Unit 1 Spring 2005 Steam
Generator Inspection

Attachment

Byron Station, Unit 1

**Docket Number STN 50-454
License Number NPF-37**

**Additional Information Regarding the Byron Station Unit 1
Spring 2005 Steam Generator Inspection**

Attachment

Additional Information Regarding the Byron Station Unit 1 Spring 2005 Steam Generator Inspection

Question 1

In a conference call with the NRC staff on March 16, 2005 (refer to NRC letter dated May 25, 2005 (ML051400413)), it was indicated that visual inspections were to be performed on certain secondary side internals in steam generator C. Please discuss the results of these inspections.

Response:

Visual inspections were performed on the secondary side of the Byron Station Unit 1 replacement steam generator (RSG) components during the Spring 2005 refueling outage (i.e., refueling outage 13). The inspections included the following.

- Post sludge lance visual inspection of the top of the secondary tubesheet in each of the four RSGs. These inspections included the tube lane, annulus, peripheral tubes and at least four in-bundle inspections down tube columns from the tube lane into the hot and cold legs in each RSG.
- Visual inspection of the upper tube bundle and top support lattice grid in the 1C RSG.
- Visual inspection of the feedring header region in the 1C RSG, including the following areas and components:
 - feedring interior surfaces,
 - feedring J-tubes, and
 - shroud slip joint and shroud pins.
- Visual inspection of the upper and lower steam drum region in the 1C RSG, including the following areas and components:
 - steam nozzle venturi,
 - steam nozzle retainer plate to bolt welds,
 - secondary deck plate seal skirt and seal skirt welds,
 - secondary deck plate, deck fasteners and welds,
 - secondary deck access cover,
 - a sampling of secondary separators,
 - lower steam drum ladder and supports,
 - primary deck plate, fasteners and welds,
 - primary deck support lug, and
 - a sampling of primary separators.

As a result of the above inspections, no degradation or abnormal conditions were identified.

Attachment

Additional Information Regarding the Byron Station Unit 1 Spring 2005 Steam Generator Inspection

The post sludge lance top of tubesheet visual inspection detected nine foreign objects in the Byron Station Unit 1 RSGs. No tube damage was identified by visual inspection or by eddy current examination as a result of these objects. Eight of the nine foreign objects were successfully retrieved. One of the objects could not be retrieved and remains in the 1D RSG. As a result of leaving this object in the RSG, five surrounding tubes were preventatively plugged and stabilized. All of the objects were characterized as machine turnings and shavings.

Question 2

Forty six indications of fan bar wear were identified during the 2005 (Refuel Outage 13) steam generator tube inspections (100% of tubes were inspected). During the last steam generator tube inspections in 2002 (Refuel Outage 11) in which approximately 50% of the tubes were inspected, only 12 indications of fan bar wear were identified. A couple of the indications identified in 2002 were not identified during the 2005 inspections. Please discuss any insights on the increase in the number of wear indications at the fan bar locations between 2002 and 2005 particularly in steam generator D where no indications were reported in 2002 and 19 indications were reported in 2005.

Response:

A review of the Byron Station Unit 1 Spring 2002 refueling outage (i.e., refueling outage 11) and Spring 2005 refueling outage (i.e., refueling outage 13) inspection results indicated that one tube contained an indication that was detected during the Spring 2002 inspection that was not reported during the Spring 2005 inspection. This tube was R46-C11 in RSG 1A. In the Spring 2002 inspection, this tube was reported as containing a 4% through-wall (TW) wear indication at the third fan bar (i.e., F03) based on a bobbin coil inspection data; however, a follow-up inspection using a +Point™ probe could not confirm the indication and no degradation was detected. During the 2005 inspection, the tube was re-inspected with the bobbin coil probe and no reportable eddy current signals were found.

The full-length bobbin coil eddy current inspection history for the Byron Station Unit 1 RSGs is shown in Table 2-1. All tubes in each RSG were inspected during the recent Spring 2005 outage but only a sample of tubes were inspected during the previous Byron Station Unit 1 Spring 2002 outage. Depending on the specific tube and RSG, the previous inspection interval for a given RSG tube could range from two to four cycles.

Attachment

**Additional Information Regarding the Byron Station Unit 1
Spring 2005 Steam Generator Inspection**

**Table 2-1
Byron Unit 1 Bobbin Coil Inspection History**

Outage	Date	RSG A	RSG B	RSG C	RSG D
9	Spring 1999	0%	100%	100%	100%
10	Fall 2000	100%	0%	0%	0%
11	Spring 2002	54%	54%	54%	54%
12	Fall 2003	0%	0%	0%	0%
13	Spring 2005	100%	100%	100%	100%

The 100% full-length Byron Station Unit 1 Spring 2005 inspection detected 46 indications of fan bar wear. The depth of the fan bar wear indications ranged from 4% TW to 21% TW. Table 2-2 provides a breakdown of the 46 fan bar wear indications reported during the Byron Station Unit 1 Spring 2005 inspection.

**Table 2-2
2005 Fan Bar Wear Indication Summary**

RSG Tube Indication Description	RSG 1A	RSG 1B	RSG 1C	RSG 1D	Total
Number of RSG tubes with indications reported in Spring 2005 also <u>previously reported</u> in Spring 2002	4	6	1	0	11
Number of RSG tubes with indications <u>newly reported</u> in Spring 2005 that were <u>not inspected</u> in Spring 2002	1	5	1	10	17
Number of RSG tubes with indications <u>newly reported</u> in Spring 2005 that were <u>previously inspected</u> in Spring 2002	4	5	0	9	18
Total Number of RSG tubes with indications reported in Spring 2005	9	16	2	19	46

* Tube R46-C11 (RSG 1A) is omitted since it was not confirmed by +Point™ inspection during the Spring 2002 inspection and not reported in the Spring 2005 inspection.

As shown in Table 2-2, a total of 35 indications were newly reported during the Byron Station Unit 1 Spring 2005 inspection; however, since only a sampling of RSG tubes (i.e., ~54%) were inspected during the Spring 2002 inspection and 100% of the tubes were inspected in 2005, it is not unusual to expect an increase in the number of reported fan bar wear indications due simply to the increase in sample size. In addition, since the initiation and growth rate of fan bar wear can be dependant on the tolerances in RSG tube-fan bar clearances the fan bar wear can vary between RSGs as a result of variances in the manufacturing and installation of both fan bars and RSG tubes in a given RSG.

Attachment

Additional Information Regarding the Byron Station Unit 1 Spring 2005 Steam Generator Inspection

From the 2005 inspection data, the number of fan bar wear indications contained in SG B and SG D are similar. Additionally, the locations of the fan bar wear indications are also similar. The majority of the indications are located near the center 10 to 15 columns and towards the larger tube rows. The 2005 indications contained in SG D were generally smaller in depth than the other SGs. The indications contained in SG D were 12% TW and less, whereas, indications contained in the other three SGs range up to 21% TW. This suggests that the growth rate in SG D is lower and would require additional operating time for the indications to grow to the detection threshold. Review of operating parameters between the SGs indicated similar conditions and the increase in the number of indications in SG D was not driven by operating conditions specific to SG D.

Fan bar wear may also be affected by the RSG operating conditions. In May of 2001, prior to the Spring 2002 inspection, Byron Station Unit 1 implemented a 5% plant power uprate. Babcock & Wilcox, the RSG Original Equipment Manufacturer, evaluated the power uprate conditions on tube vibration and tube wear. Based on these evaluations, it was concluded the susceptibility of tube wear would not increase as a result of operation at power uprate conditions. The susceptibility to tube wear is not increased at power uprate conditions due to a lower RSG circulation ratio and an increase in steam pressure caused by the concurrent increase in the nominal reactor coolant system (RCS) temperature. Primary RCS hot leg temperature increased from a nominal 610 °F to a nominal 618 °F as a result of the power up-rate implementation.

Considering these factors, the change in the number of new indications detected in Byron Station Unit 1 RSG tubes during the Spring 2005 inspection compared to number of indications in RSG tubes detected during the Spring 2002 inspection (i.e., 18 indications versus 11 indications) does not indicate a significant overall increase in the fan bar wear initiation rate from 2002 to 2005 or suggest a unique condition in the 1D RSG.

Question 3

On page 11 of 46 of your June 3, 2005 letter, it was indicated that there has been no tube wear in the row 1 tubes of steam generator B at the lattice grid support or the cold leg collector bar locations. Please discuss whether any row 1 tubes have exhibited wear indications at the hot-leg collector bar locations (i.e., for those tubes engaged with the collector bar).

Response:

No row 1 tubes have exhibited any wear at lattice grid, fan bar or collector bar locations in the hot leg and cold leg locations in any Byron Station Unit 1 RSG, including the 1B RSG.