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Byron Station  
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U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Byron Station, Unit 2  
Facility Operating License No. NPF-66  
NRC Docket No. 50-455

**Subject:** Response to Request for Additional Information Regarding the Byron Station,  
Unit 2 Spring 2004 Steam Generator Inspection

- References:**
- (1) Letter from S. E. Kuczynski (Exelon Generation Company) to U. S. NRC, "Steam Generator Tube Repairs Resulting from Byron Station, Unit-2, Cycle 11 Refueling Outage," dated April 17, 2004
  - (2) Letter from S. E. Kuczynski (Exelon Generation Company) to U. S. NRC, "Byron Station Unit 2 Steam Generator Inservice Inspection Summary Report," dated June 23, 2004
  - (3) Letter from G. F. Dick, Jr. (U. S. NRC) to C. M. Crane (Exelon Generation Company), "Request for Additional Information (RAI) Regarding Steam Generator Inservice Inspection Report for the Spring 2004 Outage - Byron Station, Unit 2," dated September 15, 2004

Based on the review of the Reference 1 and 2 submittals, the NRC determined that additional information was required in order to complete their evaluation of the Byron Station, Unit 2 Spring 2004 steam generator inspection. The NRC requested a response to two questions contained in the Reference 3 transmittal. 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/JRS/TF/rah

Attachment: Additional Information Regarding the Byron Station Unit 2 Spring 2004 Steam Generator Inspection

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**Attachment**  
**Additional Information Regarding the Byron Station Unit 2**  
**Spring 2004 Steam Generator Inspection**

**Question 1**

*During the 2002 and 2004 refueling outages at Byron 2, a number of tubes were reported with indications of wear at the anti-vibration bars (AVBs). The results from the 2002 outage were provided in letter dated December 10, 2002 (ML023520084). The staff compared the number of indications detected during the 2002 and 2004 outages, and noticed that for many of the steam generators that the number of tubes with wear at the AVBs and the number of indications appears to have declined without a commensurate amount of tube plugging. Please discuss the reasons for the trends in this data. In addition, discuss whether you compare the results of the "current" inspection with those of the previous inspection to ensure that all previously reported flaws are appropriately identified and dispositioned (or whether you will implement this practice in future inspections). Please discuss whether the growth rates for the wear indications at the AVBs are consistent with past inspections.*

**Byron Station Response:**

The number of tubes and indications of AVB wear recorded during Byron Station, Unit 2 Spring 2004 steam generator (SG) tube inspection decreased due to a number of indications being at the threshold of detection. These indications were identified and recorded by the data analysts during the Byron Station, Unit 2 Fall 2002 SG tube inspection, but were very small and near the noise level in magnitude. These indications were re-inspected and re-analyzed during the Spring 2004 inspection but did not meet the recording criteria since they were now slightly below the threshold of detection and within the tube noise range. Normal technique uncertainty and analyst variability causes slight variations in detection and sizing of very small AVB wear indications. Since a large number of indications were near the threshold of detection, it is expected that some indications would not be reported in subsequent inspections due to the variability of the eddy current process. Similarly, a number of indications were determined to be new during the Byron Station, Unit 2 Spring 2004 SG tube inspection as the uncertainties, variabilities and possible growth make an indication rise above the threshold of detection.

The Exelon Generation Company (EGC) steam generator eddy current procedures require that all previous indications reported in a prior outage be addressed by the analysts in the current outage. This was the case in the Spring 2004 SG tube inspection. All previous indications, including AVB wear, were dispositioned by the data analyst and a number of these indications did not exhibit the necessary characteristics to be reported as AVB wear indications in the 2004 inspection. The indications reported in the 2002 inspection that no longer met the recording criteria in 2004 were addressed with an "INR" (Indication Not Reportable) code in 2004. The number of new indications and the number of indications that dropped below the detection threshold during the 2004 inspection were similar to the results from previous outages.

The AVB growth rates over the prior operating cycle were similar, but slightly lower than growth rates found in prior cycles. The growth rates have generally been declining over time, as this is typical of AVB wear (see Table 1). Industry experience with AVB wear has shown that growth rates may slow over a number of cycles and Byron Station Unit 2 is consistent with this experience.

**Attachment**  
**Additional Information Regarding the Byron Station Unit 2**  
**Spring 2004 Steam Generator Inspection**

Table 1:  
Summary of Byron Station, Unit 2  
AVB Wear Indication Growth Rates  
(Average from All SGs Inspected)

|                        | Ave Growth/EFPY | 95 <sup>th</sup> Percentile Growth/EFPY |
|------------------------|-----------------|---|
| Cycle 11 (2002-2004)   | 0.31% TW        | 1.46% TW                                |
| Cycle 10 (2001-2002)** | 0.62% TW        | 2.19% TW                                |
| Cycle 9 (1999-2001)*   | 0.49% TW        | 2.91% TW                                |
| Cycle 8 (1998-1999)    | 1.83% TW        | 4.95% TW                                |

TW – Through-wall

\*SG B was the only SG inspected in Cycle 9.

\*\*1999-2002 for SG's A/C/D and 2001-2002 for SG B.

**Question 2**

*A number of tubes were reported with indications at the 7<sup>th</sup> cold-leg tube support plate (07C). Many of these indications appear to be in the periphery of the tube bundle near the "T-slot". Please clarify the nature and cause of these indications including the technical basis for your conclusions.*

**Byron Station Response:**

Tubes along the periphery and T-slot on the cold leg side of the tube bundle are susceptible to fretting from the pre-heater baffle plates and tubes support plates (TSP). This is due to the design of the steam generator where higher flow rates occur in the pre-heater section of the tube bundle. The periphery and T-slot tubes are located at the main feedwater entrance to the steam generator and inherently have higher cross flows as the feedwater flows upward and across through the baffle plate system. Plants in the industry with similarly designed SGs have also reported tube wear at support structures within the pre-heater region.

Bobbin coil indications that have a potential to be pre-heater baffle plate/TSP wear were required to be inspected with the plus-point probe to verify that the indications were indeed pre-heater baffle plate/TSP wear. The plus-point probe provides additional characterization of the flaw shape in relation to the support structure. Analysis of the plus-point data can readily determine the flaw mechanism as being pre-heater baffle plate/TSP wear based on volumetric morphology of the indications, the outside diameter surface of initiation of the indications, and the location of the indications with respect to the support structure.

Eddy current signals of pre-heater baffle plate/TSP wear reported at Byron Station Unit 2 were compared to the signals of baffle plate/TSP wear that were contained in the EPRI Appendix H Technique qualification data set for baffle plate/TSP wear. The results of this comparison concluded that the Byron signals were similar to the signals contained in the EPRI data set for baffle plate/TSP wear.