

August 4, 2006

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

SUBJECT: BYRON STATION, UNIT NOS. 1 AND 2, AND BRAIDWOOD STATION, UNIT NOS. 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION RELATED TO TECHNICAL SPECIFICATION IMPROVEMENT REGARDING STEAM GENERATOR TUBE INTEGRITY (TAC NOS. MC8966, MC8967, MC8968, AND MC8969)

Dear Mr. Crane:

By letter to the Nuclear Regulatory Commission (NRC) dated November 18, 2005, Exelon Generation Company, LLC submitted a request to alter technical specifications regarding steam generator tube integrity, for the Byron Station, Unit Nos. 1 and 2, and Braidwood Station, Unit Nos. 1 and 2.

The NRC staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is addressed in the enclosure to this letter. During a discussion with your staff on June 13, 2006, it was agreed that you would provide a response within 60 days from the date of this letter.

The NRC staff considers that timely responses to requests for additional information help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. If circumstances result in the need to revise the requested response date, please contact me at (301) 415-3733.

Sincerely,

/RA by S.Campbell for/

Robert F. Kuntz, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-454, STN 50-455,
STN 50-456 and STN 50-457

Enclosure:
Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

BYRON STATION, UNIT NOS. 1 AND 2,

AND BRAIDWOOD STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-454, STN 50-455,

STN 50-456 AND STN 50-457

In reviewing the Exelon Generation Company, LLC's (Exelon's) submittal dated November 18, 2005 (Agencywide Documents Access and Management System Accession No. ML053320303) related to technical specifications (TSs) regarding steam generator (SG) tube integrity, for the Byron Station, Unit Nos. 1 and 2 (Byron) and Braidwood Station, Unit Nos. 1 and 2 (Braidwood), the Nuclear Regulatory Commission (NRC) staff has determined that the following information is needed in order to complete its review:

1. (Category 2h) Proposed TS 5.5.9.f - Provisions for Unit 2 SG tube repair methods. The proposed TS for Units 1 and 2, including Limiting Condition for Operation 3.4.19, refer to "plugged or repaired." However, TS 5.5.9.f addresses provisions for SG tube repair methods for Unit 2 only. The NRC staff is concerned that the proposed TSs could be misconstrued to mean that there are no restrictions with respect to repairs for Unit 1. Discuss Exelon's plans for revising TS 5.5.9.f such as to clarify that tube repairs may not be performed for Unit 1. The following text provides an example of the type of TS wording the NRC staff considers to be appropriate:

f. Provisions for SG tube repair methods. Steam generator tube repair methods shall provide the means to reestablish the reactor coolant system (RCS) pressure boundary integrity of the SG tubes without removing the tube from service. For the purposes of these specifications, tube plugging is not a repair.

1. There are no approved SG tube repair methods for the Unit 1 SGs.

2. All acceptable repair methods for the Unit 2 SGs are listed below...

Other approaches might be used, provided that the TS wording is explicitly clear regarding the repair methods that are acceptable for each unit.

ENCLOSURE

2. (Category 1c) The NRC staff notes that the existing TS reporting requirements do not address issues associated with implementation of the tubesheet inspection and alternate repair criterion. Discuss Exelon's plans to revise proposed TS 5.6.9, "Steam Generator (SG) Inspection Reports," to include reporting requirements applicable to the implementation of the tubesheet inspection and alternate repair criterion, similar to what the NRC staff has requested other licensees submitting applications for tubesheet inspection and alternate repair criteria. For example:
 - a. A breakout of indications detected in the upper 17 inches of the tubesheet thickness with respect to their location, orientation, and measured size. (The only difference here relative to what is being proposed is that the indications in the tubesheet region would be listed separately from those elsewhere.)
 - b. The operational primary to secondary leakage rate observed in each SG during the cycle preceding the inspection which is the subject of the report and (2) the calculated accident leakage rate for each SG from the lowermost 4 inches of tubing for the most limiting accident. If the calculated accident leakage rate for any SG is less than two times the total observed operational primary to secondary leakage rate, the 12-month report should describe how it was determined.
3. (Category 2c) On page 7 of 17 of Attachment 1, "Evaluation of Proposed Changes," of the November 18, 2005 submittal, Exelon indicated that the roll transition zone sleeve lower joint is located near the neutral axis of the tubesheet (i.e., within the portion of the tube that will be inspected). Confirm that Licensing Report CEN-621-P, Revision 00, "Commonwealth Edison Byron and Braidwood Unit 1 and Unit 2 Steam Generators Tube Repair Using Leak Tight Sleeves, FINAL REPORT," dated April 1995, precludes the establishment of the joint in the lower 4 inches of the tubesheet. If it does not, provide technical justification why a joint in the lower 4 inches of the tubesheet is allowable. Alternatively, rewrite the proposed TSs to preclude the establishment of joints in the lower 4 inches of the tubesheet.
4. (Category 1c) In the proposed TS (and TSTF-449), a SG tube is defined as the entire length of the tube, including the tube wall (and any repairs made to it), between the tube-to-tubesheet weld at the tube inlet and the tube-to-tubesheet weld at the tube outlet. Given this definition, the proposed repair criteria in TS 5.5.9.c could be misinterpreted. Discuss Exelon's plans to modify the TSs to more clearly define the repair criteria for the sleeved portion of a tube. The following text provides an example of the type of TS wording the NRC staff considers to be appropriate:
 1. *Tubes found by inservice inspection to contain flaws in a non-sleeved region with a depth equal to or exceeding 40-percent of the nominal tube wall thickness shall be plugged or repaired except if permitted to remain in service through application of the alternate repair criteria discussed in TS 5.5.9.c.4.*

2. *Sleeves found by inservice inspection to contain flaws with a depth equal to or exceeding the following percentages of the nominal sleeve wall thickness shall be plugged:*
 - a. *Tungsten Inert Gas welded sleeves (per TS 5.5.9.f.1): 32 percent*
3. *Tubes with a flaw in a sleeve to tube joint that occurs in the sleeve or in the original tube wall of the joint shall be plugged.*
4. *The following tube repair criteria may be applied as an alternative to the 40-percent depth based criteria of TS 5.5.9.c.1:*

Other approaches might be used, provided that the TS wording clearly defines the repair criteria for the sleeved portion of a tube.

5. Regarding the revised BASES,
 - a. Proposed Page B 3.4.13 - 3 states, "The dose consequences resulting from the Locked Rotor with a Concurrent SG PORV [power-operated relief valve] Failure accident are well within the limits defined in 10 CFR [Part] 100." This statement replaces the current statement, "The dose consequences resulting from the SLB [steamline break] accident are well within the limits defined in 10 CFR [Part] 100." Why has this revision been made? Aren't the consequences of all analyzed events within the limits defined in 10 CFR Part 100? If so, why not simply state that?
 - b. On Page B 3.4.19-4, there is a statement that the accident induced leakage criteria is 1 gpm for all SGs except for specific types of degradation at specific locations. This wording (i.e., the exception) is not in the proposed TS. Describe Exelon's plans for resolving this discrepancy.
6. (Category 2a) Under the proposed 17-inch tubesheet inspection zone, it is Exelon's contention that the accident leakage integrity of the tubing below the 17-inch inspection zone is ensured by the bellwether principle. The NRC staff requests that Exelon submit a leakage sensitivity study to support the conservatism of the bellwether approach. That is, leakage during accidents will not exceed two times that observed during normal operating conditions. The NRC staff requests that this study consider axial and circumferential flaws located at the bottom of the tubesheet at three tubesheet radial locations; i.e., at the zero radius, mid-radius, and peripheral locations. For each type of crack at each location, leakage under normal operating and accident conditions should be evaluated considering only the crack leakage resistance, considering only the tube-to-tubesheet annulus resistance and, lastly, considering the total resistance of the crack and annulus to leakage. [Note, the NRC staff is not so much interested in the absolute values of the leakage predictions as it is in the relative values of the predictions between normal operating and accident conditions. Exelon has not requested that the NRC staff review the leakage prediction models, and the NRC staff would not be in a position to approve these models until the accuracy of these models has been validated by test for prototypic situations. This being said, the NRC staff believes that these

models, which are based on standard engineering principles, should at least be capable of providing a qualitative demonstration supporting the bellwether approach.]

7. (Category 1e) Section 8.2 of Attachment 7 provides a justification for why ligament tearing of circumferential cracks is not a significant concern. Provide a justification for why ligament tearing of axial cracks at the bottom of the tubesheet at the periphery is similarly not a significant concern.
8. (Category 1e) Are there any tubes in the Byron and Braidwood, Unit 2 SGs which were not fully expanded (per nominal) within the tubesheet? If so, please describe the extent of this condition and justify why the amendment request is sufficient to ensure the structural and leakage integrity of the affected tube joints.

RAI CATEGORIES

(Select only one, most dominant category for each RAI question)

1. More information is needed because of:
 - a. complexity of request
 - b. first-of-a-kind nature of request
 - c. NRC change in regulatory significance or focus
 - d. NRC questions on previously used methodology or guidance
 - e. licensee change to previously used methodology
 - f. licensee reduction in current safety margin

2. The review can not be completed without additional explanation or clarification of:
 - a. input variables or analytical assumptions
 - b. methodology used or results obtained
 - c. applicability or bounding nature of third party analyses or data correlations
 - d. differences from NRC guidance documents (SRP, RG, etc.)
 - e. no significant hazards consideration discussion
 - f. environmental considerations discussion
 - g. applicable regulatory requirements discussion
 - h. information that appears to be incorrect and needs to be corrected
 - i. response to previous RAI appears inadequate

3. Reviewer requesting information even though the question is, or the question asks for:
 - a. not directly related to the request
 - b. inconsistent with applicable codes, standards, RGs, or SRP sections
 - c. information accessible from readily available sources and was explicitly referenced
 - d. information does not appear needed given the precedent cases discussed in the request
 - e. information that is not safety significant or pertinent to the regulatory finding
 - f. information that is known to engineers who work in the general technical area
 - g. going beyond the current licensing basis and doesn't need to be asked
 - h. a formal commitment

4. Other (please specify)