

RS-16-131

June 1, 2016

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

Quad Cities Nuclear Power Station, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-29 and DPR-30  
NRC Docket Nos. 50-254 and 50-265

Subject: Additional Information Regarding License Amendment Request for Spent Fuel Storage Pool Criticality Methodology for Fuel Channel Bow/Bulge

- References:
1. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U.S. NRC, "Request for License Amendment Regarding Spent Fuel Storage Pool Criticality Methodology for Fuel Channel Bow/Bulge," dated December 14, 2015
  2. Letter from J. A. Dion (U.S. NRC) to B. C. Hanson (Exelon Generation Company, LLC), "Quad Cities Nuclear Power Station, Units 1 and 2 – Request for Additional Information Related to License Amendment for Spent Fuel Pool Criticality Methodology for Fuel Channel Bow/Bulge (TAC Nos. MF7160 and MF7161)," dated May 12, 2016

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Renewed Facility Operating License Nos. DPR-29 and DPR-30 for Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2, respectively. The proposed change would allow use of a new Criticality Safety Analysis (CSA) fuel channel bow/bulge methodology for performing the criticality safety evaluation for the new ATRIUM 10XM fuel design in the spent fuel pool.

The NRC requested additional information that is needed to complete review of the proposed change in Reference 2. In response to this request, EGC is providing the attached information.


EGC has reviewed the information supporting a finding of no significant hazards consideration, and the environmental consideration, that were previously provided to the NRC in Attachment 1 of Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. In addition, the additional information provided in this submittal does not affect

the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Mr. Kenneth M. Nicely at (630) 657-2803.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 1st day of June 2016.

Respectfully,

A handwritten signature in black ink, appearing to read "Patrick R. Simpson", followed by a long, sweeping horizontal line that extends to the right.

Patrick R. Simpson  
Manager – Licensing

Attachment: Response to Request for Additional Information

cc: NRC Regional Administrator, Region III  
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station  
Illinois Emergency Management Agency – Division of Nuclear Safety

**ATTACHMENT**  
**Response to Request for Additional Information**

**NRC RAI-1**

In the LAR (Reference 1), the licensee states that no bias or uncertainty needs to be calculated because information from AREVA report FS1-0024092 indicates that fuel geometry changes are not expected to occur for the ATRIUM 10XM fuel design at the relatively low burnups being considered. The NRC staff notes that Section 4.4 of the AREVA report states that the data presented is intended to provide statistics that will reasonably bound the observed population of channels for each exposure range. The statistics provided for the exposure range of interest does not indicate a non-zero channel bulge/bow. Provide additional detail supporting the statement that fuel geometry changes are not expected to occur.

**Response**

The channel bulge/bow values shown in the statistics, for the exposure range of interest, are not the result of fuel geometry changes. Rather, the channel bulge/bow values reflect channel fabrication dimensional data, including tolerances, which are accounted for in the criticality analysis over the exposure range of interest.

**NRC RAI-2**

In the LAR (Reference 1), Attachment 3, Table 2, lists the uncertainties and biases calculated for the ATRIUM 10XM, with the intent of demonstrating that the total reactivity effect from all biases and uncertainties for the ATRIUM 10XM fuel are bounded by the SVEA-96 Optima2 fuel from the previously approved NCS analysis. A review of the NCS analysis report associated with license amendments Nos. 253 and 248 for QCNPS, Units 1 and 2 (Reference 2), shows a comparable list of uncertainties and biases that were totaled to obtain the total reactivity effect for the SVEA-96 Optima2 fuel. The ATRIUM 10XM data appears to be missing the bias and uncertainty associated with **[[** **]]**. Describe whether the value designated as "ATRIUM 10XM Total Uncertainties and Biases" in this table includes the bias and uncertainty associated with **[[** **]]**, and if not, provide a justification for not including this reactivity effect in Table 2.

**Response**

The bias and uncertainty that appear to be missing are not included in the value designated as "ATRIUM 10XM Total Uncertainties and Biases." Significant fuel assembly geometry changes (i.e., for the items listed in Reference 1, Attachment 3, Table 1) are not expected to occur for the ATRIUM 10XM fuel design at exposures corresponding to peak reactivity (i.e., about 10-15 GWD/MTU).

**NRC RAI-3**

In the LAR (Reference 1), Attachment 3, Table 2, lists the uncertainties and biases calculated for the ATRIUM 10XM, with the intent of demonstrating that the total reactivity effect from all biases and uncertainties for the ATRIUM 10XM fuel are bounded by the SVEA-96 Optima2 fuel from the previously approved NCS analysis. One of the listed biases is for the "eccentric

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positioning and fuel assembly channel reactivity effect bias." The NRC staff understands this bias to cover the maximum reactivity increase due to a combination of: (1) eccentric positioning and (2) whether the fuel assembly is channeled or not. Confirm the staff's understanding, or provide clarification as to the intent of this bias.

**Response**

The NRC's interpretation of the "eccentric positioning and fuel assembly channel reactivity effect bias" is correct. This bias accounts for the maximum reactivity increase due to a combination of: (1) eccentric positioning (i.e., not centered in the storage cell), and (2) whether the fuel assembly is channeled or not.

**Reference**

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