

RS-16-078

10 CFR 50.55a

April 4, 2016

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

Braidwood Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Clarification to Response to Requests for Additional Information for Relief for Alternate Requirements for Repair of Reactor Vessel Head Penetrations with Nozzles Having Pressure-Retaining Partial-Penetration J-Groove Welds (RS-16-045)

- References:
- 1) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Requests for Relief for Alternate Requirements for Repair of Reactor Vessel Head Penetrations with Nozzles Having Pressure-Retaining Partial-Penetration J-Groove Welds," dated September 11, 2015
 - 2) Email from J. Wiebe (NRC) to J. Krejcie (Exelon Generation Company, LLC), Preliminary Request for Additional Information Regarding the Braidwood and Byron Requests for Relief Regarding Repair of Reactor Vessel Head Penetration J-Groove Welds, dated January 6, 2016
 - 3) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Response to Requests for Additional Information for Relief for Alternate Requirements for Repair of Reactor Vessel Head Penetrations with Nozzles Having Pressure-Retaining Partial-Penetration J-Groove Welds," dated February 11, 2016
 - 4) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Supplement to Response to Requests for Additional Information for Relief for Alternate Requirements for Repair of Reactor Vessel Head Penetrations with Nozzles Having Pressure-Retaining Partial-Penetration J-Groove Welds (RS-16-045)" dated March 15, 2016

- 5) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Supplement to Response to Requests for Additional Information for Relief for Alternate Requirements for Repair of Reactor Vessel Head Penetrations with Nozzles Having Pressure-Retaining Partial-Penetration J-Groove Welds (RS-16-045)" dated March 22, 2016
- 6) Email from E. Brown (NRC) to J. Krejcie (Exelon Generation Company, LLC) "Draft: Byron/Braidwood Request for Additional Information," dated March 31, 2016

In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), Exelon Generation Company, LLC (EGC), requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (B&PV Code) specifically related to the repair of the degraded reactor vessel closure head (RVCH) penetration nozzles and their associated partial penetration J-groove attachment welds. Specifically, the relief request proposed to perform an alternative repair technique using the Areva Inside Diameter Temper Bead (IDTB) welding method to restore the pressure boundary of a degraded nozzle. EGC submitted this request to the NRC in Reference 1.

Subsequent to submittal of Reference 1, the NRC requested additional information to support the review of the subject relief request (Reference 2). EGC responded to the questions in the Reference 3 transmittal. The Reference 3 transmittal was supplemented with two additional letters, References 4 and 5.

In Reference 6, the NRC requested clarification on the References 3, 4 and 5 transmittals. A teleconference was held with NRC staff members on March 31, 2016, where the Reference 6 questions were discussed. Clarification was provided for the questions included in Reference 6 and the NRC requested a letter from EGC to transmit the response for Question 5. The response to Question 5 is provided below.

Question 5 of Reference 6 stated:

"Section 4.4 [of Reference 5 Attachment 1] address[es] the weld anomaly flaw evaluation. Clarify whether the NB-3227.2 of Section III criteria used for cylindrical flaw propagating in the new weld metal is more stringent than the LEFM criteria (fracture toughness margins)."

EGC Response:

The triple-point weld anomaly analysis considers a cylindrical flaw in the Alloy 52/52M/52MSS weld metal. The weld metal is an austenitic material, and it is a non-flux weld. Guidance on how to evaluate the hypothetical flaw in the weld metal is taken from ASME Section XI, Appendix C Article C-4000 "Determination of Failure Mode." As noted in Paragraph C-4210 as well as Figure C-4210-1, plastic collapse is the controlling failure mode for austenitic, non-flux weld material. Linear Elastic Fracture Mechanics (LEFM) is the controlling failure mode only for ferritic material under some loading circumstances, as noted in Paragraph C-4221. Therefore, LEFM criteria are not applicable for the postulated cylindrical flaw in the non-flux weld.

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The loading applied to the triple-point weld anomaly cylindrical flaw is a shear load, caused primarily by end cap pressure forces acting on the nozzle. An appropriate and conservative evaluation for the plastic collapse load due to shear is found in ASME Section III, Paragraph NB-3227.2. Therefore, the NB-3227.2 methodology is selected for evaluating the postulated cylindrical flaw in the non-flux weld.

There are no regulatory commitments contained within this letter.

Should you have any questions concerning this letter, please contact Ms. Jessica Krejcie at (630) 657-2816.

Respectfully,

A handwritten signature in black ink, appearing to read "D. Gullott", with a long horizontal line extending to the right.

David M. Gullott
Manager – Licensing
Exelon Generation Company, LLC

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