

RS-17-138

10 CFR 50.90

October 25, 2017

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 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: Response to Request for Additional Information Related to License Amendment Request to Incorporate Changes Supported by TSTF-547, "Clarification of Rod Position Requirements"

- References:
- (1) Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request to Incorporate Changes Supported by TSTF-547, 'Clarification of Rod Position Requirements,'" dated June 30, 2017
 - (2) Email from J. S. Wiebe (U. S. NRC) to J. A. Bauer, (Exelon Generation Company, LLC, "Request for Additional Information Regarding TSTF-547 Supported Amendment," dated September 27, 2017
 - (3) Letter from K. Hsueh (NRC) to Technical Specification Task Force, "Final Safety Evaluation of Technical Specification Task Force Traveler TSTF-547, Revision 1, 'Clarification of Rod Position Requirements'" (TAC No. MF3570), March 4, 2016

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Renewed Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Renewed Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2. This amendment request proposed to revise Technical Specification (TS) 3.1.4, "Rod Group Alignment Limits," TS 3.1.5, "Shutdown Bank Insertion Limits," TS 3.1.6, "Control Bank Insertion Limits," and TS 3.1.7, "Rod Position Indication," consistent with the changes approved by the NRC in Reference 3.

In Reference 2, the NRC requested that EGC provide additional information to support their review of the subject License Amendment Request. As noted in Reference 2, a response was requested within 30 days; i.e., by October 27, 2017. The requested information is provided in Attachment 1.

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EGC has reviewed the information supporting the No Significant Hazards Consideration and the Environmental Consideration that was previously provided to the NRC in Reference 1. The additional information provided in this submittal does not affect the conclusion that the proposed license amendment does not involve a significant hazards consideration. This additional information also does not affect the conclusion that neither an environmental impact statement nor an environmental assessment need be prepared in support of the proposed amendment.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the State of Illinois of this additional information by transmitting a copy of this letter and its attachment to the designated State Official.

As noted in Reference 1, EGC requests approval of this proposed license amendment by June 30, 2018.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Joseph A. Bauer at (630) 657-2804.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 25th day of October 2017.

Respectfully,



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

Attachment 1 Response to Request for Additional Information

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

ATTACHMENT 1
Response to Request for Additional Information

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Renewed Facility Operating License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2, and Renewed Facility Operating License Nos. NPF-37 and NPF-66 for Byron Station, Units 1 and 2. This amendment request proposed to revise Technical Specification (TS) 3.1.4, "Rod Group Alignment Limits," TS 3.1.5, "Shutdown Bank Insertion Limits," TS 3.1.6, "Control Bank Insertion Limits," and TS 3.1.7, "Rod Position Indication," consistent with the changes approved by the NRC in Reference 3.

In Reference 2, the NRC requested that EGC provide additional information to support their review of the subject License Amendment Request. The requested information is provided below.

NRC Request for Additional Information

In reviewing the Exelon Generation Company, LLC (the licensee) letter dated June 30, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17187A191), related to a license amendment request to change the Braidwood Station, Units 1 and 2 and Byron Station, Units 1 and 2, technical specifications to incorporate changes supported by TSTF-547, "Clarification of Rod Position Requirements," the NRC staff has determined that additional information is required to complete the review.

The proposed change to the TSs would add a new Condition A to Limiting Condition for Operation (LCO) 3.1.5 and LCO 3.1.6 (shutdown and control bank insertion limits) that is applicable when one bank is inserted ≤ 16 steps below the insertion limits specified in the Core Operating Limits Report. You state in your submittal dated June 30, 2017, that, while the TSTF-547 verbiage is not adopted in its entirety, the requested changes are consistent with the changes approved by the NRC staff in its safety evaluation (SE) dated March 4, 2016, "Final Safety Evaluation of Technical Specification Task Force Traveler TSTF-547, Clarification of Rod Position Requirements," Revision 1 (ADAMS Accession No. ML15328A350). The NRC staff states in its SE that the bracketed number [16] in Condition A should be replaced with the plant-specific minimum number of steps that the rods must be moved to ensure correct performance of Surveillance Requirement (SR) 3.1.4.2. The Braidwood and Byron SR 3.1.4.2 requires movement of the control and shutdown rods a minimum of 10 steps in either direction. Provide justification for the use of ≤ 16 steps in Condition A in LCOs 3.1.5 and 3.1.6 and explain how this is consistent with that approved in the NRC staff's SE for TSTF-547.

Response

Braidwood Station and Byron Station Technical Specifications (TS) Surveillance Requirement, SR 3.1.4.2, states:

"Verify rod freedom of movement (trippability) by moving each rod not fully inserted in the core ≥ 10 steps in any one direction."

A value of " ≤ 16 steps" was selected as the number of allowable steps below the insertion limits specified in the proposed Condition A for LCO 3.1.5 and LCO 3.1.6.

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Specifically, LCO 3.1.5 Condition A states:

"One shutdown bank inserted ≤ 16 steps beyond the insertion limits specified in the COLR."

LCO 3.1.6 Condition A states:

"Control bank A, B or C inserted ≤ 16 steps beyond the insertion, sequence, or overlap limits specified in the COLR."

The selection " ≤ 16 steps" for these LCOs is consistent with the statement in the NRC's Safety Evaluation for TSTF-547 that specifies: *"The value of [16] steps corresponds to the minimum number of steps that the rods must be moved to ensure correct performance of SR 3.1.4.2."* The value of 16 steps is based on the design of the Digital Rod Position Indication (DRPI) System. The following is an excerpt from TS Bases B 3.1.7, "Rod Position Indication," that briefly describes the DRPI System design.

"The DRPI System determines the actual position of each control bank and shutdown bank rod by using individual coils that are mounted concentrically along the outside boundaries of the rod drive pressure housings. Each control bank rod has 42 coil assemblies evenly spaced along its length at 3.75 inch (6 step) intervals from rod bottom to the fully withdrawn position. Each shutdown bank rod has 20 coil assemblies evenly spaced along its length at 3.75 inch intervals from rod bottom to 18 steps and from 210 steps to the fully withdrawn position, with a transition LED representing shutdown bank rod position between 18 steps and the fully withdrawn position. The coils magnetically sense the presence or absence of a rod drive shaft and send this information to two Data Cabinets located in the containment building."

"Normal system accuracy is ± 4 steps (± 3 steps with an additional step added for coil placement and thermal expansion)."

Based on this design, one LED will illuminate on the DRPI panel in the Main Control Room (see Figure 1) with every 6 steps of rod movement. To verify 10 steps of rod movement, a change of two DRPI LEDs must be observed; i.e., the bank must be inserted 12 steps, as an insertion of only 10 steps may result in only one DRPI LED change. As noted above, normal DRPI system accuracy is ± 4 steps, therefore, a shutdown or control bank could be as much as 4 steps further inserted than indicated on the DRPI system.

A bounding scenario for the performance of SR 3.1.4.2 is to conduct the SR with a subject bank of rods starting from in the "All Rods Out (ARO)" position (assume 228 steps for this scenario). The ARO position could also be synonymous with the bank's rod insertion limit (RIL). When stepping a bank into the core a total of 12 steps to verify 10 steps of rod movement, the bank of rods could physically be located 16 steps below the RIL of 228 steps (i.e., at 212 steps) due to DRPI system design accuracy; i.e., 12 steps ± 4 steps. Based on this bounding scenario, " ≤ 16 steps" was selected as the appropriate value for Condition A of LCO 3.1.5 and LCO 3.1.6.

It should be noted that Braidwood Station and Byron Station conduct SR 3.1.4.2 in a manner that is bounded by the above scenario providing additional conservatism. Each bank is first withdrawn from the ARO position (i.e., 228 steps) to the fully withdrawn position (i.e., 231 steps); then inserted approximately 12 steps to observe a change of two DRPI LEDs (i.e., to verify 10 steps of rod movement). In addition, the RIL for the current cycle at all Braidwood

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Station and Byron Station units is 224 steps. With this SR test protocol, a bank would be inserted 12 steps from 231 steps; i.e., to 219 steps; however, considering the ± 4 step accuracy, the bank could be physically located at 215 steps (i.e., 9 steps below the current RIL of 224 steps).

Given that the ARO position may change from cycle to cycle potentially becoming synonymous with the RIL, the above bounding scenario value of " ≤ 16 steps" was selected as the number of allowable steps below the insertion limits specified in the newly proposed Condition A for LCO 3.1.5 and LCO 3.1.6.

The proposed changes to Condition A of LCO 3.1.5 and 3.1.6 are consistent with the NRC Safety Evaluation for TSTF-547 (i.e., Reference 3). In Reference 3, Section 3.1, "Provide Time to Correct Rod Movement Failures that Do Not Affect Operability Review," the NRC noted the following:

The NRC staff reviewed the justification for the proposed addition of Condition A to TS 3.1.5 and TS 3.1.6 provided in the Technical Evaluation Section of Traveler TSTF-547, to ensure the reasoning is logical, complete and clearly written. The justification in Traveler TSTF-547 states:

- 1. All control and shutdown rod assemblies are required to be Operable. If a rod is untrippable (i.e., inoperable), then a plant shutdown is required in accordance with LCO 3.1.4, Condition A.*
- 2. Only one control bank and shutdown bank may be inserted beyond insertion limits by no more than [16] steps. If one or more control banks or shutdown banks exceed the insertion limit, a brief time period is permitted to correct the condition and then a plant shutdown is required.*
- 3. If one rod is not within the alignment limits, adequate [Shutdown Margin] SDM is verified and a power reduction is required by LCO 3.1.4, Condition B. If more than one rod is not within the alignment limit as defined in LCO 3.1.4, adequate SDM is verified and a plant shutdown is required.*

The above justification stated in the TSTF is applicable to the proposed revision to LCO 3.1.5 and LCO 3.1.6 for Braidwood Station and Byron Station.

In Reference 3, Section 3.1, the NRC also stated:

The insertion limits are established to ensure a sufficient amount of negative reactivity can be rapidly inserted to shutdown the reactor. The NRC staff finds that allowing continued full-power operations for 24 hours with a rod movement failure is acceptable for the following reasons:

- (1) the Shutdown Margin continues to be met;*
- (2) all control and shutdown rods are trippable - i.e., capable of being rapidly inserted into the core;*
- (3) only one bank may exceed insertion limits by no more than a specified number of steps;*

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(4) *all immovable rod assemblies are aligned; and*

(5) *the rods must be restored to within the insertion limits within 24 hours.*

All the above stated reasons are applicable to the proposed revision to LCO 3.1.5 and LCO 3.1.6 for Braidwood Station and Byron Station.

Finally, in Reference 3, Section 3.1, the NRC concluded the following:

The change to TS 3.1.5 and TS 3.1.6 to provide time to correct rod movement failures that do not affect operability will allow sufficient time for diagnosis and repairs while maintaining the safety function of the control rods since the affected rods are still trippable. The thermal margins may be affected by power distribution changes due to control rod bank insertion, both during the insertion and during the resulting local xenon transient. However, insertions at or near the typical value of 16 steps from fully withdrawn, as provided in the proposed changes to TSs 3.1.5 and 3.1.6, would result in a very small negative reactivity impact at the top of active fuel. The resulting effect on the axial power distribution is not expected to be significant. In addition, alignment of all rods with the rod bank position (as per LCO 3.1.4) must be maintained and it will be verified that the reactor can still be shutdown. Therefore, the NRC staff has determined that the proposed 24-hour completion time for Condition A in LCO 3.1.5 and 3.1.6 specifying shutdown bank and control bank insertion limits is acceptable.

The above discussion is valid and applicable to Braidwood Station and Byron Station.

Conclusion

Based on the information presented above, EGC concludes that the value of " ≤ 16 steps" is appropriate for the number of allowable steps below the insertion limits specified in the proposed Condition A for LCO 3.1.5 and LCO 3.1.6. The proposed revisions to LCO 3.1.5 and LCO 3.1.6 are consistent with that approved in the NRC Safety Evaluation for TSTF-547 (i.e., Reference 3).

References

1. Letter from D. M. Gullott (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request to Incorporate Changes Supported by TSTF-547, 'Clarification of Rod Position Requirements,'" dated June 30, 2017
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Figure 1
 Rod Position Indication Panel in the Main Control Room

