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U. S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

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

Subject: Reply to a Notice of Violation

Reference: Letter from G.E. Grant (NRC Region III) to O.D. Kingsley (Exelon Generation Company, LLC), "Braidwood Station, Units 1 and 2, NRC Inspection Report 50-456/01-11 (DRP); 50-457/01-11 (DRP) and Notice of Violation," dated December 12, 2001

In the referenced letter, based on the results of an inspection, the NRC determined that Braidwood Station has been in violation of NRC requirements since July 11, 2000. The inspectors determined that instrument uncertainties associated with the Ultimate Heat Sink (UHS) average temperature were not assumed in design analyses and were not accounted for in the Technical Specification (TS) limit or associated testing acceptance criteria. The NRC cited this as a violation of 10 CFR 50, Appendix B, Criterion XI, "Test Control."

The attachment to this letter contains our response to the Notice of Violation. Instrument uncertainties have not been explicitly incorporated in the TS limit for UHS average temperature or the surveillance which confirms that the limit has not been exceeded. However, instrument uncertainties have been implicitly accommodated in the overall safety analyses due to the methodologies, assumptions and conservatism used in performing the analyses. To date, in support of previous licensing actions, the implicit accounting for instrument uncertainty has been based on qualitative evaluations of design margin in components served by the UHS and in the safety analyses. This is consistent with the treatment of such uncertainty for instrumentation that does not initiate a protective action and is not used in the accident response. However, the UHS design is inherently conservative based on meeting the applicable criteria contained in section 9.2.5 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," and Regulatory Guide (RG) 1.27, "Ultimate Heat Sink." We do acknowledge the concern identified in the inspection report. To substantiate that adequate margin exists, additional analyses will be performed to identify and quantify conservatism in the analyses to demonstrate that instrument uncertainties are appropriately accounted for implicitly in the overall safety analyses.

IE01

Based on our review of the regulations and guidance, we do not agree that a violation of Criterion XI occurred.

This issue has been entered into the Corrective Action Program to track completion of the additional analyses. Architect Engineering services have been contracted to perform the additional analyses and the analytical work has begun. However, additional time is needed to document and complete the analyses, which are scheduled to be completed by April 19, 2002. The analyses will provide a quantitative comparison of the results of the additional analyses, along with the previously performed component-specific design margin and safety analyses evaluations, to the instrument uncertainty associated with UHS temperature. Based on the violation being categorized as an issue of very low safety significance (Green), the completion date for the analyses is considered appropriate.

If you have any questions or comments regarding this reply, please contact Ms. A. Ferko, Braidwood Station Regulatory Assurance Manager, at (815) 417-2699.

Respectfully,

James D. von Suskil
Site Vice President
Braidwood Station

Attachment: Reply to Notice of Violation

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector - Braidwood Station
Director, Office of Enforcement

ATTACHMENT
Reply to Notice of Violation

In a letter from G.E. Grant (NRC Region III) to O.D. Kingsley (Exelon Generation Company, LLC), dated December 12, 2001, the NRC issued a Notice of Violation. The violation of NRC requirements was identified during an NRC inspection conducted on October 1 through November 19, 2001 and is provided below:

> "10 CFR 50, Appendix B, Criterion XI, states, in part, that a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.
>
> The maximum analyzed design limit for essential service water temperature was 100 degrees Fahrenheit as referenced below. Instrument uncertainty of +/- 2.6 degrees Fahrenheit for 1TI-SX015A,B (main control board 1A, 1B SX pump discharge analog temperature gauges) was not accounted for in these analyses.
>
> - The Updated Final Safety Analysis Section 9.2.2.1 stated, "The component cooling (CC) system design is based on the design-basis service water supply maximum temperature of 100 [degrees Fahrenheit]." The CC water system provided cooling water to the residual heat removal system and the spent fuel pool cooling system.
> - In addition, the Updated Final Safety Analysis Section 6.2.1.1.3, listed the maximum temperature limit analyzed for essential service water inlet temperature for the containment heat removal system (reactor containment fan cooler heat exchanger) as 100 [degrees Fahrenheit].
> - Finally, the Updated Final Safety Analysis Section 9.5.5.2 stated that the maximum essential service water inlet temperature to the emergency diesel generator jacket water cooling heat exchanger was 100 [degrees Fahrenheit].
>
> Technical Specification Surveillance Requirement 3.7.9.2 required verification that the average water temperature of the ultimate heat sink (source of the essential service water system) was less than or equal to 100 [degrees Fahrenheit] every 24 hours.
>
> Procedure 1(2)BwOSR 0.1-1,2,3, "Unit One – Modes 1, 2, and 3 Shiftly and Daily Operating Surveillance Data Sheet," Revision 4, was the implementing procedure for Surveillance Requirement 3.7.9.2. Surveillance Requirement 3.7.9.2 acceptance criteria as less than or equal to 100 degrees Fahrenheit.
>
> Contrary to the above, since July 11, 2000, Operating Surveillance Procedure 1(2)BwOSR 0.1-1,2,3 was inadequate, in that, previously identified measurement instrument tolerance band of +/- degrees Fahrenheit for 1TI-SX015A,B was not accounted for in the Surveillance Requirement 3.7.9.2 acceptance criteria. Therefore, the test program to assure the satisfactory performance of several safety related systems would have allowed the actual temperature of the essential service water system to exceed acceptance limits contained in applicable design documents."

Response:

The following is our response to the Notice of Violation.

Question 1
The reason for the violation, or, if contested, the basis for disputing the violation.

Response

We disagree with the basis of the Notice of Violation. Our review of appropriate regulatory requirements and guidance did not identify specific requirements regarding design margin, accounting for instrument uncertainties, or the need for testing to establish limits and/or acceptance criteria that include measurement uncertainties. Therefore, we do not conclude that there is a requirement to account for this uncertainty in TS Surveillance Requirement testing acceptance criteria.

Regulatory Guide (RG) 1.105, "Instrument Setpoints," describes an acceptable method for ensuring that the setpoints in systems important to safety are initially within and remain within the specified limits, including incorporation of instrument uncertainties. Braidwood Station is committed to Revision 1 of this RG as described in Appendix A of the Updated Final Safety Analysis Report. RG 1.105, Revision 1 describes a method acceptable to the NRC to meet 10 CFR 50.36, "Technical Specifications," which requires, in part, where a limiting safety system setting is specified for a variable on which a safety limit has been placed, the setting be so chosen that automatic protective action will correct the most severe abnormal situation anticipated before a safety limit is exceeded. Based on having to meet this requirement, the scope of this RG is limited to protective actuation setpoints, i.e., Reactor Protection System (RPS) and Engineered Safety Feature Actuation System (ESFAS) Instrumentation. For setpoints that are applicable to this scope, our method is consistent with the RG criteria. The UHS temperature instrumentation is not associated with a limiting safety system setting, not associated with any protective actuation feature, and is not used in accident responses. Consequently, the elements of RG 1.105 do not apply to the UHS temperature instrumentation.

Subsequent revisions to RG 1.105 (i.e., Revision 3) endorse Part 1 of ISA-S67.04-1994, "Setpoints for Nuclear Safety-Related Instrumentation," as a method acceptable to the NRC staff for complying with the NRC's regulations for ensuring that setpoints for safety-related instrumentation are initially within and remain within the technical specification limits. ISA-S67.04-1994 endorses the concept of allowing for a graduated or "graded" approach, including implicit accounting for instrument uncertainty for "setpoints that are not credited in the accident analyses to initiate a reactor shutdown or the engineered safety features," which is the case for the UHS temperature instrumentation.

Although the UHS temperature instrumentation does not perform any protective actuation feature, and does not involve a setpoint, the UHS average temperature limit ensures that the design basis temperatures of safety related equipment will not be exceeded. Addressing instrument uncertainty is important in ensuring that the design basis temperatures of safety related equipment will not be exceeded. In support of previous licensing actions, qualitative evaluations of design margin in components served by the UHS and the safety analyses have been performed that would demonstrate that adequate margin exists to account for instrument uncertainties. However, to substantiate that adequate margin exists, additional analyses will be performed to identify and quantify the conservatism in the analyses. A quantitative comparison will be made of the results of the additional analyses, along with the previously performed component-specific design margin and

safety analyses evaluations, to the instrument uncertainty associated with UHS temperature. This comparison will be provided to the NRC when it is completed.

The UHS design is based on the requirements described in Section 9.2.5 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," and RG 1.27, "Ultimate Heat Sink." The elements of NUREG-0800 and RG 1.27 ensure that the UHS design is adequately conservative and that the UHS analyses are conservatively performed. For example, NUREG-0800 requires that the heat input to the UHS be conservatively estimated by accounting for reactor system heat, sensible heat, pump work, and station auxiliary system individual and total heat loads. Adequacy of the UHS design is based, in part, on meeting Branch Technical Position (BTP) ASB 9-2, "Residual Decay Energy for Light-Water Reactors for Long-Term Cooling," which conservatively predicts the residual decay energy release rate by applying uncertainty factors. Although there is sufficient conservatism in the design of the UHS as discussed above, additional analyses will be performed to quantify the conservatism to substantiate that the UHS design and safety analyses adequately account for the UHS measurement uncertainty.

Question 2
The corrective steps that have been taken and the results achieved.

Response
This issue has been entered into the Corrective Action Program to track completion of the additional analyses. Architect Engineering services have been contracted to perform the additional analyses and the analytical work has begun. However, additional time is needed to document and complete the analyses. The analyses are scheduled to be completed by April 19, 2002.

Question 3
The corrective steps that will be taken to avoid further violations.

Response
Based on our assessment of the Notice of Violation, no further corrective steps are required to avoid further violations.

Question 4
The date when full compliance will be achieved.

Response
Braidwood Station believes it is in compliance with the Criterion XI of 10CFR50 Appendix B.