

August 24, 2016

MEMORANDUM TO: Victor M. McCree
Executive Director for Operations

FROM: Gary M. Holahan, Backfit Appeal Review Panel Chairman */RA/*
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SUBJECT: BACKFIT APPEAL REVIEW PANEL FINDINGS ASSOCIATED WITH
BYRON AND BRAIDWOOD COMPLIANCE WITH 10 CFR 50.34(b),
GDC 15, GDC 21, GDC 29, AND THE LICENSING BASIS

In response to your memorandum of June 22, 2016, establishing a Backfit Appeal Review Panel (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16173A311), the Panel undertook a review of the relevant documents in this case. This included the licensee and NRC staff letters related to the backfit; the 2001 power uprate and the 2004 valve setpoint license amendments (ADAMS Accession Nos. ML033040016 and ML042250531, respectively); and a June 16, 2016, letter from the Nuclear Energy Institute (NEI) supporting the Exelon backfit appeal (ADAMS Accession No. ML16208A008). The Panel also reviewed numerous other documents related to the topic of inadvertent operation of the emergency core cooling system (ECCS) and pressurizer safety valve performance.

In addition to the document review, the Panel had the benefit of meetings with the Office of Nuclear Reactor Regulation (NRR) (both the Division of Safety Systems and the Division of Engineering), the Office of the General Counsel, and the NRC Committee to Review Generic Requirements (CRGR). In addition, the Office of Nuclear Regulatory Research (RES) conducted an analysis that provided insights on the risk significance of the sequence at issue.

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The Panel also shared its draft preliminary findings with NRR and OGC for comment. NRR provided comments, the consideration of which is reflected in the attached report. Both Exelon (Bradley Fewell, Senior Vice President of Regulatory Affairs) and NEI (Tony Pietrangelo, Senior Vice President and Chief Nuclear Officer) declined offers for a public meeting but indicated a willingness to provide information if the Panel identified the need. The Panel did not identify a need for additional information from either Exelon or NEI to complete its review, which is summarized below and documented in the attached report.

Based on its review, the Panel concludes that the NRC staff positions taken to support the compliance backfit finding represent new and different staff views on how to address potential pressurizer safety valve failures following water discharge. Although these staff positions are well-intentioned and conservative approaches that could provide additional safety margin, they do not provide a basis for a compliance backfit. In the absence of a failure of the pressurizer safety valve to reseal, the concerns articulated in the backfit related to event classification, event escalation, and compliance with 10 CFR 50.34(b) and General Design Criteria 15, 21, and 29 are no longer at issue.

The Panel notes that the issue of pressurizer valve performance following water discharge appears to have generic applicability, and is not specific to Byron and Braidwood. The Panel believes that resolution of this issue would have benefited from consideration of the generic nature of the issue through the appropriate NRC processes.

Your June 22, 2016 memorandum asked the Panel to answer five questions. These questions and the Panel's responses follow:

1. Were the approvals based on a mistake? If so, what was the mistake and what are the implications for Braidwood and Byron?

Answer: The 2001 and 2004 license amendments were based on reasonable and well-informed engineering judgment of the NRC staff, not a mistake.

2. What is the known and established standard for water qualification of pressurizer safety valves?

Answer: The standard in place in 2001 and 2004 and at present is that failures of pressurizer safety valves to reclose need not be assumed to occur following water discharge if the likelihood is sufficiently small, based on well-informed staff engineering judgment.

3. What is the known and established standard for progression of postulated events between categories of severity? Include a discussion of Regulatory Issue Summary 2005-29, "Anticipated Transients that Could Develop into More Serious Events," dated December 14, 2005 [ADAMS Accession No. ML051890212], and the draft Revision 1 that was issued for public comment in 2015 [ADAMS Accession No. ML15014A469].

Answer: For Byron and Braidwood, the standard for progression of postulated events between categories of severity is set forth in the Updated Final Safety Analysis Report (UFSAR), as described in the NRC staff's October 9, 2015, backfit imposition letter (ADAMS Accession No. ML14225A871). The Panel supports the NRC staff's view that non-escalation (from Condition II to Condition III or IV, as defined in American Nuclear

Society Standard 51.1/N18.2-1973, "Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants," dated August 6, 1973) is a known and established standard applicable to Byron and Braidwood. However, this event progression standard does not establish specific standards for valve qualification. Therefore, it is not the basis for a compliance backfit given this set of facts. Regulatory Issue Summary 2005-29 and its draft Revision 1 do not alter this conclusion.

4. Does the current licensing basis for Braidwood and Byron comply with the applicable regulations? Is it adequate to provide protection to public health and safety?

Answer: For the specific technical issues reviewed by the Panel, the Panel concluded that the current licensing basis for Byron and Braidwood complies with the applicable regulations and provides adequate protection of the public health and safety.

5. Given that Exelon suggests that the NRC pursue a cost-justified substantial safety enhancement backfit, what is the contribution to overall plant risk of the current configuration at Braidwood and Byron?

Answer: The analysis performed for the Panel by RES provides insights on the risk significance of the sequence at issue. This analysis suggests that an inadvertent ECCS actuation sequence, assuming that pressurizer overfill would lead to a small loss-of-coolant accident, contributes approximately 1 percent of the total internal events core damage frequency (CDF). If the backfit were implemented such that the pressurizer safety valves would always reclose properly, the CDF reduction is estimated at 1.5E-07 per year. If the pressurizer safety valves were not assumed to always fail following water discharge (consistent with the NRC staff expert judgment in 2001) or if the backfit were less than perfectly effective, the risk-reduction benefit of implementing the backfit would be even smaller.

The Panel is aware of and sensitive to two important issues related to this question. First, NRR, not the appeal Panel, is responsible for any decisions on alternative application of the backfit rule to this issue. Second, the Panel does not wish to imply that "the contribution to plant risk" should be seen as the only measure of enhanced safety. For example, defense-in-depth has a recognized role and value in the regulatory process.

The Panel's findings therefore support the Exelon backfit appeal, and we recommend that you respond to NRR's repeal with a reversal of the October 9, 2015, backfit imposition.

In addition, to address the generic nature of the issues described in the enclosed report, we recommend that you direct NRR to:

- verify (e.g., through letter, meeting, or owners group activity) that all pressurized-water reactors have resolved this technical issue in a reasonable manner, and
- re-evaluate the matters discussed in Regulatory Issue Summary 2005-29 and its draft Revision 1 through the appropriate generic process to avoid the inappropriate or inadvertent imposition of backfits.

Furthermore, in the course of its activities, the Panel has developed several insights relevant to the backfit process and the use of generic processes to address potential safety issues. The Panel plans to share these insights with the CRGR for its use in addressing your June 9, 2016, tasking related to implementation of agency backfitting and issue finality guidance (ADAMS Accession No. ML16133A575). The Panel also identified other lessons from its review of the NRC evaluation of the performance of pressurizer safety valves for Braidwood, Byron, and other nuclear power plants that are identified in the attached report.

Finally, the Panel would like to recognize the valuable context and insights provided by NRR and OGC staff during this effort, and the timely and responsive efforts of RES in providing the comprehensive and useful risk analyses requested by the Panel.

The Panel is available to respond to any questions or provide any other assistance needed.

Enclosure: As stated

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Enclosure: As stated

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ADAMS Accession Nos.: Package ML16236A198

Memorandum ML16236A202; Enclosure ML16236A208

***via email**

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