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| **From:** | Mayer, Annie |
| **To:** | Loomis, Thomas R:(Exelon Nuclear) |
| **Cc:** | Mayer, Annie |
| **Subject:** | Calvert Cliffs Nuclear Power Plant, Units 1 and 2 – Request for Additional Information re: Proposed Alternative for Pressurizer Circumferential and Longitudinal Shell-to-Head Welds and Nozzle-to-Vessel Welds (EPID L-2021-LLR-0037) |
| **Date:** | Wednesday, October 13, 2021 2:40:39 PM |

Hello Tom,

By letter dated May 12, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21133A297), Exelon Generation Company, LLC (Exelon, the licensee) requested U.S. Nuclear Regulatory Commission (NRC) approval of an alternative, RS 21-056, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55 a(z)(1)(i) to the requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at Calvert Cliffs Nuclear Plant Units 1 and 2 (Calvert Cliffs 1 and 2). The proposed alternatives for Braidwood Station Units 1 and 2 and Bryon Station Units 1 and 2 included in the letter are being reviewed separately. The proposed alternative would allow the licensee to forego ASME Code, Section XI-required examinations of various pressurizer welds through the end of the extended licenses.

The NRC staff has determined that additional information is needed to complete its review of the request. The draft request for additional information (RAI) was sent to you on October 1, 2021, and a clarification call was held with your staff on October 13, 2021. It was agreed that Exelon would provide a response no later than November 19, 2021.

**REQUEST FOR ADDITIONAL INFORMATION**

Pursuant to 10 CFR 50, Paragraph 50.55a(z)(1), the licensee proposed to increase the inservice inspection (ISI) interval for the subject components to the end of the current approved period of extended operation, from the current ASME Code Section, Section XI requirement of 10 years. Paragraph 50.55a(z)(1) of 10 CFR requires the licensee to demonstrate that the proposed alternative provides an acceptable level of quality and safety. The licensee referred to the analyses in nonproprietary Electric Power Research Institute (EPRI) Report No. 3002015905, "Technical Bases for Inspection Requirements for PWR Pressurizer Head, Shell-to-Head, and Nozzle-to-Vessel Welds", December 2019 (ADAMS Accession No. ML21021A271) to support the proposed alternative in the submittal. The licensee also included an applicability evaluation of EPRI Report 3002015905 to Calvert Cliffs 1 and 2 in the submittal.

**RAI 1**

In Appendix D of the licensee's submittal, the licensee stated that Calvert Cliffs 1 and 2 does not track thermal transients. The licensee instead provided fatigue usage factors and environmental-assisted fatigue usage factors. The licensee stated that Calvert Cliffs 1 and 2 meet the design limits for fatigue usage factor up to 60 years of operation. The staff notes that compliance with design requirements does not imply that the probabilistic fracture mechanics (PFM) evaluation in EPRI Report 3002015905 is an appropriate basis for inspection relief for the Calvert Cliffs 1 and 2 pressurizer welds. While the application provides some insight relative to the EPRI report modeling, the staff is unable to compare these results with the population of cycles modeled in the EPRI report. This is particularly

important in that several of the subject components also received low inspection coverage values, creating combined uncertainties relative to the applicability of the EPRI model. An appropriate technical basis should include a discussion for why the analyzed fatigue histories are a reasonable representation of the actual fatigue histories.

Provide a technical basis related to fatigue history, irrespective of compliance with design requirements, for why the generic PFM in EPRI Report 3002015905 is an appropriate basis for inspection relief at Calvert Cliffs 1 and 2.

**RAI 2**

The requested alternative relies on the applicability of the conclusions of EPRI Report 3002015905 to the subject components to justify the requested alternative. The staff notes that the report demonstrates that successful preservice inspection (PSI) and ISI impact calculated outcomes for the subject components, particularly significant for the limiting component in the analysis (i.e. approaching the risk criterion used in the report).

The staff noted that for both Calvert Cliffs units the results of the PSI were not reported, and for a significant number of the components, low inspection volumes were achieved. In addition, the staff understands that the PROMISE model is unable to model situations where a specific volume of a component cannot be inspected in successive inspections (i.e. the program generates a new “miss” chance for each inspection round, modeling a random chance that any modeled flaw may be identified by a modeled inspection round). The lack of verifiable PSI results coupled with low inspectability of a large volume of material is not well addressed by the sensitivity studies reported in the EPRI report.

Provide a technical basis related to how the subject pressurizer welds at the Calvert Cliffs units, in particular the pressurizer welds with less than 50 percent coverage, can be considered adequately represented by the modeling in the EPRI Report; or otherwise justified.

**RAI 3**

In Table 4 of Attachment 1 to the licensee’s submittal, the licensee provided the inspection history of the pressurizer welds in scope of the alternative request for Calvert Cliffs 1 and 2. Table 4 shows that upper and lower shell welds 2-401B and 2-401C for both units have no documented examination history. In footnote 4 of Table 4, the licensee states that, for Successive Inspection Intervals, ASME Section XI requires only 1 foot of weld to be volumetrically examined. The staff notes that compliance with ASME Section XI requirements does not imply that the generic PFM evaluation in EPRI Report 3002015905 is an appropriate basis for inspection relief for the subject welds.

The NRC staff has previously addressed conclusions in EPRI Report 3002015905 that are based upon PFM evaluations of the PSI-only case, since PSI-only examination does not account for performance monitoring (see Section 10 of “Salem Generating Station Unit Nos. 1 and 2 – Authorization and Safety Evaluation for Alternative Request No. SC-I4R-200 (EPID L-2020-LLR-0103),” ADAMS Accession No. ML21145A189). An appropriate technical basis should include a discussion for why the analyzed examination histories in the EPRI report are a reasonable representation of the actual examination histories. Also, the staff notes that footnote 4 of Table 4 does not provide a complete explanation of the

ASME Section XI requirements that led to no documented examination history for the subject welds.

a. Provide a technical basis related to examination history, irrespective of compliance with Section XI requirements, for why the generic PFM in EPRI Report 3002015905 is an appropriate basis for inspection relief for upper and lower shell welds 2-401B and 2-401C at Calvert Cliffs 1 and 2.

b. Provide an expanded explanation of the ASME Section XI requirements related to upper and lower shell welds 2-401B and 2-401C, including specific reference to relevant ASME Section XI paragraphs.

Docket Nos. 50-317, 50-318

Thank you,

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