Browns Ferry Nuclear Plant, Unit 2

Pre-Submittal Meeting for Proposed Alternative Request for IWB-2420 Successive Examination Requirements for Reactor Pressure Vessel Weld No. V-3-A.

September 27, 2021

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Agenda

- Introduction
- Applicable Code Requirement
- Reason for Request
- Description of the Alternative Request
- Conclusion
- Precedents
- Schedule for Submittal

Introduction

- Purpose of the meeting is to provide information for a planned request for alternative from successive inspections required by ASME Section XI, Subsection IWB-2420(b)
- During the U2R21 refueling outage (Spring 2021) BFN identified an indication in a vertical weld, V-3-A, of the reactor pressure vessel (RPV)
- The flaw is subsurface, per the requirements of IWA-3320, with a half-depth of 1.6-inch and length of 3.8-inch. (aspect ratio, a/l = 0.421)
- The flaw was evaluated and determined to be acceptable for continued service per Section XI, IWB-3600
- Fatigue crack growth analysis concluded it would require more than 70 additional years of service before the flaw reaches the maximum allowable depth

Applicable Code Requirement

- ASME Section XI, IWB-2420(b) requires areas containing flaws or relevant conditions to be reexamined during the next three inspection periods, when a component is accepted for continued service in accordance with IWB-3132.3 or IWB-3142.4.
- Code Case N-526 provides an NRC approved alternative to the successive examination requirements of IWB-2420(b), with a condition that the flaw is characterized as sub-surface per N-526

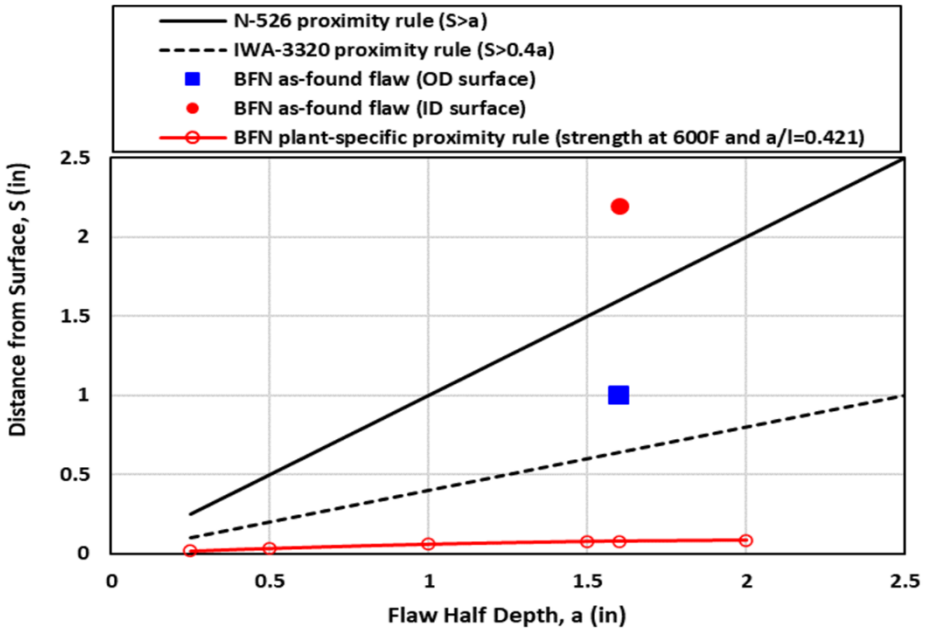
Reason for Request

- When considering the proximity of the flaw to the inside (ID) surface, the evaluation concludes that the flaw would meet the surface proximity criteria in ASME Code Case N-526.
- When considering the proximity of the flaw to the outside (OD) surface, the flaw does not meet the criteria set forth in ASME Code Case N-526 for exemption from the three successive examinations requirement in IWB-2420(b).
- Unlike IWA-3320, ASME Code Case N-526 does not specify which surface is supposed to be used for proximity evaluation, so BFN conservatively assumed that the calculation should apply the lesser of these two distances. However, upon review of the ASME Code Case N-526 technical basis, it is evident that the calculation basis was developed based on the flaw's proximity to the inside diameter (ID) surface.
- Additionally, conservative assumptions were identified in the technical basis of Code Case N-526 regarding stresses and flaw aspect ratio.

Plant-Specific Surface Proximity Rule

An analysis was performed to demonstrate that the BFN RPV weld flaw met the intent of Code Case N-526 when plant-specific materials, stresses, and aspect ratio were applied, using the technical basis of Code Case N-526.

As shown in the figure, the plant-specific surface proximity curve falls below both IWA-3320 proximity and Code Case N-526 surface proximity rules indicating that the Code Case N-526 surface proximity rule is overly conservative for the as-found flaw in the vertical weld of the BFN RPV.



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Conclusion

- A plant-specific assessment surface proximity rule was developed for an as-found flaw in a vertical weld of the BFN RPV using the plant-specific stresses, actual flaw's aspect ratio, and bounding flow strength of RPV material.
- Using the as-developed plant-specific surface proximity rule, Browns Ferry has demonstrated that the observed flaw can be classified as a subsurface flaw, meeting the intent of Code Case N-526.
- Based on this analysis, TVA is requesting to exempt this flaw from the re-examinations in accordance with IWB-2420(b) of vessel volumes containing subsurface flaws.
- All other conditions of Code Case N-526 (b and c) are met.

Duration of Proposed Alternative

- TVA is requesting the proposed alternative through the next two inspection periods (Interval 5, period 3 and Interval 6, period 1) during which Successive Examinations are required by IWB-2420(b).
- The next subsequent reexamination will be performed on the normal interval-based frequency (Interval 6, period 2), per the schedule in table IWB-2500-1.

Precedents

- No previous submittals have been identified requesting an alternative to ASME Section XI, IWB-2420(b), related to the ASME Section XI, Category B-A, Item No. B1.12 (Shell Longitudinal Weld).

Schedule Milestones

- September 27, 2021 – Pre-submittal meeting with NRC
- October 27, 2021 – Expected Submittal of Request for Alternative
- February 25, 2023 – U2R22 Outage start*
- March 01, 2025 – U2R23 Outage start*
- November 04, 2022 – Requested NRC approval date

- * Outage start dates subject to change.


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