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PWROG Evaluation of the Potential Non-Conservative Fracture Toughness in BWRVIP-100, Rev. 1-A

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- Background
- Discussion



- MRP-227-A contains inspection and evaluation guidelines to manage the aging of PWR reactor internals
 - Section 7.5 of MRP-227-A requires an NRC-approved method to evaluate inspection results
- WCAP-17096-NP-A, Rev. 2, contains a generic methodology and data requirements for the evaluation of inspection results that do not meet the acceptance criteria in Section 5 of MRP-227
- The flaw tolerance methodologies and fracture toughness values contained in WCAP-17096-NP-A, Rev. 2 are based upon those in BWRVIP-100, Rev. 1-A
- WCAP-17096-NP, Rev. 3 is currently being reviewed by the NRC



Discussion

- Westinghouse and Framatome received the Part 21 TOI via the PWROG
 - The methodologies for B&W plants are not based upon BWRVIP-100, Rev. 1-A; therefore, the potential issue is not applicable to Framatome
 - Westinghouse concluded that the potential reduction in fracture toughness in BWRVIP-100, Rev. 1-A would not result in a substantial safety hazard (i.e., a loss of safety function) and is not reportable in accordance with 10 CFR Part 21



- The flaw tolerance evaluation methodologies in WCAP-17096-NP-A, Rev. 2 are used to develop acceptance criteria for PWR core shrouds and core barrels
- Westinghouse is working with EPRI to:
 - Re-evaluate the fracture toughness data to address the overly conservative interpretation identified in slides 18 through 20 of the EPRI closed session presentation
 - Determine if there is an impact on the flaw tolerance methodologies and/or fracture toughness values in WCAP-17096-NP-A, Rev. 2 and WCAP-17096-NP, Rev. 3



Discussion

- Irradiated austenitic stainless samples tested in BWRVIP and MRP programs have retained significant ductility
 - Base metal, weld metal, and heat affected zone material
 - Post-test fractographs show primarily ductile-dimple morphology on the fracture surfaces indicating ductile crack growth behavior



Weld Fracture Toughness Specimen W2WFT06 1E21 n/cm² [1.58 dpa] Typical fracture surface morphology MRP-451 EPRI licensed and copyright-protected