



ASME Code Case N-702

Staff Thoughts on Updating Condition in RG 1.147 and Revised Review Procedures for Relief Requests

On Yee

*Materials Engineer
NRR/DMLR/MVIB*

Simon C. F. Sheng

*Senior Materials Engineer
NRR/DMLR/MVIB*

Steve Ruffin

*Branch Chief
NRR/DMLR/MVIB*

David Rudland

*Senior Technical Advisor
NRR/DMLR*

Industry/NRC Non-Destructive Examination
Technical Information Exchange Meeting
January 17, 2018
Rockville, Maryland, USA

Overview



- ASME Code Case N-702
- Application Status
- Staff Thoughts on Updating Condition in Regulatory Guide (RG) 1.147
- Revised Review Procedures – Current and Future Applications
- Comments on Probabilistic Fracture Mechanics (PFM) Analysis
- Conclusion

ASME Code Case N-702



Purpose

- Provides alternative requirements to inspect only 25% of the BWR reactor pressure vessel (RPV) nozzles (i.e., nozzle inner radius and nozzle-to-shell welds) each inservice inspection (ISI) interval instead of the ASME Code required inspection of 100% of the nozzles
- Allows the use of VT-1 visual examination in lieu of volumetric examination for the nozzle inside radius section

Supporting Technical Documents

- BWRVIP-108, "Technical Basis for the Reduction of Inspection Requirements for the BWR Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii"
- BWRVIP-241, "PFM Evaluation for the BWR Nozzle-to-Vessel Shell Welds and Nozzle Blend Radii"
- BWRVIP-241, Appendix A, for period of extended operation (PEO)
- Corresponding NRC safety evaluations (SEs)

Application Status



- Almost all BWRs have an approved applications for use of Code Case N-702 during a 10-year ISI interval within the initial 40-years of plant operation
 - *Only one licensee has never submitted an application for use of Code Case N-702
- In 2017, there were ~8 applications for a 10-year ISI interval within the PEO and ~3 applications for a 10-year ISI interval within the initial 40-years of plant operation

Staff Thoughts on Updating Condition in RG 1.147



- “Applicability evaluation” for initial 40-years of plant operation would only be submitted once
- “Applicability evaluation” for the PEO shall be in accordance with BWRVIP-241, Appendix A, and would only be submitted once
 - Plant-specific PFM analysis is always an option
- “Applicability evaluation” for initial 40-years of plant operation and the PEO can be **combined** and would only be submitted once
- If VT-1 is used, Code Case N-648-1, “Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles,” with the condition in RG 1.147, shall be followed

Revised Review Procedure

Current and Future Applications

- NRC evaluation of the “repeat” applications within initial 40-years of plant operation will be expedited
 - A single application can cover the entire initial 40-years of plant operation
- Applications that cover the license renewal period can be for the entire PEO
 - If a licensee cannot demonstrate that its application for the PEO is in accordance with BWRVIP-241, Appendix A, a plant-specific PFM analysis can be used
- Applications for initial 40-years of plant operation and the PEO can be **combined**
- If VT-1 is used, Code Case N-648-1, “Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles,” with the condition in RG 1.147, shall be followed

Comments on PFM Analysis

- The NRC SE approved BWRVIP-108 based on the Probability of failure (PoF) values from the generic PFM analysis for the most appropriate simulation case provided by EPRI
 - 80% of the simulated cases indicate that normal operation is limiting
 - $1.19\text{E-}7$ for LTOP and $1.98\text{E-}6$ for the normal operation – See SE on BWRVIP-108
- Plant-specific PFM analysis should address both LTOP and the normal operation, consistent with BWRVIP-108-A
- Recent NRC PFM analysis on Branch Technical Position 5-3 study (ML16364A285) indicated that 100°F cooldown following saturation curve for BWRs may not be insignificant

Conclusion

- Revised review procedures for the “repeat” applications within initial 40-years and applications for the entire PEO eliminates unnecessary NRC and industry burden
- Revised review procedures will maintain an acceptable level of quality and safety because the submitted information will be the same from one ISI interval to the next as long as they are within the 40-year operation or within the PEO
- Staff thoughts on updating condition in RG 1.147 are consistent with the revised review procedures
- Appropriate results (i.e., LTOP and normal condition) in plant-specific PFM analysis will assist the review of Code Case N-702 applications