

NRC Staff Comments on “Industry Response to July 15, 2014 Meeting with NRC on CASS

Areas of Agreement

Staff agrees low-molybdenum CASS grades are less sensitive to TE, as demonstrated in Appendix A of the industry document.

Staff agrees that there is no significant difference in the response to low levels of neutron fluence (0.08 dpa) between low-molybdenum and high-molybdenum grades of CASS, and does not change the conclusions with respect to high- and low- moly sensitivity.

Comments

1. The following comments pertain to Figure 1 of Appendix B, Irradiated CF-3 and CF-8 Fracture Toughness Data from Literature:
 - a. There is insufficient data for low molybdenum CASS in the fluence range of interest between 0 and 5 dpa to accurately define a lower bound curve
 - b. The BWRVIP-100 curve is more conservative than the proposed lower bound of Fig. 1. This is counterintuitive because the staff would expect wrought materials to have better fracture toughness than CASS materials.
 - c. Some of the data is room temperature data which would not be conservative. However, the staff acknowledges that this is a problem with the data set on which the NUREG/CR-7027 lower bound curve is based, of which EPRI used a subset. Therefore, the same criticism applies to the staff’s screening criteria. However, the staff’s screening criteria are based on the original NUREG curve which is more conservative.
2. The only real disagreement between the NRC and EPRI screening criteria are for static-cast low molybdenum, 16-20% ferrite, staff proposes loss of fracture toughness at > 0.45 dpa, EPRI proposes loss of fracture toughness at > 1 dpa.
3. Staff would like to understand what components in operating reactors are affected by the difference in screening criteria (i.e., which fall into the low-moly, static cast, between 0.45 dpa and 1 dpa fluence).
4. Staff would like to discuss alternatives for the components affected by the difference in screening criteria, such as component-specific flaw tolerance analyses or inspections, screening based on stress, etc.
5. Bounding flaw tolerance evaluations justifying a different fracture toughness basis for the screening limits for RVI (i.e., lower than 255 kJ/m²) could provide a more robust technical basis for more relaxed screening criteria.