

Intermediate coolant system related SFR-DCs:

Informal Public Comments

SFR-DC 75: Quality of the intermediate coolant
boundary

SFR-DC 76: Fracture prevention of the
intermediate coolant boundary

SFR-DC 77: Inspection of the intermediate
coolant boundary

Use of SFR-DCs 75, 76, and 77

- SFR-DC 70: *Intermediate coolant system* states when an intermediate coolant system is required
- However, some designs may still have an intermediate coolant system even if not required by SFR-DC 70
- If a design has an intermediate coolant system then SFR-DCs 75, 76, and 77 should be applied (PDCs)

Informal Public Comments

- Most comments were to delete these three SFR-DCs:
 - Design does not have an intermediate coolant system
 - The intermediate coolant system is not safety-related in a specific design
 - SFR-DC 70 has overlapping inspection requirements with SFR-DC 77

Overall SFR-DC Changes

- Focus on consistency and flexibility while still ensuring adequate protection
- Major changes based on comments
 - If a design has an intermediate coolant system, then SFR-DCs 75, 76, and 77 apply (PDCs)
 - Revised wording to make SFR-DCs based on “importance to safety”
 - Removed overlapping inspection requirements from SFR-DC 70

SFR-DC 75

Quality of the intermediate coolant boundary.

Components which are part of the intermediate coolant boundary shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

Rationale

~~This criterion is unique to the SFR design because, based on the information available to the staff, it is the only nuclear plant design for which there is an intermediate coolant loop.~~ This criterion is similar identical to GDC 30 in 10 CFR 50, Appendix A, and is intended to ensure that, similar to the reactor coolant pressure boundary, the intermediate coolant boundary is designed, fabricated, and tested using quality standards and controls sufficient to ensure that failure of the intermediate system would be unlikely.

SFR-DC 76

Fracture prevention of the intermediate coolant boundary.

The intermediate coolant boundary shall be designed with sufficient margin to assure that when stressed under operating, maintenance, testing, and postulated accident conditions (1) the boundary behaves in a nonbrittle manner and (2) the probability of rapidly propagating fracture is minimized. ~~The design shall reflect consideration of service temperatures and other conditions of the boundary material under operating, maintenance, testing, and postulated accident conditions and the uncertainties in determining (1) material properties, (2) the effects of irradiation on material properties, (3) residual, steady state and transient stresses, and (4) size of flaws.~~

SFR-DC 76

Rationale

~~This criterion is unique to the SFR design because, based on the information available to the staff, it is the only nuclear plant design for which there is an intermediate coolant loop.~~

This criterion is similar ~~identical~~ to GDC 31 in 10 CFR 50, Appendix A, and is intended to ensure that, similar to the reactor coolant pressure boundary, the intermediate coolant boundary is designed to avoid brittle and rapidly propagating fracture modes.

The second sentence related to required analyses is removed in order to make the criteria more generic. In this manner, the design considerations may include, but are not limited to, those previously stated in the design criteria.

SFR-DC 77

Inspection of the intermediate coolant boundary.

Components which are part of the intermediate coolant boundary shall be designed to permit (1) periodic inspection and functional testing of important areas and features to assess their structural ~~and leaktight~~ integrity commensurate with the system's importance to safety., and (2) an appropriate material surveillance program for the intermediate coolant boundary. Means shall be provided for detecting and, to the extent practical, identifying the location of the source of coolant leakage.

SFR-DC 77

Rationale

~~This criterion is unique to the SFR design because, based on the information available to the staff, it is the only nuclear plant design for which there is an intermediate coolant loop.~~ This criterion is similar ~~identical~~ to GDC 32 in 10 CFR 50, Appendix A, and is intended to ensure that, similar to the reactor coolant pressure boundary, the intermediate coolant boundary is designed to avoid brittle and rapidly propagating fracture modes.

“Leaktight” integrity would be demonstrated through appropriate functional testing of system performance and operability.

Added “commensurate with the system’s importance too its safety function.” If leakage of the intermediate system constitutes a significant risk to the plant, then the appropriate inspection of the intermediate coolant boundary is necessary to ensure that the structural integrity of the boundary is maintained.

The requirement for an appropriate surveillance program is maintained to ensure that such a program is provided, as needed, to ensure that the integrity of the intermediate boundary is maintained. At this time, the staff generally does not expect that the projected fluence on the intermediate boundary will be at levels that would necessitate a materials surveillance program that focuses on the impacts of irradiation embrittlement. However, the staff recognizes that this may not be the case for every design. In addition, a materials surveillance program may also be used to monitor the effect of other environmental conditions on the boundary materials.