

Fast Reactor Safety Design Approach

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Current SFR Designs Have incorporated Several Design Features Many Based on Experience

- DOE and NRC developed a set of design criteria for SFRs to replace the Appendix A GDC which are LWR focused
 - Initiated during the licensing of CRBR
 - Incorporated into an ANS standard 54.1
 - Based on experience with FFTF and EBR II and world wide operational experience with SFRs
 - Used as the bases for the SFR-DC listed in Reg. Guide 1.232
- GIF has developed similar international SFR design criteria based on the IAEA LWR criteria

US SFR Design Criteria Are Based on Design Principals Derived from SFR Experience

- Use of passive and inherent features where possible In the reactor design
- Reduce impacts of positive Na void reactivity where possible in the core design
- Overall reactivity feedback must be strongly negative
- Use of passive decay heat removal in design
 - RVACs, DRACs, PRACs, IRACs, SGACS...
- Redundant and diverse reactivity control and plant protection
 - Reduce or eliminate possible control rod ejection (low pressure, rod stops)

U.S. SFR Design Criteria Are Based on Design Principals Derived from SFR Experience (cont.)

- Prevent contact of Na with air, water, or concrete
 - Monitor for Na leaks
 - Provide for Na fire protection
- Avoid organic materials that might leak into Na
- Design to enhance natural circulation
 - Proper placement of equipment (elevation)
- Proper core restraint to maximize negative bowing reactivity feedback during accidents
- Use Na compatible materials in intermediate coolant and maintain at higher pressure than primary coolant

U.S. SFR Design Criteria Are Based on Design Principals Derived from SFR Experience (cont.)

- Provide Na and cover gas cleanup capability
- Reduce potential for flow blockages
- Design of containment should be based on its safety function
- Strive to keep impurities out of the Na (corrosion buildup, organics etc.) and monitor for impurities-materials selection
- Reduce the possibility of a core disruptive accident to residual risk levels
- Avoid Na freezing by appropriate location and use of reliable trace heating