

**ABSTRACT:**

**THE U. S. NUCLEAR REGULATORY COMMISSION'S  
STRATEGY FOR REVISING THE RIA ACCEPTANCE CRITERIA**

**ANS 2007 INTERNATIONAL LWR FUEL PERFORMANCE MEETING**

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The U.S. Nuclear Regulatory Commission (NRC) has issued interim criteria and guidance for the reactivity-initiated accident (RIA) within the latest revision to NUREG-0800, "Standard Review Plan" (SRP), Section 4.2, "Fuel System Design," Appendix B (Revision 03, March 2007). The purpose of this paper is as follows:

1. present a change in regulatory staff position regarding the requirements of 10 CFR 50, Appendix A, General Design Criteria 28 (GDC28) and changes in regulatory guidance provided in Regulatory Guide (RG) 1.77, RG 1.195, RG 1.183, and previous versions of NUREG-0800 SRP;
2. describe the implementation strategy and schedule for both new reactors and the existing fleet; and
3. encourage licensees and nuclear fuel vendors to (1) develop improved core physics analytical methods to allow a more deliberate transition to the new fuel cladding failure criteria and (2) develop the technical basis to address the new core coolability criteria.

RIAs consist of postulated accidents which involve a sudden and rapid insertion of positive reactivity. These accident scenarios include a control rod ejection (CRE) for pressurized water reactors (PWRs) and a control rod drop accident (CRDA) for boiling water reactors (BWRs). The uncontrolled movement of a single control rod out of the core results in a positive reactivity insertion which promptly increases local core power. Fuel temperatures rapidly increase prompting fuel pellet thermal expansion, an increase in cladding temperature, and cladding strain. NUREG-0800 SRP Section 15.4.8 and 15.4.9 provide further detail on the CRE and CRDA respectively.

Regulatory criteria were established in 1974 to satisfy the requirements of GDC28 as it relates to limiting the amount and rate of reactivity increase in order to limit damage to the reactor coolant pressure boundary and ensure core cooling capability. Results from RIA test programs in the United States, France, Japan, and Russia challenge the adequacy of current regulatory criteria.

As identified in SRP Section 4.2 Appendix B, several established regulatory positions and staff guidance related to reactivity-initiated accidents are being revised. Specifically;

1. The fuel cladding failure criteria, specified in RG 1.77 and previous versions of NUREG-0800, are being revised to include separate PWR and BWR criteria for both high cladding temperature failure and pellet-to-cladding mechanical interaction (PCMI) failure mechanisms.
2. The core coolability criteria, specified in RG 1.77 and previous versions of NUREG-0800, are being revised to specifically address both short-term (e.g. fuel-to-coolant interaction, rod burst) and long-term (e.g. fuel rod ballooning, flow blockage) phenomena which challenge coolable geometry and reactor pressure boundary integrity.
3. The fission-product inventory for dose calculations, specified in RG 1.77, RG 1.183, and 1.195, is being revised to specifically account for transient-induced fission gas release.

This paper will present the NRC's strategy for implementing the interim criteria and guidance, revising regulatory guidance documents, and implementing final criteria.

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