

September 13, 2002

MEMORANDUM TO: Ashok C. Thadani, Director  
Office of Nuclear Regulatory Research

FROM: Samuel J. Collins, Director */RA/*  
Office of Nuclear Reactor Regulation

SUBJECT: TECHNICAL WORK TO SUPPORT POSSIBLE ALTERNATIVE RULES  
TO 10 CFR 50.46, APPENDIX K, AND GDC 35

References:

- (1) Research Information Letter (RIL) 0202, "Revision of 10 CFR 50.46 and Appendix K, June 20, 2002
- (2) Transmittal of Technical Work to Support Possible Rulemaking on a Risk-Informed Alternative to 10 CFR 50.46/GDC 35, July 31, 2002
- (3) Framatome ANP Letter, "Proposed Changes to the ECCS Regulations"

I would like to thank you and your staff for providing the technical work to support the development of potential alternatives to 10 CFR 50.46, Appendix K, and GDC 35. On June 20, 2002, we received Research Information Letter (RIL) 0202 (Ref. 1) which discusses the technical work for developing alternate ECCS acceptance criteria and evaluation models. On July 31, 2002, we received your report, "Transmittal of Technical Work to Support Possible Rulemaking on a Risk-Informed Alternative to GDC 35" (Ref. 2).

RIL 0202 concluded that retaining all of the existing requirements in 10 CFR 50.46 and Appendix K in their present form remains technically acceptable as an option such that no model changes or re-analysis would be required. Nevertheless, the RIL concluded that the option to revise 50.46 and Appendix K is feasible and provided a number of recommendations for providing alternate ECCS acceptance criteria and evaluation model requirements.

For the ECCS acceptance criteria, RIL 0202 recommended (1) replacing the peak cladding temperature limit and the maximum cladding oxidation limit in 50.46 by a performance-based requirement that would be independent of the particular zirconium-based cladding alloy being considered, and (2) removal of the 1 percent total hydrogen generation requirement, since the combustible gas requirements are considered in 10 CFR 50.44, "Standards for combustible gas control system in light water-cooled power reactors."

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With respect to the ECCS evaluation model requirements, RIL 0202 recommended adding options to Appendix K as follows: (1) an option to replace the 1971 ANS decay heat standard with the 1994 ANS decay heat standard, provided that there is an appropriate selection of user-specified values and a determination of decay heat uncertainty, (2) an option to replace the Baker-Just correlation with the Cathcart-Pawel correlation to account for heat release from the chemical reaction of steam with zirconium-based cladding materials, and (3) an option to delete the requirement for only reflood steam cooling for reflood rates less than one inch per second. Regarding the prohibition on return to nucleate boiling during blowdown, the RIL recommended that this requirement be retained.

Furthermore, the RIL recommended that licensees making use of the new Appendix K options should be required to ensure that the results are sufficiently and demonstratively conservative, and that the Evaluation Models appropriately account for non-conservatisms that include (a) subcooled and saturated boiling in a downcomer annulus during the reflood phase of a LOCA and the resulting void generation and phase separation, (b) downcomer entrainment and inventory reduction due to steam bypass during reflood, and (c) fuel relocation following cladding swelling during a temperature transient. An NRC staff review of these new Evaluation Models would, therefore, be necessary.

On June 28, 2002, the RES staff hosted a public meeting to present RIL 0202 findings to solicit stakeholder feedback. Although the industry generally agreed with the RES technical findings, some stakeholders voiced concerns about the economic feasibility of developing and implementing an alternate ECCS rule. In a July 10, 2002 letter to the NRC (Ref. 3), Framatome ANP stated that although some of the changes being recommended by the staff have initial appeal, none of the proposals has sufficient merit to justify the large investment required to institute them. On September 26, 2002, NRR will host a public meeting with the purpose of gathering additional stakeholder input in order to identify ways to form a basis for pursuing a rulemaking or a basis for concluding that the potential cost/benefit of this effort does not warrant further rulemaking activity at this time.

The July 31, 2002, report on technical work related to GDC 35 recommended that the staff should not further pursue, on a generic basis, a risk-informed alternative to GDC 35 which addresses overall ECCS functional reliability and the single failure criterion. This recommendation is due in large part to the lack of full-scope PRA models available to the staff, and the significant differences between plants. On the other hand, the report concluded that a risk-informed alternative to GDC 35 that addresses overall ECCS functional reliability and the single failure criterion, on a plant-specific basis, is feasible, provided that policy and technical issues related to PRA scope and uncertainties are resolved.

In addition, the report recommended that the staff should move forward to eliminate, on a generic basis, the ECCS design requirement for consideration of an assumed LOOP coincident with large, and possibly medium, LOCAs based on LOCA frequency and conditional LOOP probability estimates provided in the report. However, the report concluded that these estimates are preliminary and that RES is embarking on a formal elicitation process that will provide final updated LOCA frequency distributions within 8 to 12 months after initiation.

As you noted, we have formed a working group that includes both NRR and RES staff dedicated to establishing the necessary groundwork to pursue this rulemaking. The staff's working group agrees that the policy and technical issues identified above, along with issues related to risk guidelines, defense-in-depth, and others need to be further addressed for this rulemaking effort. It is our intent that following the completion of developing these technical bases for an alternate risk-informed GDC 35, we will embark on the rulemaking phase. In the mean time, we plan to solicit stakeholder feedback at the September 26, 2002 meeting on how the recommendations in the July 31, 2002, technical report can be further developed to complete the technical bases.

Please relay my appreciation to your staff for the technical reports and I look forward to a continued cooperative effort among all the staff who are involved in this challenging project.

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\*See previous concurrence

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