

NUCLEAR REGULATORY COMMISSION

Notice of Availability and Solicitation of Public Comments on Documents Under Consideration to
Establish the Technical Basis for New Performance-Based
Emergency Core Cooling System Requirements

[NRC-2008-0332]

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of availability and request for public comment.

SUMMARY: The Nuclear Regulatory Commission (NRC) is announcing the availability of Research Information Letter (RIL) 0801, "Technical Basis for Revision of Embrittlement Criteria in 10 CFR 50.46" and NUREG/CR-6967, "Cladding Embrittlement During Postulated Loss-of-Coolant Accidents," and is seeking public comment on these documents. The NRC is soliciting comment on the subject documents to confirm that a sufficient technical basis exists to proceed with new performance-based regulations on emergency core cooling system (ECCS) acceptance criteria, and to identify issues that may arise with respect to experimental data development or regulatory costs or impacts of new requirements.

DATES: Comments on these documents should be submitted by September 5, 2008.

Comments received after this date will be considered to the extent practical, but assurance of consideration cannot be given to comments received after this date.

ADDRESSES: Members of the public are invited and encouraged to submit comments by mail to Michael Lesar, Chief, Rulemaking, Directives and Editing Branch, Office of Administration, Mail Stop T6-D59, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

You may also submit comments electronically at the federal rulemaking portal, <http://www.regulations.gov>; search on rulemaking docket ID: NRC-2008-0332.

To ensure efficient and complete comment resolution, comments should include references to the section and page numbers of the document to which the comment applies, if possible. Comments will be discussed during a 10 CFR 50.46(b) public workshop tentatively scheduled for September 2008 (specific date and location to be noticed separately).

You can access publicly available documents related to this notice using the following methods:
Federal e-Rulemaking Portal: Documents related to this action, including public comments, are accessible at the federal rulemaking portal, <http://www.regulations.gov>, by searching on rulemaking docket ID: NRC-2008-0332. The NRC also tracks all rulemaking actions in the “NRC Regulatory Agenda: Semiannual Report (NUREG-0936).”

NRC’s Public Document Room (PDR): The public may examine and have copied for a fee, publicly available documents at the NRC’s PDR, Public File Area O-1F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland.

NRC’s Agencywide Document Access and Management System (ADAMS): RIL 0801, Technical Basis for Revision of Embrittlement Criteria in 10 CFR 50.46” (ADAMS ML081350225) and NUREG/CR-6967, “Cladding Embrittlement During Postulated Loss-of-Coolant Accidents” (ADAMS ML081780360) are available electronically at the NRC’s Electronic Reading Room at <http://www.nrc.gov/NRC/reading-rm/adams.html> . From this page, the public can gain entry into ADAMS, which provides text and image files of NRC’s public documents. If you do not have access to ADAMS or if there are any problems in accessing the documents located in ADAMS,

contact the NRC PDR Reference staff at 1-800-397-4209, 301-415-4737 or by e-mail to PDR.resource@nrc.gov .

FOR FURTHER INFORMATION, CONTACT: Paul M. Clifford, Division of Safety Systems, Office of Nuclear Reactor Regulation, telephone: (301) 415-4043, e-mail: Paul.Clifford@nrc.gov.

SUPPLEMENTARY INFORMATION: In early 2003, the Commission directed the NRC staff to complete the technical basis and move forward with rulemaking to establish improved, performance-based ECCS acceptance criteria in 10 CFR Section 50.46(b), "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors." The NRC sponsored an extensive research and testing program at Argonne National Laboratory (ANL) to develop the body of technical information needed to support the new regulations. This information has been summarized in RIL 0801 and the detailed experimental results are contained in NUREG/CR-6967. Because of the importance of this regulation, the staff has decided to release the technical documentation for domestic and international public comment. With this approach, the NRC can address stakeholder questions and respond to comments early in the process. The public is invited to comment on the adequacy of this technical information, including the following:

I. Technical Basis

1. RIL 0801 Figure 1 provides the measured embrittlement threshold for all fresh and irradiated cladding specimens investigated during the ANL research program. Hydrogen dependent post-quench ductility regulatory criteria, similar to the lines on this figure, may be established from these experimental results.
 - a. Is the technical information presented within NUREG/CR-6967 sufficient in scope and depth to justify specific regulatory criteria applicable to all current zirconium cladding alloys?

- b. Is the technical information presented within NUREG/CR-6967 sufficient in scope and depth to justify periodic testing on as-fabricated cladding material?
 - c. Is the technical information presented within NUREG/CR-6967 sufficient in scope and depth to address sensitivities to alloy composition, trace elements, manufacturing practices, fuel rod burnup, and transient temperature profile?
2. Section 2 of NUREG/CR-6967 details the experimental techniques and procedures employed at ANL to assess cladding properties.
- a. Were the experimental techniques and procedures adequate for their intended purpose of defining acceptable fuel criteria (e.g., specimen preparation, specimen size, heating/cooling rates, ring-compression techniques, test temperature, acceptance criteria for post-quench ductility and breakaway oxidation, etc.)?
 - b. Is the technical information presented within NUREG/CR-6967 sufficient in scope and depth to address uncertainties related to and repeatability of measured results?

II. Performance-Based Testing Requirements

1. Due to potential sensitivities to manufacturing processes, performance based testing may be required to characterize the loss-of-coolant accident (LOCA) performance of new cladding alloys.
- a. Section 2.1 of NUREG/CR-6967 details all of the fresh and irradiated cladding specimens investigated during the ANL research program. Is the extent of the ANL material database sufficient to justify the applicability of experimental results to future cladding alloys?
 - b. Conducting testing on irradiated specimens is more difficult and expensive than similar tests performed on unirradiated specimens. Does a sufficient technical basis exist to justify testing on hydrogen charged, unirradiated cladding specimens as a surrogate for irradiated fuel cladding?

2. Due to potential sensitivities to manufacturing processes, routine testing may be required to verify material performance. Are there difficulties or limitations with periodic testing that would make such a requirement impractical?

III. Implementation

1. Implementing new regulatory criteria for 10 CFR 50.46(b) may necessitate further testing and new licensing activities (e.g., revised methods, updated safety analyses, etc.). What is the cost-benefit for implementing new regulatory requirements similar to those discussed in RIL 0801?
2. Implementing hydrogen-based regulatory criteria may require the development of high confidence corrosion and hydrogen pickup models.
 - a. What type of information is needed to develop such models and is such information readily available?
 - b. What performance indicators (e.g., pool-side measurements, hot cell examinations, etc.) could be used to validate models?
 - c. What additional regulatory requirements would be necessary to assure that the fuel is performing in accordance with the approved models? How will compliance with the rule be demonstrated on a cycle by cycle basis?
3. Crud deposits on the fuel cladding surface may affect fuel stored energy, fuel rod heat transfer, and cladding corrosion.
 - a. What role does plant chemistry and crud deposits play on these items?
 - b. How should normal and abnormal levels of crud deposits be addressed from a regulatory perspective?

The NRC is seeking public comment to receive feedback from the widest range of interested parties and to ensure that all information relevant to revision of the embrittlement criteria in 10 CFR 50.46 is available to the NRC staff. The NRC will review public comments received on this technical information and incorporate appropriate changes before starting to develop the

proposed revisions to the regulations. Comments will be discussed during a 10 CFR 50.46(b) public workshop tentatively scheduled for September 2008 (specific date and location to be noticed separately).

Dated at Rockville, Maryland, this _____ day of _____, 2008.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION,

William H. Ruland, Director
Division of Safety Systems
Office of Nuclear Reactor Regulation.