

POLICY ISSUE INFORMATION

August 24, 2004

SECY-04-0154

FOR: The Commissioners

FROM: Luis A. Reyes
Executive Director for Operations

SUBJECT: ISSUANCE OF NUCLEAR REGULATORY COMMISSION GENERIC LETTER 2004-XX, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS"

PURPOSE:

To inform the Commission of the staff's intent to issue the subject generic letter. A copy of the proposed generic letter is provided as Attachment 1.

SUMMARY:

The generic letter asks licensees of pressurized-water nuclear power reactors to perform an evaluation and provide information to enable the NRC to verify whether licensees can demonstrate that their emergency core cooling systems (ECCS) and containment spray systems (CSS) are capable of performing their intended post-accident mitigating functions following a design basis accident requiring recirculation operation. The staff intends to issue the subject generic letter approximately ten working days after the date of this information paper.

BACKGROUND:

In 1979, as a result of evolving staff concerns about the adequacy of pressurized-water reactor (PWR) recirculation sump designs, the NRC opened Unresolved Safety Issue (USI) A-43, "Containment Emergency Sump Performance." Through the resolution of USI A-43, the staff found that the 50 percent blockage assumption (under which most nuclear power plants had

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been licensed) identified in Regulatory Guide (RG) 1.82, Revision 0, "Sumps for Emergency Core Cooling and Containment Spray Systems," dated June 1974, should be replaced with more comprehensive guidance. This guidance would ensure that an assessment of debris blockage effects be performed on a plant-specific basis to ensure that the functionality of the ECCS and CSS design features are maintained.

In response to events at boiling-water reactor (BWR) facilities that challenged the conclusion that no new requirements were necessary to prevent clogging of ECCS strainers at operating BWRs, the NRC issued several bulletins to address this issue. On the basis of the BWR licensees' implementation of appropriate procedural measures, maintenance practices, and plant modifications to minimize the potential for debris accumulation to clog the ECCS suction strainers following a LOCA, the NRC staff concluded that all BWR licensees had sufficiently addressed the bulletins.

Although this issue was resolved at BWR facilities, the research conducted at the time raised questions concerning the adequacy of PWR sump designs to prevent clogging. These questions pertained to the quantities of generated debris, the composition and transportability of debris, and the potential for a combination of different debris sources to create substantially greater head loss than a comparable single debris source. These findings prompted the NRC to open Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on PWR Sump Performance." On the basis of the information acquired during its efforts to resolve GSI-191, the staff determined that the guidance used to develop current licensing basis analyses does not adequately and completely model sump screen blockage and related effects.

On June 9, 2003, the NRC issued Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Recirculation During Design-Basis Accidents at Pressurized-Water Reactors." The bulletin requested PWR licensees to either (1) state their compliance on a mechanistic basis with regulatory requirements applicable to the ECCS and CSS recirculation functions, or (2) describe any interim compensatory measures that they had implemented or would implement to reduce risk. In developing Bulletin 2003-01, the NRC staff recognized that it may be necessary for addressees to undertake complex evaluations to determine whether regulatory compliance exists in light of the concerns identified in the bulletin and that the methodology needed to perform these evaluations was not currently available. As a result, that information was not requested in the bulletin, but addressees were informed that the staff was preparing a generic letter that would request this information. This generic letter is the follow-on to the bulletin.

DISCUSSION:

After the bulletin was issued, the staff developed a new revision (Revision 3) of RG 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," dated November 2003, to provide a methodology to evaluate debris blockage effects on a plant-specific basis. The generic letter requests that the addressees perform a new, more realistic analysis using an NRC-approved methodology and confirm the functionality of the ECCS and CSS during design basis accidents requiring containment sump recirculation. To assist in determining, on a plant-specific basis, the impact on sump screen performance and other related effects of extended post-accident operation with debris-laden fluids, addressees may use the guidance in RG 1.82, Revision 3. In addition, the NRC staff is currently reviewing

evaluation guidance developed by the industry. The NRC staff intends to document its review in a safety evaluation, which licensees can reference as regulatory guidance. This evaluation contains, in part, risk-informed approaches as discussed in SECY-04-0150, dated August 16, 2004 (ADAMS Accession No. ML041660473). Individual addressees may also develop an alternative to the approaches discussed in this paragraph for responding to the generic letter; however, this may require additional staff review to assess the adequacy of such approaches.

The generic letter requests that addressees provide, within 90 days of the issuance of the NRC safety evaluation, a description of their planned actions and schedule for completion of the requested evaluation. This description should include details of the methodology that the addressee used or will use to analyze the susceptibility of the ECCS and CSS recirculation functions to the adverse effects identified within the generic letter, as well as the completion date for the analysis, if appropriate.

In addition, no later than September 1, 2005, the generic letter requests that addressees provide: (1) Information to confirm that the ECCS and CSS recirculation functions under debris-loading conditions are or will be in compliance with the applicable regulatory requirements, (2) A general description and implementation schedule for all corrective actions, (3) A description of the methodology the addressee used to perform the analysis, (4) A description of specific plant design features associated with sump recirculation, (5) A description of licensing basis changes, and (6) A description of any existing or planned programmatic controls to restrict potential sources of debris introduced into containment. The staff requires that the addressees submit their written responses in accordance with 10 CFR 50.54(f).

Under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, 10 CFR 50.109(a)(4)(i) and 10CFR 50.54(f), this generic letter requests that addressees evaluate their facilities to confirm compliance with the existing applicable regulatory requirements as outlined in this generic letter. This generic letter also transmits an information request for the purpose of verifying compliance with existing applicable regulatory requirements. The staff has determined that, in light of the information identified during the efforts to resolve GSI-191, the previous guidance used to develop most addressees' current licensing basis analyses does not adequately and completely model sump screen debris blockage and related effects. Due to the deficiencies in the previous guidance, a potential analytical error could have been introduced which would result in ECCS and CSS performance that does not conform with existing applicable regulatory requirements. In response, the staff revised its guidance for determining the susceptibility of PWR recirculation sump screens to the adverse effects of debris blockage during design basis accidents requiring recirculation operation of the ECCS or CSS to ensure compliance with existing applicable regulatory requirements. Thus, the information requested by this generic letter is considered a compliance exception to the rule in accordance with 10 CFR 50.109(a)(4)(i).

The NRC staff has assessed whether existing PWRs should continue operation while responding to the subject generic letter [in light of the GSI-191 resolution schedule, proposed through December 31, 2007, as mentioned above,] and determined that continued operation is justified because the probability of an initiating event is extremely low, certain existing design features tend to prevent flow blockage to the ECCS sump, and sources of margin in PWR designs exist which are not always credited in the licensing basis for each plant. The basis for this evaluation was documented in "Justification for Continued Operation from April 2001, NRR Director's Quarterly Status Report", dated August 14, 2001, which was made publicly available

through a meeting summary (ADAMS Accession Number ML012270168). Additionally, by implementing interim compensatory measures, such as those that were requested by NRC Bulletin 2003-01, (e.g., alternate water sources or refilling the refueling water storage tank (RWST)), licensees have enhanced safety by improving guidance for successful operator recovery actions. The staff has also determined that addressees are not required to be in compliance with the newly issued analysis using a NRC-approved methodology, until after all plant modifications (if required) are completed in accordance with the resolution schedule, and addressees have changed their licensing basis, as appropriate. However, if a non-compliance with the existing licensing design basis that affects the operability of an ECCS or CSS design feature is identified while taking actions in response to the generic letter, addressees should comply with established regulatory requirements.

The NRC has developed a Web page to keep the public informed of generic activities on PWR sump performance at (<http://www.nrc.gov/reactors/operating/ops-experience/pwr-sump-performance.html>). This page provides links to information on PWR sump performance issues, along with documentation of NRC interactions with industry (industry submittals, meeting notices, presentation materials, and meeting summaries). The NRC will continue to update this Web page as new information becomes available. In addition, the staff incorporated public comments from the issued draft generic letter as shown in Attachment 2. These measures are intended to increase the openness and communications to the stakeholder.

COORDINATION:

The Advisory Committee on Reactor Safeguards reviewed the generic letter during its 514th meeting on July 7, 2004, and recommended that it be issued. The Committee to Review Generic Requirements (CRGR) reviewed and endorsed the generic letter during its 397th meeting on August 10, 2004. The staff incorporated the CRGR comments from this meeting.

The Office of the General Counsel reviewed the subject generic letter and had no legal objections to its content. In addition, the Office of the Chief Financial Officer (OCFO) determined that a review of the generic letter was unnecessary; therefore, OCFO stated no objections based on budget or financial management concerns, or potential resource impacts.

The subject generic letter is a “rule” under the Small Business Regulatory Enforcement Fairness Act of 1996, and the Office of Management and Budget has determined it to be a “non-major” rule.

/RA/

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Attachments:

1. NRC Generic Letter 2004-XX, Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors
2. Public Comment Table

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DOCUMENT ACCESSION NUMBER: ML042250006 (SECY Paper)

ML042250005 (Package)

*via email

ML042250007 (Attachment 1)

ML042260161 (Attachment 2)

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