

PRM-50-84
(72FR28902)



Citizens and Scientists for Environmental Solutions

Union of Concerned Scientists

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OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

July 31, 2007

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Annette Vietti-Cook, Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Rulemaking and Adjudications Staff

Submitted electronically to SECY@nrc.gov

**SUBJECT: COMMENTS ON PETITION FOR RULEMAKING SUBMITTED BY
MARK EDWARD LEYSE (Docket No. PRM-50-84)**

Dear Ms. Vietti-Cook:

As noticed in the *Federal Register* (Vol. 72, No. 99, May 23, 2007, pp. 28902-28906), the Nuclear Regulatory Commission (NRC) published a petition for rulemaking submitted by Mark Edward Leye for public comment. On behalf of the Union of Concerned Scientists (UCS), I submit the enclosed comments.

UCS believes the petitioner has identified a genuine safety concern and that the regulatory changes sought in this petition will adequately resolve the concern.

Sincerely,

David Lochbaum
Director, Nuclear Safety Project

Enclosure: as stated

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**Union of
Concerned
Scientists**

Citizens and Scientists for Environmental Solutions

**Comments on Petition Submitted
by Mark Edward Leye
Docket No. PRM-50-84**

Number	Comment
1	<p>The petitioner provided a well-documented justification for the recommended changes to the regulations. The UCS agrees with the petitioner that the requested rulemaking changes are necessary to provide reasonable assurance that public health and safety is adequately protected.</p>
2	<p>Additional justification for the petition is found in the September 23, 2005, letter from ACRS Chairman Graham B. Wallis to NRC EDO Luis A. Reyes, titled "Report on a Proposed Technical Basis for Revision of the Embrittlement Criteria in 10 CFR 50.46." Dr Wallis wrote on page 2:</p> <p><i>"The research [undertaken by NRC's Office of Research in cooperation with the nuclear industry] has identified new mechanisms of cladding embrittlement and has improved the understanding of embrittlement mechanisms known at the time the current regulations were written."</i></p> <p>The NRC has frequently revised its regulations to reduce unnecessary regulatory burden on its licensees justified in large part on operating experience demonstrating that the original requirements were overly conservative. When presented irrefutable evidence of new information about a safety shortfall in the original requirements, the NRC must invoke the same remedy by revising its regulations to reduce unnecessary risk burden on the public.</p>
3	<p>Additional justification for the petition is found in General Design Criterion 4 in Appendix A to 10 CFR Part 50. That criterion, in its entirety, states:</p> <p><i>Criterion 4--Environmental and dynamic effects design bases. Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit. However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.</i></p> <p>The subject of the petition – the cladding for the nuclear fuel – is required under this regulation to be designed to accommodate the effects of the environmental conditions associated with normal operation and postulated accidents. The petitioner provides a well-documented argument that the thermal resistance of insulating layers of crud and/or oxidation on the fuel cladding should result in peak cladding temperatures higher than calculated by current safety analyses. The regulatory changes sought by the petition are necessary to prevent non-conservative safety analyses and, more importantly, significantly worse consequences should a loss of coolant accident occur.</p>

Number	Comment
4	<p>Additional justification for the petition is found in the chemical effects testing and related activities performed to support resolution of Generic Safety Issue No. 191 (GSI-191), the PWR containment sump problem. For example:</p> <p>NUREG-1861, "Peer Review of GSI-191 Chemical Effects Research Program," (December 2006), page C-13: <i>"the tests also did not model the extremely hot fuel cladding and pressure vessel surfaces, where dissolved and suspended solids plating and scale formation might occur"</i> and page C-24: <i>"The solids [in the reactor coolant system water following an accident] might also cling tenaciously to the fuel cladding and compromise the heat transfer meant to occur during the post-LOCA period. If such deposition occurs, it might sufficiently impede the desired heat transfer as to lead to fuel cladding failure due to thermal stresses"</i> and page D-9: <i>"The temperature at the clad surface [during an accident] will cause materials with retrograde solubility (calcium carbonate, sodium-aluminosillates, etc.) will precipitate out and bind to these surfaces. This may have secondary precipitation effects (i.e., other materials being flocculated or trapped by this primary precipitate), as well as fuel decay heat removal effects (heat transfer is reduced potentially leading to other fuel clad concerns). Once water that has passed through the core exits at a higher temperature, it can dissolve additional ions from containment materials. This will lead to more precipitate being formed from the mixture of materials (i.e., the equilibrium initially established will be pushed to yield more precipitate)."</i></p>
5	<p>The petition is necessary to explicitly state the regulatory requirements for accounting for crud and oxidation on fuel cladding during normal operation and postulated accidents in safety analyses. Information about new mechanisms of cladding embrittlement and post-accident chemical effects render the existing regulatory requirements and associated safety analyses non-conservative. The regulatory changes sought by this petition are necessary to provide reasonable assurance that public health and safety is adequately protected.</p>

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are attached.

Thanks,

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