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Secretary
ATTN: Rulemakings and Adjudications Staff
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

RIN 3150-AH42, Comments on Advanced Notice of Proposed Rulemaking for Performance-Based Emergency Core Cooling System Acceptance Criteria

AREVA NP Inc. (AREVA NP) is pleased to provide comments on the staff's Advanced Notice of Proposed Rulemaking (ANPR) as published in the Federal Register on August 13, 2009. This ANPR addresses rulemaking to revise the acceptance criteria for emergency core cooling systems for light water reactors. The Nuclear Energy Institute (NEI) has worked extensively with nuclear utilities and nuclear suppliers (vendors) to generate a comprehensive set of comments on this ANPR. AREVA NP has participated in that effort and generally endorses the comments that NEI will provide on behalf of the nuclear industry on October 27, 2009. This letter is to affirm the AREVA NP endorsement and to provide specific comments and responses on the ANPR (see Attachment).

If you have questions related to this letter, please contact Mr. Bert Dunn, Manager, PWR LOCA Licensing Manager at (434) 832-2427 or by e-mail at bert.dunn@areva.com.

Sincerely,

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AREVA NP Inc.

Enclosure

cc: H.D. Cruz
Project 728

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Attachment

AREVA NP Comments on RIN 3150-AH42, Advanced Notice of Proposed Rulemaking for Performance-Based Emergency Core Cooling System Acceptance Criteria

1. High Level Rule Language

As stated in the ANPR, the rule language should be altered such that only the high level requirements are included. The supporting method of assuring the requirements should be recorded in other NRC documents that are not part of the Code of Federal Regulations. This allows flexibility in the maintenance of those methods and in the adoption of new methods while assuring that the mission of the criteria continues to be accomplished. Thus, AREVA NP supports rule language written as requiring that:

1. The core remains in a coolable geometry,
2. There not be an excessive release of combustible gases, and
3. Long-term core cooling is provided.

2. Cladding and Pellet Design and Materials

AREVA NP supports the elimination of specific cladding and pellet materials from the rule language. Differing cladding alloys or designs are under development and may, in some cases, will require differing methods of establishing compliance to the above three criteria. However, so long as the upper level rule requirements are satisfied, the ECCS system will have accomplished its purpose. It is much less likely that the pellet material will impact the method of compliance and, as with the cladding material, if the upper level requirements are met, the ECCS has performed satisfactorily.

3. Evaluation Model Change Reporting

The NRC requested comments concerning possible new reporting requirements. These requirements dictate the conditions under which a licensee must report a change to the LOCA evaluation model to the NRC. The NRC suggested that the reporting be based on the proximity of the revised analysis result to the limiting criteria and offered an illustration of possible methods based on peak cladding temperature and local oxidation results. However, these approaches only relate to existing cladding materials and presently foreseen methods of compliance to the rule requirements. Should the cladding material or design change substantially or the method of compliance change, a differing reporting criteria could well be in order. An example would be the possible use of a spun ceramic cladding. AREVA makes the following recommendations:

1. Reporting requirements should only be for changes which would degrade the margin to criteria if applied individually to the analysis of record.
2. These requirements should be contained in NRC documentation other than the Code of Federal Regulation so that they can more easily be kept current with design and methodology improvements.

4. Request for Typical Time at Temperature during LOCA

The NRC requested information on typical time at temperature results for US reactors. AREVA NP notes that this information is highly variant with the reactor design under consideration and the LOCA evaluation model applied. Although in most cases the core will be returned to a quenched condition within 60 minutes of the initiation of the accident, exceptions occur. Further, it is not clear how this information will be employed in the determination of the new rule or its enforcement. Therefore, AREVA NP has decided not to respond with further details.

5. Oxidation Limits as Function of PCT Limit

AREVA NP supports providing the possibility of the development of individual transient oxidation limits as a function of the peak cladding temperature (PCT) during the transient. This would allow some plants the ability to take credit for keeping the PCT low. The NRC should include the allowed oxidation limits versus cladding Hydrogen content at the highest allowed oxidation temperature (2200°F) within the documentation of the specific criteria but should also provide for appropriately supported individual oxidation limits at lower PCTs.

6. Cladding Hydrogen Concentrations

The NRC postulated that basing the oxidation limits on pre-transient cladding Hydrogen concentrations dictated a need for a Hydrogen pickup correlation. AREVA NP agrees in general but in describing the issues surrounding the correlation, the NRC factors in considerations that AREVA NP believes to be unnecessary. A reasonable approach to the determination is a best estimate of the average cladding Hydrogen concentration over several pellet heights. Localized spot concentrations of Hydrogen within such a dimension could produce larger post transient alpha regions but these will be surrounded by low Hydrogen regions that result in alpha regions of lesser depth. The result, provided the material is ductile at the average Hydrogen concentration, is an over all ductile material with spot embrittlement. As presented in the NEI response to the ANPR, this has been supported in the Argonne test program. Further considerations are the conservatisms with which the oxidation limit will be applied. NEI mentions decay heat as a conservatism present in all evaluation models. It is also apparent that the oxidation temperature, even if time dependent, at which the oxidation limit is derived will be substantially higher through the transient than the transient temperature predicted. Thus, because there is a fairly strong relationship between cladding temperature and Oxygen absorption, providing conservative margin to an actual embrittlement condition.

7. Ductility Testing Methods

The NRC requested commentary on the proposed testing methods associated with setting ductility standards. AREVA NP considers it important that the testing be performed in a way that is fair and straightforward but not prescriptive. We support the adoption of a standard for the testing but not at the expense of disallowing improvements in testing methods or in the basic science involved. Thus, it is AREVA NP's consideration that the outline for the testing method should specify what is to be

accomplished (objective) and the accuracy of the determination (uncertainties) rather than the specific methodology. This can best be accomplished in a workshop format involving LOCA evaluation analysts, materials engineers, regulators, and interested testing laboratories.

8. Interior Alpha Layer Development

Part of the ANPR discusses a requirement to include a calculation of the development of an interior alpha layer in the fuel pin cladding at locations remote from the rupture locations if the burnup of the pin exceeds that at which clad-to-pellet contact would occur during normal operation. As has been discussed in workshops, there is evidence that this phenomenon may occur and there is evidence that this does not occur. AREVA NP believes that the inclusion of this requirement is premature at this time. However, the primary concern is that any requirements be placed in a flexible implementation document so that as the science solidifies, the treatment of the potential phenomena can be kept appropriate.

9. Further Experimental Programs

AREVA NP has, in the past, provided significant experimental support to the Argonne test program and published much of this information publicly. The testing, which continues, was done at our laboratories in Saclay and Grenoble, France and incorporates some procedural differences from the Argonne studies. AREVA NP has not yet completed an assessment of which of our experimental programs may be of assistance to the NRC in formulating the particulars of the proposed rule change. However, AREVA NP will do this in the near future and provide that accounting to the NRC so that our data can be considered in formulating any resulting rule.