DOCKETED NUMBER
PETITION FOR RULEMAKING: PRM-50-73

DOCKETED
USNRC

September 04, 2001 (3:16PM)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C., 20555-0001
Attn: Rulemakings and Adjudications Staff

September 4, 2001

Petition

1. Specification of the regulation that is to be amended:

§50.46 Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors.

Appendix K to Part 50 -- ECCS Evaluation Models

2. Petitioner's grounds for and interest in the action requested:

Petitioner is aware of deficiencies in Part 50.46 and Appendix K. These deficiencies must be corrected in order to retain defense in depth.

3. Petitioner's statement of the specific issues involved; views with respect to those issues; relevant technical, scientific, or other data involved:

The specific issue is that 50.46 and Appendix K do not address the impact of crud on coolability during a fast moving (large break) LOCA. A licensed power reactor has operated with unusually heavy crud deposits on many of the fuel pins. These deposits were found and at least partially classified during a refueling outage. If a fast moving (large break) LOCA had occurred prior to the shutdown for refueling, extensive blockage of the flow channels within the fuel bundles would likely have developed. During blowdown, the redistribution of crud into any or all of the several restricted channels would yield the substantial flow blockage. These restricted flow channels include at least the following items within the fuel bundles: the spacer grids, the mixing vanes attached to spacer grids, the regions of ballooned and burst fuel cladding, and likely others. With the consequent degradation of coolability, there would likely have been a rapid deterioration of defense in depth. That is, the single entity, unusually heavy crud deposits on the fuel pins, would have threatened the integrity of all of the barriers that in total yield the defense in depth.

It could be argued that significant crud deposits would lead to an extensive amount of fuel failure during operation at power. The amount of failed fuel would then lead to a decision to shut down the reactor as the inventory of radioactive material in the reactor coolant reached the limits that are allowed by the Technical Specifications. However, operating experience reveals that it is possible to operate an LWR within the applicable Technical Specifications even though unusually heavy crud deposits are present on the fuel pins.

Elements of 50.46 and K that must be revised to include the impact of crud deposits on the fuel pins include at least the following items that are directly copied from 50.46 and K. These are listed in the order that they appear in 50.46 and K. The lettering or numbering or the lack thereof are as the items were copied from 50.46 and K.

Item from 50.46:

Comparisons to applicable experimental data must be made...

Items from K:

B. Swelling and Rupture of the Cladding and Fuel Rod Thermal Parameters.

2. Frictional Pressure Drops. The frictional losses in pipes and other components including the reactor core shall be calculated...

4. Critical Heat Flux.

5. Post-CHF Heat Transfer Correlations.

7. Core Flow Distribution During Blowdown.

3. Calculation of Reflood Rate for Pressurized Water Reactors.

5. Refill and Reflood Heat Transfer for Pressurized Water Reactors.

6. Convective Heat Transfer Coefficients for Boiling Water Reactor Fuel Rods Under Spray Cooling.

7. The Boiling Water Reactor Channel Box Under Spray Cooling.

II. Required Documentation
1. a. A description of each evaluation model shall be furnished.

Finally, the petitioner has elected to not identify the specific LWR that prompted him to submit this petition. The petitioner has not consulted with the NRC for guidance in the preparation of this petition.

Submitted by:

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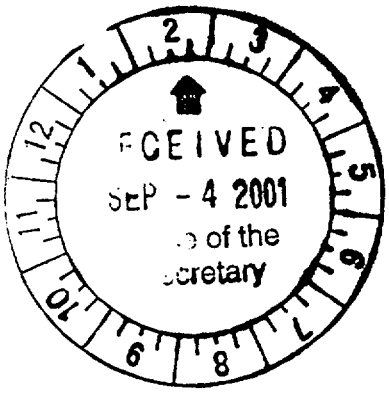
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