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PETITION RULE PPM

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(11)

The petition should be denied because the evaluations of cladding materials do not account for the realities of plant operation under so-called normal conditions as well as the LOCA environment.

According to the petitioner, *"The proposed wording does not eliminate current NRC practices regarding review and approval of new cladding materials brought forward by fuel vendors."*

At least one LWR has operated with substantial oxide thicknesses on the zirconium fuel pins. Now, according to the petitioner, *"An applicant must perform high-temperature oxidation and quenching tests of the cladding material to demonstrate that the 2200-degrees F peak cladding temperature and 17 percent oxidation limits protect the cladding against embrittlement and prevent the oxidation from becoming autocatalytic. This is demonstrated by heating the cladding to various high temperatures for a variety of time periods and quickly quenching the cladding in a cold water bath."* Thus, the testing does not require that the quenching tests of the cladding material be performed with cladding material that is preoxidized to depths that have occurred during reactor operation within technical specifications.

Moreover, *"...heating the cladding to various high temperatures for a variety of time periods and quickly quenching the cladding in a cold water bath,"* is not representative of the LOCA environment. The LOCA environments cover a range of scenarios depending on the time-temperature and thermal hydraulic path of the LOCAs. The procedure of heating in an inert atmosphere and then quickly quenching in cold water does not bound the severity of LOCA conditions.

Following is copied from the petition in order to illustrate that I have not quoted material out of context:

D The Proposed Amendment Allows the Use of Alternative Materials That Meet the Cladding Performance Requirements

The existing regulations address only zircaloy and ZIRLO cladding materials. The regulation needs to be generalized to avoid unnecessary burdens on the developers of new cladding alloys and utilities who will use those alloys. The language of this proposed amendment will encompass all zirconium-based cladding material for which the ECCS performance criteria of 10 CFR 50.46(b) are applicable. The proposed wording does not eliminate current NRC practices regarding review and approval of new cladding materials brought forward by fuel vendors. It does permit the NRC regulation to be more efficiently applied to those cladding materials demonstrated to meet the acceptance criteria of § 50.46(b)(1) and (b)(2). Experience has shown that qualification of an acceptable material can only be achieved by testing. An applicant must perform high-temperature oxidation and quenching tests of the cladding material to demonstrate that the 2200-degrees F peak cladding temperature and 17 percent oxidation limits protect the cladding against embrittlement and prevent the oxidation from becoming autocatalytic. This is demonstrated by heating the cladding to various high temperatures for a variety of time periods and quickly quenching the cladding in a cold water bath. These tests must demonstrate that

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failure did not occur until beyond the temperature limits and that no autocatalytic oxidation was observed. As long as the tests confirm that the 2200-degrees F and 17 percent oxidation are conservative for the cladding material, then the material design is acceptable for LOCA licensing analyses up to currently approved burn up limits. Providing a new, more general description of the fuel cladding is consistent with the NRC movement toward a performance-based, rather than prescriptive, regulatory philosophy.

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