

May 15, 2008

MEMORANDUM TO: Michele G. Evans, Director
Division of Component Integrity
Office of Nuclear Reactor Regulation

FROM: Jennifer L. Uhle, Director */RA/ S. Richards for*
Division of Engineering
Office of Nuclear Regulatory Research

SUBJECT: EMBRITTLEMENT TREND CURVE DEVELOPMENT FOR
REACTOR PRESSURE VESSEL MATERIALS

Over the course of the last year and a half the staff of the Office of Nuclear Reactor Regulation (NRR) and the staff of the Office of Nuclear Regulatory Research (RES) have been working on the development of an updated approach to estimating the effects of neutron irradiation embrittlement on reactor pressure vessel materials. This "Embrittlement Trend Curve," (ETC) work directly impacts Regulatory Guide 1.99; Title 10 of the Code of Federal Regulations (CFR) Part 50.61; 10 CFR Part 50.61a; and 10 CFR Part 50, Appendix G. In October of 2007, RES completed a draft NUREG report detailing recommendations on a revised ETC, and on other technical matters pertinent to Regulatory Guide 1.99. Following discussions with your staff it was agreed to arrange for a group of individuals external to the Nuclear Regulatory Commission to review our reports; these individuals are considered international experts on the mechanisms, quantification, and prediction of irradiation damage. The findings of these experts are now in the final editorial phase, and will be transmitted to you under separate cover.

The purpose of this memorandum is to transmit to you the report that we provided to the external reviewers and also various items of correspondence that passed between my staff and the external reviewers during the course of their work. All of this information has previously been made available to your staff. We are also placing this memorandum and all of its enclosures into ADAMS in the public domain because this information is needed to support replies to public comments for 10 CFR Part 50.61a. Specifically, please find enclosed the following information:

- Enclosure 1. A Draft NUREG report on the RES's staff's technical basis for Revision 3 of Regulatory Guide 1.99
- Enclosure 2. A letter to the expert panel detailing a further improvement to the ETC recommended in Enclosure 1. This improvement was motivated by discussions held between my staff and the expert panel.

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- Enclosure 3. An attachment to Enclosure 2 that was also provided to the expert panel. This attachment provides an assessment of how well the ETC recommended in Enclosure 2 fits various embrittlement databases that are available to my staff.
- Enclosure 4. A letter to the expert panel detailing newly available data for boiling water reactors that was provided to my staff by the Electric Power Research Institute.
- Enclosure 5. An additional appendix to Enclosure A that my staff sent to the expert panel. This appendix provides a detailed empirical review of the effects of high fluences (above 3×10^{19} n/cm²) on irradiation embrittlement.

In response to NRR user needs, my staff continues to work on ETCs, and on the development of a third revision to Regulatory Guide 1.99. By agreement with your staff our current focus is (a) development of a plan to address the issues raised by the experts' review, and (b) to synchronize our work on Regulatory Guide 1.99 with our work on risk-informing 10 CFR Part 50, Appendix G.

Enclosures:
As stated

M. Evans

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Enclosures:
As stated

DISTRIBUTION:

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ADAMS Accession No.: ML081120474

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NAME	M. Kirk	M. Kirk	R. Hardies	J. Uhle /RA/ S. Richards for
DATE	04/30/08	04/30/08	05/01/08	05/15/08

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