

December 15, 2000

Dr. William D. Travers
Executive Director
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

SUBJECT: PROPOSED FINAL REGULATORY GUIDE DG-1053, "CALCULATIONAL AND DOSIMETRY METHODS FOR DETERMINING PRESSURE VESSEL NEUTRON FLUENCE"

Dear Dr. Travers:

During the 478th meeting of the Advisory Committee on Reactor Safeguards, December 6-9, 2000, we met with representatives of the NRC staff to discuss the proposed final Regulatory Guide DG-1053, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence." Our Subcommittee on Materials and Metallurgy met on November 16, 2000, to discuss this matter. We had the benefit of the documents referenced.

Recommendation and Conclusion

- We recommend that the regulatory guide be issued for use by the industry.
- The NRC staff should be commended for the development of an excellent regulatory guide. The new guidance will result in more accurate calculations of the fluence and expedite review of licensee submittals.

Discussion

To ensure the integrity of reactor pressure vessels, the NRC has established fracture toughness requirements for normal operation and anticipated operational occurrences in 10 CFR Part 50, Appendix G, "Fracture Toughness Requirements," and for potential pressurized thermal shock events in pressurized water reactors in 10 CFR 50.61, "Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock Events." Methods for the determination of the fast neutron fluence are needed to estimate the fracture toughness of reactor pressure vessel materials. Various methods implemented in numerous ways of varying reliability and accuracy have been used to determine the fluence. This wide variation in calculation methods has resulted in lengthy plant-specific reviews. To remedy this situation, the staff has developed a regulatory guide to provide standardized methods and procedures to simplify and expedite these reviews.

We reviewed draft Regulatory Guide DG-1025 on this subject in July 1993 and issued a letter dated July 15, 1993. Since then the staff has revised DG-1025 several times in response to

stakeholders comments and designated it as DG-1053. The latest revision includes guidance for using Monte Carlo methods as well as the more conventional discrete ordinates calculation methodology. In addition, the staff has issued NUREG/CR-6115, which provides PWR and BWR pressure vessel fluence calculation benchmark problems and solutions that can be used to validate licensee calculational methods. The revised regulatory guide and the associated NUREG/CR-6115 provide guidance on the selection of appropriate geometrical and material input data, fluence calculation methods, the qualification of the methodology and modeling assumptions, and the determination of the uncertainties associated with the analysis. The methodology provides a best estimate rather than a bounding or conservative estimate of the fluence.

The draft regulatory guide has received substantial input and comment from the industry and concerned citizens. The staff and its contractor have considered the comments and incorporated many of them to improve the clarity of the guidance. There appears to be a consensus between the staff and the industry that the new guidance will result in more accurate calculations of the fluence and more efficient review of licensee submittals. Indeed, the reduction in the uncertainties in the fluence calculation could lead eventually to reductions in dosimetry and the margin terms required in estimates of the fracture toughness.

We commend the staff for its efforts to develop improved guidance for the calculation of vessel neutron fluence. The regulatory guide should be issued for industry use.

Sincerely,

/RA/

Dana A. Powers
Chairman

References:

1. Memorandum dated November 29, 2000, from Michael E. Mayfield, Office of Nuclear Regulatory Research, to John T. Larkins, Advisory Committee on Reactor Safeguards, Subject: Request for Review and Concurrence to Issue Proposed Regulatory Guide, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," including regulatory and backfit analysis.
2. Letter dated July 15, 1993, from J. Ernest Wilkins, Jr., Chairman, ACRS, to James M. Taylor, Executive Director for Operations, NRC, Subject: Proposed Draft Regulatory Guides DG-1023, "Evaluation of Reactor Pressure Vessels With Charpy Upper-Shelf Energy Less Than 50 FT-LB," and DG-1025, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence."
3. U.S. Nuclear Regulatory Commission, NUREG/CR-6115, BNL-NUREG-52395, "PWR and BWR Pressure Vessel Fluence Calculation Benchmark Problems and Solutions," completed May 20, 1997.
4. Draft Summaries of Comments Received From Nuclear Energy Institute, Professor Alireza Haghighat, and Don't Waste Michigan concerning DG-1053, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," received October 23, 2000. [Predecisional].

5. Comments Received From Nuclear Energy Institute, Professor Alireza Haghighat, and Don't Waste Michigan concerning DG-1053, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence," received October 23, 2000.
[Predecisional].