



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

NUCLEAR PROJECT NO. 2

DOCKET NO. 50-397

1.0 INTRODUCTION

In a letter dated July 28, 1994, the Washington Public Power Supply System (the licensee) submitted for staff review and approval its assessment of the applicability to the WPPSS Nuclear Project No. 2 (WNP-2) reactor vessel of General Electric Company (GE) Topical Report, NEDO-32205, Revision 1, "10 CFR 50 Appendix G, Equivalent Margin Analysis for Low Upper Shelf Energy in BWR/2 Through BWR/6 Vessels."

Appendix G, 10 CFR Part 50, requires that reactor vessel beltline material must maintain a Charpy upper-shelf energy (USE) of no less than 50 ft-lb, unless it is demonstrated in a manner approved by the Director, Office of Nuclear Reactor Regulation, that lower values of USE will provide margins of safety against fracture equivalent to those required by Appendix G of the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME) Code. ASME Code Case N-512 contains analytic procedures and acceptance criteria for demonstrating that reactor vessel beltline materials with low Charpy USE will have margins of safety against fracture equivalent to Appendix G of the ASME Code.

In a December 9, 1993 letter to L.A. England from J.T. Wiggins, the NRC staff provided its report of the review of GE Topical Report NEDO-32205, Revision 1. The NRC staff concluded that the reactor pressure vessels of the participating utilities should have margins of safety against ductile failure in low USE plates and welds until the end of their licenses (32 EFPY) for level A, B, C, and D conditions, and meet the criteria of ASME Code Case N-512. The NRC staff requested that individual licensees that reference the topical report as the basis for addressing the USE requirements of 10 CFR Part 50, Appendix G, confirm the plant specific applicability of the report by comparing the predicted percentage decrease in the USE to the allowable decrease in the USE from the topical report.

2.0 EVALUATION

Regulatory Guide (RG) 1.99, Revision 2 recommends two methods acceptable to the staff for determining the percentage decrease in USE. The percent decrease in USE may be determined from surveillance data or from Figure 2 in the RG. Figure 2 indicates that the percentage decrease in USE increases with increasing amounts of copper and neutron fluence. However, the percent decrease in USE could be affected by surveillance test results. If surveillance data indicate that the percent decrease in USE is greater than

9509210306 950915
PDR ADDCK 05000397
PDR

the amount predicted by Figure 2 in the RG, the percent decrease in USE for the material must be increased. If surveillance data indicate that the percent decrease in USE is less than the amount predicted by Figure 2 in the RG, the percent decrease in USE for the material may be decreased from the amount predicted by Figure 2. Since WNP-2 has not withdrawn the first capsule from its surveillance program, the percent decrease in USE must be determined based on the amount of copper and neutron fluence. However, when the first capsule is withdrawn, the licensee will need to evaluate the test results to determine if the criteria in NEDO-32205, Revision 1 are satisfied.

As a result of the information provided by the licensee in their responses to information requested in Generic Letter (GL) 92-01, Revision 1, "Reactor Vessel Structural Integrity, 10 CFR 50.54(f)," the NRC staff has determined that insufficient information existed for the beltline plates and axial beltline welds to determine that they will have USE greater than 50 ft-lb at the expiration of the WNP-2 license.

The beltline plates with the greatest amount of copper and neutron fluence are the plates with heat number C1337-1 and C1337-2. The beltline axial welds all have the same amount of copper and neutron fluence. The percentage decrease in USE for the beltline plate with the greatest amount of copper is projected to be 13 percent and the percentage decrease in USE for the beltline axial welds is projected to be 10 percent.

The allowable decrease in USE from the topical report is 21 percent and 34 percent for plate and weld material, respectively. Since the allowable decrease in USE is greater than the values projected for the beltline materials, the conclusions of the topical report are applicable to the WNP-2 reactor vessel.

3.0 CONCLUSIONS

The staff has concluded that (1) since the projected decrease in USE for the beltline plates and weld are less than the allowable decrease in USE from the topical report, the conclusions of the topical report are applicable to the WNP-2 reactor vessel, and (2) the WNP-2 reactor vessel satisfies the criteria in ASME Code Case N-512, will provide margins of safety against fracture equivalent to those required by Appendix G of the ASME Code at the expiration of its license, and meets the requirements of Appendix G, 10 CFR Part 50 for reactor vessels with USE less than 50 ft-lb.

Principal Contributor: B. Elliott

Date: September 15, 1995