



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REVIEW OF PLANT-SPECIFIC APPLICABILITY OF

GE TOPICAL REPORT NEDO-32205, REVISION 1

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated February 7, 1995, the Nebraska Public Power District (the licensee) submitted for staff review and approval its assessment of the plant specific applicability 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," to its Cooper Nuclear Station reactor vessel. As part of the submittal, the licensee provided plant specific worksheets to demonstrate that the reactor vessel materials are bounded by the analysis provided in the GE topical report.

Appendix G of 10 CFR Part 50, requires that reactor vessel beltline material must maintain an 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 (NRR), 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 and Appendix K contain 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 (USNRC), the staff reviewed the GE topical report NEDO-32205, Revision 1. The 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 and Appendix K. Individual licensees that reference the topical report as the basis for addressing the USE requirements of 10 CFR Part 50, Appendix G were requested to 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

Methods acceptable to the staff for determining the percentage decrease in USE are documented in Regulatory Guide (RG) 1.99, Revision 2. Figure 2 in the RG 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 the amount predicted by Figure 2 in this 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.

After having reviewed the information provided by the licensee in its responses to Generic Letter (GL) 92-01, Revision 1, "Reactor Vessel Structural Integrity, 10 CFR 50.54(f)," the staff has determined that insufficient information existed for some beltline materials of the Cooper reactor vessel to determine that it will have USE greater than 50 ft-lb at expiration of its license. In the current application, the licensee reported that the percent decrease in USE of the surveillance plate is less than that from using Figure 2 in the RG and the predicted USE decrease of 18X for the limiting plate is less than the allowable limit of 21X for plates from NEDO-32205. As to beltline welds, since the surveillance weld indicated a more severe USE decrease than that from the RG, the licensee had adjusted its predicted end-of-license USE decrease proportionally from 20% to 30.7% for the 32 EFPY fluence of $1.1E18$ n/cm². Nonetheless, this value is still less than the allowable limit of 34% for welds from NEDO-32205.

3.0 CONCLUSIONS

Based on the evaluation, the staff verified that the projected decreases in USE for the beltline materials are less than the allowable decreases in USE from the topical report. Consequently, the applicability requirements of NEDO-32205 have been satisfied and the conclusions of the topical report are applicable to the Cooper reactor vessel. As a result, the Cooper reactor vessel satisfies the criteria in ASME Code Case N-512 and Appendix K, and will have margins of safety against fracture equivalent to those required by Appendix G of the ASME Code at the expiration of its license. Therefore, the USE requirements of Appendix G of 10 CFR Part 50 are met.

Principle Contributor: S. Sheng

Date: November 6, 1995