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

SAFETY EVALUATION RELATED TO THE APPROVAL OF ASME BOILER AND PRESSURE VESSEL SECTION III CODE CASE 1804 AS IT PERTAINS TO FEEDWATER NOZZLE BASE METAL REMOVAL AT MONTICELLO NUCLEAR GENERATING PLANT

DOCKET NO. 50-263

INTRODUCTION

By letters dated August 31, 1977 and September 23, 1977, Northern States Power Company (NSP) described the feedwater nozzle repair program to be performed at the Monticello Nuclear Generating Plant during the present refueling outage. As part of that program and because nozzle base material removal was planned NSP recalculated the adequacy of nozzle reinforcement. These calculations were performed in accordance with the requirements of Paragraph NB-3330 and alternative rules of Paragraph NB-3339, both of the ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section III. NSP stated that because the nearest feedwater nozzles are closer to the control rod drive return line nozzle and instrument line nozzle than is allowed by NB-3339.1, they proposed to invoke the rules of Code Case 1804 and supported this proposal by data showing the nozzle spacing would be within the limits of Code Case 1804. Paragraph 50.55a(a)(2)(ii) of Title 10 Code of Federal Regulations Part 50 (10 CFR 50) allows the approval and use of specific Code Cases provided the proposed alternatives to the described requirements or portions thereof provide an acceptable level of quality and safety.

DISCUSSION AND EVALUATION

The application of Code Case 1804 is necessary in order that the Monticello pressure vessel, when repaired as intended, will meet the requirements of Section III of the ASME Boiler and Pressure Vessel Code. Although Code Case 1804 does not yet appear in USNRC Regulatory Guide 1.84 ("Code Case Acceptability, ASME Section III Design and Fabrication), it is being incorporated in ASME Section III as a revision to paragraph NB-3339.1(c). This action passed the ASME main committee at the September 1976 meeting and should appear in the Summer 1977 Addenda to the Code.

As explanation for the need for Code Case 1804, calculation shows that removal of one-half inch of base metal underlying the cladding in the feedwater nozzles will result in less than 100 per cent area replacement in the nozzle reinforcement. 100% replacement is presently required by regular Code rules, but approximately 93% will be available after metal removal, by our calculations. Therefore, NSP chose to use the allowed alternative rules of paragraph NB-3339 of the ASME Code, Section III. Those rules would permit 75% area replacement provided certain limitations are met.

The limitation on nozzle spacing, given in paragraph NB-3339.1 (c) of the 1974 Edition of the ASME Code, is that edge-to-edge distance shall not be less than 2.5 $\sqrt{Rt}$, where R is vessel radius and t is wall thickness.

For the Monticello vessel, this value is 56.93 inches ($2.5 \sqrt{102.5 \times 5.06} = 56.93$). The actual edge to-edge spacing between the nearest feedwater nozzle and the control rod drive return line nozzle, as stated in the NSP letter of August 31, 1977, is 36.89 inches and between the nearest feedwater nozzle and the instrument line nozzle is 37.35 inches. However, Code Case 1804 reduces the minimum allowable spacing to 1.25 ($d_1 + d_2$), where d_1 and d_2 are the inside diameters of the nozzles in question. Utilizing data obtained from NSP, we have conservatively calculated that the minimum code allowable spacing is 20.33 inches [1.25 (12.13 + 4.13) = 20.33] for the feedwater and control rod drive return line nozzles, and 18.91 inches for the feedwater and instrument line nozzles [1.25 (12.13 + 3.0) = 18.91]. Thus the Monticello vesel nozzle spacings are well within the limits of Code Case 1804. Because we have determined that the nozzle reinforcement is being reduced only slightly below the 100% area replacement required by regular Code rules, and because the nozzle spacing of the nozzles in question is well above the minimum allowed by Code Case 1804, we have determined that Code Case 1804 is acceptable for application to the specific Monticello feedwater nozzle repair program. We have further determined that the application of Code Case 1804 will provide acceptable levels of quality and safety.

Date: September 28, 1977