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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 71 TO FACILITY OPERATING LICENSE NO. NPF-42

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

By application dated May 27, 1993, Wolf Creek Nuclear Operating Corporation (the licensee) requested changes to the Technical Specifications (Appendix A to Facility Operating License No. NPF-42) for the Wolf Creek Generating Station. The proposed changes would revise the heatup, cooldown, and cold overpressure mitigation system power-operated relief valve setpoint pressure/temperature limits. The revised limits reflect the analysis of the most recently withdrawn surveillance capsule associated with the reactor vessel radiation surveillance program (10 CFR Part 50, Appendix H). The revised limits bound operation through 13.6 Effective Full Power Years (EFPY).

2.0 BACKGROUND

To evaluate the P-T limits, the staff uses the following NRC regulations and guidance: 10 CFR 50.36(c)(2); Appendices G and H of 10 CFR Part 50; Generic Letter 88-11, "NRC Position on Radiation Embrittlement of Reactor Vessel Materials and Its Impact on Plant Operations;" Regulatory Guide (RG) 1.99, Rev. 2, "Radiation Embrittlement of Reactor Vessel Materials;" and Standard Review Plan (SRP) Section 5.3.2, "Pressure Temperature Limits."

Each licensee authorized to operate a nuclear power reactor is required by 10 CFR 50.36 to provide technical specifications for the operation of the plant. In particular, 10 CFR 50.36(c)(2) requires that limiting conditions of operation be included in the technical specifications. The P-T limits are among the limiting conditions of operation in the technical specifications for all commercial nuclear plants in the United States.

Appendix G to 10 CFR Part 50 requires that "...pressure-temperature limits for the reactor vessel must be at least as conservative as those obtained by following the methods of analysis and the required margins of safety of Appendix G of the ASME Code..." Appendix G also imposes requirements on the minimum temperature for criticality, the closure head flange, and hydrostatic pressure tests or leak tests.

Appendix H of 10 CFR Part 50 requires the licensee to establish a surveillance program to monitor embrittlement of reactor vessel materials. The program includes capsules that contain test specimens made from plate, weld, and heat-

affected-zone (HAZ) materials of the reactor beltline. Appendix H refers to the ASTM Standards which, in turn, require that the capsules be installed in the vessel before startup and be removed from the reactor vessel periodically for testing. The test results may be used in calculating P-T limits.

Generic Letter 88-11 requires that licensees use the methods in RG 1.99, Rev. 2, to predict the effect of neutron irradiation on reactor vessel materials This guide defines the adjusted reference temperature (ART) as the sum of unirradiated reference temperature, the increase in reference temperature resulting from neutron irradiation, and a margin to account for uncertainties in the prediction method.

SRP 5.3.2 describes a step-by-step calculation of the P-T limits that is based on methodology specified in Appendix G to the ASME Code, Section III.

3.0 EVALUATION

The licensee calculated the ART for each beltline material in the Wolf Creek reactor vessel in accordance with RG 1.99, Rev. 2. The licensee determined that, at 13.6 EFPY, lower shell plate, R2508-3, is the limiting material. The chemistry for the plate is 0.07 percent copper and 0.62 percent nickel with an initial RT_{ndt} of 40°F. For plate R-2508-3, the licensee calculated the ARTs of 89°F at the 1/4T location and 79°F at the 3/4T location based on Regulatory Position C.2 of RG 1.99. The staff has identified the same plate as the limiting material and confirmed the licensee's ARTs to be correct. Substituting the ARTs of 89°F and 79°F into equations in SRP 5.3.2, the staff verified that the proposed P-T limits for heatup, cooldown, criticality, and leak test meet the requirements in Paragraphs IV.A.2 & IV.A.3 of Appendix G of 10 CFR Part 50.

In addition to beltline materials, Appendix G of 10 CFR Part 50 also imposes a minimum temperature at the closure head flange based on the reference temperature for the flange material. Section IV.A.2 of Appendix G states that when the pressure exceeds 20 percent of the preservice system hydrostatic test pressure, the temperature of the closure flange regions highly stressed by the bolt preload must exceed the reference temperature of the material in those regions by at least 120°F for normal operation and 90°F for hydrostatic pressure tests and leak tests. Based on the flange reference temperature, provided by the licensee, of 20°F, the staff has determined that the proposed P-T limits have included this requirement.

The licensee has removed surveillance capsules U and Y from the Wolf Creek reactor vessel and has performed required tests per ASTM E-185. The test results of both capsules are published in reports by Westinghouse (Refs. 1 and 2). The licensee used the surveillance test data from both capsules in the P-T limits calculation. The staff has determined that the licensee followed the recommended procedure in RG 1.99, Rev. 2.

The staff concludes that the proposed P-T limits for heatup, cooldown, leak test, and criticality are valid through 13.6 EFPY because the limits conform to the requirements of Appendix G of 10 CFR Part 50 and Generic Letter 88-11. Hence, the proposed P-T limits may be incorporated in the Wolf Creek Technical Specifications.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Kansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (58 FR 36449). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 REFERENCES

1. "Analysis of Capsule U from the Wolf Creek Nuclear Operating Corporation Wolf Creek Reactor Vessel Radiation Surveillance Program," Westinghouse Electric Corporation, WCAP-11553, August 1987.

2. "Analysis of Capsule Y from the Wolf Creek Nuclear Operating Corporation Wolf Creek Reactor Vessel Radiation Surveillance Program," Westinghouse Electric Corporation, WCAP-13365, April 1993.

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