



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 80 TO FACILITY OPERATING LICENSE NO. DPR-51

ARKANSAS POWER & LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

Introduction

By letter dated February 27, 1984, Arkansas Power and Light Company (AP&L or the licensee) requested amendment to the Technical Specifications (TSs) appended to Facility Operating License DPR-51 for Arkansas Nuclear One, Unit 1 (ANO-1). The amendment would change the ANO-1 pressure-temperature limit curves for hydrostatic test, normal heatup, and normal cooldown (Figures 3.1.2-1, 3.1.2-2 and 3.1.2-3 of the TSs), to be applicable for a period of time corresponding to 15 effective full power years (EFPY). The proposed change would require these proposed pressure-temperature curves to be updated prior to reaching 15 EFPY of operation.

Background and Discussion

Pressure-temperature limits must be calculated in accordance with the requirements of Appendix G, 10 CFR 50, which became effective on July 26, 1983. Pressure-temperature limits that are calculated in accordance with the requirements of Appendix G, 10 CFR 50, are dependent upon the initial RT_{NDT} for the limiting materials in the beltline and closure flange regions of the reactor vessel and the increase in RT_{NDT} resulting from neutron irradiation damage to the limiting beltline material.

The ANO-1 reactor vessel was procured prior to the issuance of the Appendix G, 10 CFR 50 regulation. However, the ANO-1 reactor vessel materials must meet the safety margins and testing requirements of the regulation. Appendix G, 10 CFR 50, requires that samples from each reactor vessel material be

fracture toughness tested to determine their initial (unirradiated) RT_{NDT} . The limiting beltline material was fracture toughness tested to determine its initial RT_{NDT} . However, due to the unavailability of sample materials from the ANO-1 reactor vessel closure flange region, the initial RT_{NDT} of the closure flange region materials were determined using generic materials properties data. The generic materials properties data were documented in BAW Topical Report BAW-10046, "Methods of Compliance with Fracture Toughness and Operational Requirements of 10 CFR 50, Appendix G." This topical report was reviewed by the staff and found acceptable for referencing in licensing applications. The staff's review is documented in a letter from S. A. Varga to J. H. Taylor dated June 22, 1977. Based on the safety evaluation, which was attached to the Varga signed letter, the licensee's estimate for the initial RT_{NDT} for the closure flange region material may be used in determining the ANO-1 reactor vessel pressure-temperature limits. The increase in RT_{NDT} of the limiting beltline materials resulting from neutron irradiation damage was estimated by the licensee using the methodology documented in Regulatory Guide 1.99, Rev. 1, "Effects of Residual Elements on Predicted Radiation Damage to Reactor Vessel Materials." This estimate is reported in Table 8-1 of B&W Report BAW 1698, "Analysis of Capsule ANI-B From Arkansas Power & Light Company's Arkansas Nuclear One, Unit 1." The licensee indicates that, using this Regulatory Guide methodology, the limiting beltline material is weld metal WF-112. This material was not tested as part of the ANO-1 reactor vessel material surveillance program. However, it was tested as part of the B&W Owners Group Integrated Reactor Vessel Material Surveillance Program, in which AP&L is an active member. The effect of neutron irradiation on the RT_{NDT} of weld metal WF-112 is documented in B&W Report BAW-1436, "Analysis of Capsule OCI-E, Duke Power Company, Oconee Nuclear Station-Unit 1." The WF-112 weld metal was irradiated in the Oconee Unit 1 reactor vessel and had been irradiated to 1.5×10^{18} nvt. Our review of the Charpy V-Notch data documented in BAW-1436 indicates that WF-112 weld metal had an increase in RT_{NDT} of 83°F as a result of irradiation to 1.5×10^{18} nvt. Using the WF-112 weld metal chemical composition reported in B&W Proprietary Report BAW-1511P, "Irradiation-Induced Reduction in Charpy Upper-Shelf Energy of Reactor Vessel Welds," and the Regulatory Guide 1.99, Rev. 1, method of estimating neutron irradiation damage, the estimate of increase in RT_{NDT} at

1.5×10^{18} nvt is 120°F. Since the increase in RT_{NDT} of WF-112 surveillance weld metal is significantly less than that predicted by Regulatory Guide 1.99, Rev. 1, the Regulatory Guide should provide conservative estimates as to the amount of neutron irradiation damage to weld metal WF-112.

Evaluation

We have used the unirradiated RT_{NDT} for beltline and closure flange materials, which were previously discussed, the Regulatory Guide 1.99, Rev. 1, method of estimating neutron irradiation damage, and Standard Review Plan 5.3.2 method of calculating pressure-temperature limits to evaluate the licensee's proposed pressure-temperature limits. Our evaluation indicates that the proposed pressure-temperature limit curves meet the safety margins of Appendix G, 10 CFR 50, for a period of time corresponding to 15 EFPY. Hence, the proposed curves are acceptable for incorporation into ANO-1 TSs.

As previously discussed in this evaluation, the limiting ANO-1 reactor vessel beltline material, weld metal WF-112, is being irradiated as part of the B&W Owners Group Integrated Reactor Vessel Materials Surveillance Program. According to B&W Report BAW-1543, Rev. 1, "Integrated Reactor Vessel Material Surveillance Program," weld metal WF-112 is contained in surveillance capsules OCI-A, -C and -E. Since the test results from these capsules will evaluate the effect of neutron irradiation on the ANO-1 limiting material, AP&L must use the test results from these capsules in determining the safety margins required for their pressure-temperature limits. If test results from these capsules indicate that the ANO-1 pressure-temperature limits are non-conservative, the licensee must revise the limits and submit them for NRC staff review.

Environmental Consideration

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this 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 this amendment.

Conclusion

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: July 27, 1984

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