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U. S. Nuclear Regulatory Commission
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SUBJECT: Arkansas Nuclear One - Unit 1
Docket No. 50-313
License No. DPR-51
Long-Term Plans for Satisfying
10CFR50 Appendix G Requirements
(TAC No. M77665)

Gentlemen:

In letter dated September 20, 1990, Entergy Operations submitted a Technical Specification change request for Arkansas Nuclear One, Unit 1 (ANO-1). The request was to revise the reactor coolant system Technical Specification pressure/temperature operating limits for the first 15 effective full power years, using the methodology of Regulatory Guide 1.99, Revision 2. The request also revised the low-temperature overpressure protection enable temperature. The request was supplemented by letters dated February 28, and August 14, 1991.

This change request was approved and the Safety Evaluation (SE) was transmitted to ANO-1 in letter dated November 14, 1991. The Staff noted in the SE that Section IV.A of 10CFR50, Appendix G requires that the predicted Charpy Upper Shelf Energy (USE) at end-of-life (EOL) be above 50 ft-lb. The Staff determined that weld WF-18, which has the lowest unirradiated USE and the highest Cu content (0.29%), was the limiting weld for ANO-1. Since surveillance data was not available for this type of weld, the Staff used Figure 2 in Regulatory Guide 1.99, Revision 2 directly and calculated the EOL USE at 1/4T to be 44.9 ft-lb.

To satisfy the requirements of Section V. of Appendix G, the licensee has to propose a program at least three years prior to the date when the predicted fracture toughness levels will no longer satisfy the requirements of Section V.B of Appendix G. Since the Staff determined that the ANO-1 EOL USE would be below the 50 ft-lb limit, it was requested by the Staff that Entergy Operations provide information regarding the long-term plans to satisfy Appendix G. The purpose of this submittal is to address this NRC concern.

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Based on information currently available to ANO, Entergy Operations does not believe that the EOL predicted fracture toughness levels of the ANO-1 reactor vessel beltline materials will fall below the requirements of Section V.B of Appendix G during the licensed 40-year life. Specifically, the USE throughout the life of the vessel is expected to remain at or above 50 ft-lb. The basis for this conclusion follows:

ANO-1 is a charter member of the Babcock & Wilcox Owners Group (B&WOG) Reactor Vessel Integrity Program (RVIP). The B&WOG recognized at the time of its issuance, that while Regulatory Guide 1.99 prediction correlations would not immediately present any plant licensing concerns, its boundingly conservative methods would cause licensing difficulties in the future. In particular, weld metals with the greatest sensitivity to radiation damage have a much larger predicted shift in reference temperatures and decrease in Charpy USE, when based on the regulatory guide, than is actually observed during specimen testing. The B&W fabricated, submerged-arc weld metals, made with copper-plated Mn-Mo-Ni wire and Linde 80 flux, fall into this category. Therefore, the B&WOG embarked on a program to develop sufficient data to permit an evaluation of this material exclusively.

The availability of a significant number of reactor vessel material surveillance capsule specimens has provided a database of sufficient size to develop prediction correlations that are distinctly representative of the behavior of B&W-fabricated, submerged-arc weld materials. The prediction techniques were documented in Revision 1 to BAW-1803, which was submitted to the NRC on October 4, 1991, by B&WOG letter OG-955. As a comparison, BAW-1803 techniques are based on 47 data sets of Linde 80 weld metals versus Regulatory Guide 1.99 correlations that are based on a total of 51 data sets for all types of weld metal. Thus, it is Entergy Operations' position that the correlations presented in BAW-1803 are more representative of the ANO-1 weld metals than those in Regulatory Guide 1.99.

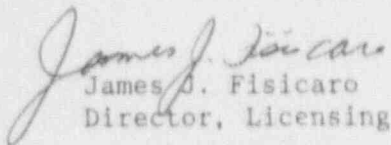
Using the correlations of BAW-1803, the USE at EOL was calculated for all RVIP participants. The results of these calculations are summarized in Appendix B of BAW-1803, with the ANO-1 specific summary provided in Table B-22. The estimated 1/4T EOL USE for the ANO-1 limiting weld (WF-112) has a mean value of 52 ft-lb. This value is supported by actual surveillance data for this weld metal, as reported in BAW-2150. It is therefore concluded that, based on the ANO-1 reactor vessel beltline materials', Charpy USE will be maintained above 50 ft-lb throughout the current licensed life of the plant and the requirements of Section V.C of Appendix G will not be applicable.

ANO-1 remains a member of the RVIP, which is continuing to monitor the behavior of Linde 80 weld metals and will issue revisions to BAW-1803, as significant improvements to the present prediction correlations are developed. The B&WOG continues to work closely with the NRC, reporting on the progress of the NRC-approved Master Integrated Reactor Vessel Surveillance Program, as outlined in BAW-1543, Revision 3. Any significant findings of the RVIP that would negatively impact the ANO-1 reactor vessel fracture toughness would be addressed by Entergy Operations, including any revised prediction of USE if it were predicted to fall below 50 ft-lb.

As additional information, it should be noted that a new B&W report, BAW-2121P, was issued on May 1, 1991. This report supplements BAW-1500, issued in 1978, and revises the copper content of WF-18 from 0.29% to 0.20%. Although the WF-18 weld qualification value was 0.105% Cu, BAW-2121P and the B&WOG has chosen to use the more conservative and representative (based on work performed for BAW-2121P) value of 0.20%. The decrease in copper content to 0.20% naturally increases the EOL USE of WF-18 and WF-112 then becomes the limiting weld at ANO-1.

In summary, the requirements of Section V.C of Appendix G are not expected to be applicable to ANO-1 before EOL. Should you have any questions regarding this submittal, please contact me.

Very truly yours,


James J. Fisicaro
Director, Licensing

JJF/RWC/mmg

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