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Director of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Mail Station P1-137  
Washington DC, 20555

Subject: Zion Nuclear Power Station, Unit 2  
License No. DPR-48  
NRC Docket No. 50-304  
Analysis of Capsule Y-Unit 2 Reactor Vessel

Gentlemen:

Enclosed are eight copies of the technical report which provides the results of the Reactor Vessel Material Surveillance Program for Capsule Y for Zion, Unit 2, as required by 10 CFR 50, Appendix, H.

A summary of the report yielded the following results:

- The capsule received an average fast neutron fluence ( $E > 1.0$  MeV) of  $1.48 \times 10^{19}$  n/cm<sup>2</sup>.
- Irradiation of the reactor vessel lower shell Plate C4007-1, to  $1.48 \times 10^{19}$  n/cm, resulted in 30 and 50 ft-lb transition temperature increases of 121°F and 130°F, respectively, for specimens oriented normal to the major working direction (transverse orientation) and temperature increases of 88°F and 103°F, respectively, for specimens oriented parallel to the major working direction (longitudinal orientation).
- Weld metal irradiated to  $1.48 \times 10^{19}$  n/cm<sup>2</sup> experienced increases in the 30 ft-lb and 50 ft-lb transition temperatures of 220°F and 255°F, respectively. This results in a 30 ft-lb transition temperature of 210°F and a 50 ft-lb transition temperature of 300°F.

Irradiation to  $1.48 \times 10^{19}$  n/cm<sup>2</sup> resulted in no decrease in the average upper shelf energy of Plate C4007-1 (transverse orientation) and a decrease of 18 ft-lb for the weld metal. This results in a weld metal average upper shelf energy of 51 ft-lb.

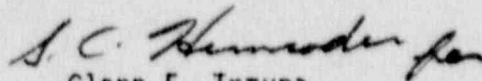
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- Comparison of the 30 ft-lb transition temperature increases for the Zion Unit 2 surveillance material with predicted increases using the methods of NRC Regulatory Guide 1.99, Revision 2, demonstrated that the Plate C4007-1 material and weld metal transition temperature increases were 31°F and 22°F, respectively, greater than predicted. NRC Regulatory Guide 1.99, Revision 2 requires a 2 sigma allowance, of 34°F for base metal and 56°F for weld metal, be added to the predicted reference transition temperature to obtain a conservative upper bound value. Thus, the reference transition temperature increases for Plate C4007-1 material and the weld metal are bounded by the 2 sigma allowance for shift prediction.

Please direct any further questions that you may have regarding this matter to this office.

Very truly yours,



Glenn E. Trzyna  
Nuclear Licensing Administrator

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cc: Chandu Patel - NRR (w/ enclosure)  
Senior Resident Inspector - Zion (w/o enclosure)