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November 22, 1989

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 1.48×10^{19} n/cm^2.

- Irradiation of the reactor vessel lower shell Plate C4007-1, to 1.48×10^{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 1.48×10^{19} n/cm^2 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 1.48×10^{19} n/cm^2 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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1/8

- 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,

S. C. Hunsader for

Glenn E. Trzyna
Nuclear Licensing Administrator

tlm/0342k:1-2

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