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AUTH.NAME AUTHOR AFFILIATION
PLUNKETT,T.F. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Endorses,for applicability to facilities,B&W0G Topical Rept BAW-2178P, "Low Upper-Shelf Toughness Fracture Mechanics Analysis of RVs of B&W Owners RV Working Group for Level C & D Svc Loads," submitted via 930309 ltr.

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APR 09 1993

L-93-88
10 CFR 50, Appendix G

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Low Upper-Shelf Toughness Fracture Mechanics Analysis of Reactor Vessels of Turkey Point Units 3 and 4 for Load Level C and D Conditions

The purpose of this letter is to endorse, for applicability to Turkey Point Units 3 and 4, the Babcock & Wilcox Owners Group (B&WOG) report BAW-2178P, "Low Upper-Shelf Toughness Fracture Mechanics Analysis of Reactor Vessels of B&W Owners Reactor Vessel Working Group for Level C & D Service Loads," submitted by B&WOG letter OG-1158 dated March 9, 1993, (J. H. Taylor to USNRC), in accordance with the requirements of 10 CFR 50 Appendix G, Section V.C.3.

Turkey Point Units 3 and 4 are predicted to drop below the 50 ft-lb Charpy upper shelf energy (USE) limit of 10 CFR 50 Appendix G prior to the end of the current full-term operating lives. In accordance with 10 CFR 50, Appendix G, FPL has, for Turkey Point Units 3 and 4:

* Performed, in 1991, a volumetric inspection of 100% of the reactor vessel critical beltline welds;

* Developed supplemental data, through the Babcock & Wilcox Owners Group (B&WOG) and is currently irradiating additional material; and

* Performed analyses which demonstrate adequate margin against brittle fracture.

By letter L-89-190 dated June 16, 1989, Florida Power and Light Company (FPL) proposed to incorporate the most recent developments in analytical techniques in the analysis of a low upper-shelf fracture toughness condition of the Turkey Point Units 3 and 4 reactor vessels. Analysis for load level A and B conditions was documented in the November 1991 BAW-2118P report, "Low Upper-Shelf Toughness Fracture Analysis of Reactor Vessels of Turkey Point Units 3 and 4 for Load Level A & B Conditions." FPL submitted this analysis to the NRC by FPL letter L-92-02, dated February 4, 1992. This analysis demonstrates adequate margin against brittle fracture for Units 3 and 4 for load level A and B conditions.

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The NRC further requested that an analysis for load level C & D conditions be performed. This analysis was performed as part of a B&WOG bounding analysis in the BAW-2178P report. The BAW-2178P report envelopes the Turkey Point Units 3 and 4 vessels and demonstrates adequate margin against brittle fracture for load level C and D conditions. A Turkey Point steam line break transient was evaluated under both level C & D criteria. The material properties used in the analysis were those of the Zion vessel with WF-70 Linde 80 material, oriented in a longitudinal direction. The Turkey Point circumferentially oriented SA 1101 Linde 80 material has consistently shown superior material properties than the WF-70 material.

The results of the analysis for the Turkey Point vessels were evaluated against the acceptance criteria for low upper-shelf fracture toughness analysis, developed by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI. The elastic-plastic fracture mechanics evaluation performed shows that the crack driving force applied is significantly lower than the material toughness at a crack extension of 0.1 inch, as specified by ASME Section XI. Also, the analysis results demonstrate that when the crack driving force is equal to the material toughness, crack growth is stable, as required by ASME Section XI. Additional loading margin exists since the Turkey Point vessels were fabricated using only circumferential welds in the beltline.

The analysis clearly shows that, although the upper-shelf energy of the Turkey Point vessels may drop below 50 ft-lbs, there will be adequate margin of safety against fracture through at least 40 years of operation. This completes the additional analysis requirements defined in 10 CFR 50, Appendix G, for Turkey Point Units 3 and 4.

Should there be any questions, please contact us.

Very truly yours,

T. F. Plunkett
Vice President
Turkey Point Nuclear

TFP/OIH

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC R. C. Butcher, Senior Resident Inspector, USNRC, Turkey Point Plant