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SUBJECT: Forwards description of util activities re fracture toughness requirements of 10CFR50, App G.

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JANUARY 31 1989

L-89-32

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

Gentlemen:

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Fracture Toughness Requirements

By letter dated May 4, 1988 (letter L-88-207) Florida Power & Light Company (FPL) provided its plan for complying with the fracture toughness requirements contained in 10 CFR 50, Appendix G, Section V.C, and discussed surveillance program change recommendations made by the NRC staff. The information was provided in response to an October 30, 1987 NRC letter which transmitted a safety evaluation of the FPL report, "Reactor Vessel Material Surveillance Program for Turkey Point Unit 3, Analysis of Capsule V."

We have discussed with your staff on several occasions FPL's continuing efforts to further define the materials properties of the Turkey Point Unit 3 and 4 reactor vessels. Utilizing information from our own surveillance program, other applicable industry data and NRC approved analytical techniques we have demonstrated significant margins of safety for both reactor vessels.

As you know, industry research in the fracture toughness area is continually evolving. FPL is actively involved in those efforts. We intend to use the results of this research to further define the Turkey Point reactor vessels' status as the results become available. A complete description of these activities as they apply to the requirements of Appendix G of 10 CFR 50 is attached. This information supersedes that provided in our May 4, 1988 submittal.

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Should there be any questions on this information, please contact us.

Very truly yours,


W. F. Conway
Senior Vice President - Nuclear

WFC/TCG/gp

Attachment

cc: Malcolm L. Ernst, Acting Regional Administrator,
Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant



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ATTACHMENT

FRACTURE TOUGHNESS REQUIREMENTS

COMPLIANCE WITH 10 CFR 50, APPENDIX G, SECTION V.C

Appendix G. Requirements

Section V.C. of Appendix G requires that when the Charpy upper shelf energy (USE) is predicted to be less than 50 ft.-lbs the following requirements be satisfied:

1. A volumetric examination of 100 percent of the beltline materials that are predicted to be less than 50 ft.-lb.
2. Additional evidence of the fracture toughness of the beltline materials after exposure to neutron irradiation is to be obtained from results of supplemental fracture toughness tests.
3. An analysis is performed that conservatively demonstrates, making appropriate allowances for all uncertainties, the existence of equivalent margin of safety for continued operation.

Turkey Point 3 & 4 meets these requirements with the following:

1. Volumetric Examination

The Turkey Point Unit 3 & 4 reactor vessels were examined in accordance with the ASME Boiler and Pressure Vessel Code 1974 Summer 75 Edition, modified by the requirements of Regulatory Guide 1.150.

Turkey Point Unit 3 was examined by Southwest Research Institute (SWRI) during July 1981 and the results were reported in SWRI Project No. 17-4352 report dated December 1981. The regulatory guide requirement to examine the clad base metal interface was accomplished by full vee path 45° examination. No recordable indications were detected.

Turkey Point Unit 4 was also examined by SWRI during November 1982 and the results were reported in SWRI Project No. 4520 report dated January 1983. The full vee path 45° examination was further enhanced by twin element 70° refracted longitudinal wave.

Both reactor vessels will be inspected again during the third period of the second inservice inspection interval which starts in February 1991.

2. Supplemental Fracture Toughness Data

FPL is actively pursuing sources of additional fracture toughness data. The following activities are designed to provide confirmation of the adequate toughness of the Turkey Point reactor vessels:

- The Heavy Section Steel Technology (HSST) program second and third irradiations supply the most immediately retrievable source of supplemental fracture toughness data. This data was used in our previous submittals on this subject. This is test reactor data, irradiated at various temperatures. EPRI is currently reviewing this data to determine its validity. FPL has been actively participating in the EPRI reactor vessel embrittlement task force efforts.
- The Turkey Point 3 & 4 reactor vessel was manufactured by the Babcock & Wilcox Company. FPL has joined with the Babcock and Wilcox Owner's Group (B&WOG) in a program which will supply fracture toughness data for end of life conditions.

Two surveillance capsules will be fabricated as part of this effort which will contain weld SA1101, the Turkey Point critical weld. One capsule will contain several (the exact number is not yet determined because of material quantity limitations) compact tension specimens fabricated from archival material. A second capsule will contain charpy specimens reconstituted from a Turkey Point surveillance capsule. Both capsules will be irradiated in a power reactor to a fluence of approximately 3×10^{19} n/cm². This data will not be available before 1998.

- FPL is planning to integrate its surveillance program with other Westinghouse plants with B & W vessels and the existing B&WOG plants. The details of this work will be published as a revision to B & W document BAW1543 scheduled to be published during the 2nd quarter of 1989.
- FPL did not test the wedge open loading fracture toughness specimens supplied in Turkey Point surveillance capsule V as part of the surveillance materials. These are available to be tested but the meaningfulness of results of these specimens is still being evaluated.
- FPL is planning to move the Turkey Point capsule X to a leading position as recommended by the NRC. This action is tentatively planned for the next reactor vessel examination outage when the internals are removed.

3. Analysis

As noted by NRC in their safety evaluation, FPL submitted analyses in 1984, and supplemented in 1986, which demonstrated significant margins of safety for continued operation. We have attended ASME working group on A-11 meetings and are keeping abreast of their work. We are aware of the status of the ongoing resolution process concerning J modified vs. J deformation usage in low upper shelf analysis.

In the interim, the analysis submitted demonstrates that the fracture toughness margin in the Turkey Point Unit 3 & 4 reactor vessels is adequate for continued safe operation.