Docket Nos. 50-250
and 50-251

April 26,1984

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Mr. J. W. Williams, Jr., Vice President
Nuclear Energy Department
Florida Power and Light Company
Post Office Box 14000
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Dear Mr. Williams:

SUBJECT: EVALUATION OF REACTOR VESSEL MATERIALS DATA FOR TURKEY POINT PLANT UNITS 3 AND 4 REACTOR VESSELS

By letter dated February 10, 1984, you provided a report which included a larger data base of information on the chemical composition of the reactor vessel welds for the Turkey Point, Units 3 and 4, reactor vessels than was previously available to the NRC staff. As a result of your evaluation of the data, you concluded that the $RT_{ndt}$ should be ±10°F without any standard deviation, Copper content equal to 0.26% and Nickel content equal to 0.60%.

The Component Integrity Section, Materials Engineering Branch, Division of Engineering has reviewed the report provided in the submittal referenced above. The staff has concluded, based on the enclosed Safety Evaluation, that the data base supports the above values and they are acceptable for screening criteria calculations for Pressurized Thermal Shock considerations for the Turkey Point Units 3 and 4, reactor vessels.

Sincerely,

ORIGINAL SIGNED BY

Steven A. Varga, Chief
Operating Reactors Branch #1
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

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J. W. Williams, Jr.
Florida Power and Light Company

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

## FLORIDA POWER AND LIGHT COMPANY

## TURKEY POINT UNIT NOS. 3 AND 4

## DOCKET NOS. 50-250 AND 50-251



## I. Introduction

In the reactor vessels for Turkey Point Units 3 and 4, made by the Babcock and Wilcox Company, the critical beltline circumferential welds were both identified as weld SA-1101. It was made using Page copper coated weld wire, heat number 71249 and Linde 80 flux lot number 8445. The original report on copper content from B & W, 0.21% copper, was disregarded in the Pressurized Thermal Shock (PTS) review, because those old values had been proven to be low in many cases. Instead, a value of 0.32% Cu was used, which was the average of 5 measurements on broken irradiated Charpy bars by Westinghouse. These had been reported to the NRC by FPL letter of Jan. 21, 1982 in their "150 day report" on PTS.

## II. Evaluation

Letter L-84-31 from FPL dated Feb. 10, 1984 presented the results of a total of 51 measurements of copper content, most of which were obtained from B & W following the release of proprietary data in July, 1983 and published as BAW 1799, "B & W 177-FA Reactor Vessel Beltline Weld Chemistry Study". The letter from FPL recommends that the mean of the 51 values - 0.26% Cu (standard deviation of 0.04%) - be used in future analyses. Similarly, there were 41 measured values of nickel content with a mean of 0.60% and a standard deviation of 0.04%.

In reviews of this kind, our practice has been to consider that the copper content is determined by the weld wire heat number and to use best estimate values of copper and nickel content in entering our tables for calculation of shift. This practice is being put in writing in Revision 2 of Reg. Guide 1.99, which goes on to state that the best estimate is the mean of the measured values for the weld wire heat number when these are available. Thus, the procedure proposed by FPL is satisfactory, provided all 51 values are of equal weight.

In addition to the 5 measurements reported by Westinghouse from surveillance work, there are two significant groups of data from BAW 1799. Nine measurements made on weld SA 1101 (Wire heat No. 71249), obtained from a nozzle dropout, yielded values ranging from 0.15 to 0.23% Cu, average of 0.18% Cu. Twenty-six measurements made on weld SA 1769 (Wire Heat No. 71249, but a different weld flux lot) gave a range 0.24 to 0.34% Cu, average of 0.28% Cu. An explanation for the difference, solicited from A. Lowe of B & W, is that it may reflect a difference in the amount of copper plating applied to different redraw bar lots from Wire Heat Number 71249. (Copper plating is applied while the material is in the form of ¼ inch diameter bars prior to drawing the wire). Or, the difference may reflect some difference in weld procedures used for the surveillance weld, from which the higher values came, and the nozzle shell course longitudinal weld from which the lower copper values came.

It is disconcerting to find two populations of copper content having means of 0.18 and 0.28% Cu represented by one weld wire heat number. In deciding what value to use for the welds in Turkey Point Units 3 and 4 the choice is between a grand average (0.26% Cu), or the average for the higher of the two populations (0.28% Cu.), or the value used in the PTS work (0.32% Cu). To put the decision in perspective, from Table I of proposed Reg. Guide 1.99 Rev. 2, we find that at these nickel and copper levels, 0.01% Cu is equivalent to about 4.0°F change in $RT_{NDT}$ at a fluence of slightly over $1 \times 10^{19}$ n/cm2 (E >/Mev), the current fluence level for these plants. Therefore by reducing the best estimate value of copper content from 0.32 to 0.26 we have reduced the calculated value of $RT_{NDT}$ by about 24°F. For comparison, the margin added to the mean, per the provision of proposed Revision 2 is 56°F.

III. Conclusion

To be consistent with the practice of using the mean of the measured values for the weld wire heat number, as written in Revision 2 of Reg. Guide 1.99, the staff accepts the mean value of 0.26% Cu. The corresponding nickel content is 0.60%. FPL also provides some measured values of initial reference temperature for weld SA 1101, obtained from an EPRI report. Following ASME Code rules, the initial $RT_{NDT}$ was found to be +10°F. The staff accepts this value.

Date: April 26, 1984

Principal Contributor:

P. Randall