Enclosure 1

SAFETY EVALUATION REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
H. B ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
MATERIAL PROPERTIES FOR FRACTURE TOUGHNESS REQUIREMENTS
FOR PROTECTION AGAINST PRESSURIZED THERMAL SHOCK EVENTS
10 CFR 50.61

1.0 BACKGROUND

In the February 4, 1986 submittal Carolina Power and Light (CP&L) identified the upper girth weld as the controlling material, which was (and still is) acceptable to the NRC. As the basis for the copper and nickel contents, the CP&L submittal cited two sets of measurements on the Robinson surveillance weld, which is reported to have been made from heat W5214, the same as the upper girth weld. However, this relationship was questioned by the staff because the reported copper content (0.34%) was higher than other published values for heat W5214 (average of 0.19% Cu) and the nickel content was reported to be 0.66%; whereas other published values for heat W5214 were around 1.0% Ni. Moreover, a CP&L submittal of June 29, 1984 to H. R. Denton concluded that the best-estimate chemistry for the Upper Girth weld was 0.17% Cu and 1.0% Ni.

By letter of August 26, 1986, the NRC staff requested that this inconsistency be resolved and the relationship of the Robinson 2 surveillance weld to the upper girth weld be more clearly established if CP&L wished to use the chemistry of the surveillance weld as that of the vessel weld. This they have done.

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2.0 REVIEW OF THE JANUARY 16, 1987 SUBMITTAL

By their presentation at a meeting on December 18, 1986, supported by an EPRI representative and one from Westinghouse, and by their submittal of January 16, 1987, CP&L has presented acceptable evidence that the H. B. Robinson surveillance material is indeed representative of the upper girth weld. All of the welds made with wire heat W5214 considered in this analysis had nickel added by "cold feeding" a pure nickel wire into the weld puddle formed by an arc at the W5214 feed wire. A distinguishing feature of the surveillance weld and the upper girth weld is the use of a single-arc process, whereas (with one exception) the other W5214 welds used a tandem primary electrode feed and certain other changes in the welding parameters that gave lower predicted nickel content for the single-arc welds.

The inconsistency in copper content was credited to variation from spool to spool of the copper plating thickness on the weld wire. CP&L believes "... the surveillance weld copper content is considered conservative since it is apparently representative of the upper range of the variability within this family of RACO-3 weld wires." The staff agrees with this assessment.

Finally, CP&L presented detailed evidence on the HBR surveillance weld traceability, linking it with the vessel fabrication history through the unique set of characteristics of the pieces of plate that were welded

together to form the surveillance weld: thickness - 20.75 in., steel type - low, nickel 302-A, and the vessel plate identification numbers. Shop travelers, shipping records and weld inspection records were found to form a documentation record that also argued against a mixup in the identification of the surveillance weld when specimens were prepared.

3.0 CONCLUSION

The controlling beltline material from the standpoint of PTS susceptibility was identified to be the upper circumferential weld, weld 10-273, (weld wire heat No. W5214 plus Ni 200 made by the single arc process).

The material properties of the controlling material and the associated margin and chemistry factor were reported to be:

		Utility Submittal	Staff Evaluation
Cu (copper content, %)	=	0.34	0.34
Ni (nickel content, %)	=	0.66	0.66
I (Initial RT_{NDT}, °F)	=	-56	-56
M (Margin °F)	=	59	59
CF (Chemistry Factor, °F)	=	--	228. 3

The controlling material has been properly identified. The justifications given for copper and nickel contents and the initial RT_{NDT} are acceptable. The margin has been derived from consideration of the bases for these values, following the PTS Rule, Section 50.61 of 10 CFR Part 50. Assuming that the reported values of fluence are correct, Equation 1 of the PTS rule governs, and the chemistry factor is as shown above.