August 26, 1986

Docket No. 50-261

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Mr. E.E. Utley, Senior Executive Vice President
Power Supply and Engineering & Construction
Carolina Power and Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

Dear Mr. Utley:

SUBJECT: 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 (TAC NO. 59977)

We have completed our review of your submittal for acceptability of reported reactor vessel material properties dated February 4, 1986. We conclude that the reported chemical composition of the controlling material, the upper girth weld, is inconsistent with a previous submittal and is not justified by the information supplied to us. The heart of the issue discussed in the attachment to this letter is: Can the material in the Robinson surveillance capsule be considered representative of the upper girth weld in the vessel? The PTS submittal from you says that it is representative, but an earlier submittal dated June 29, 1984 says it is not. The attachment to this letter gives the staff's summary of the conflicting evidence.

The discrepancy does not affect the outcome of this PTS review in a significant way because H. B. Robinson 2 will meet the screening criteria using either chemical composition to calculate RT_{PTS}. The issue is important, however, because it affects the applicability of the Robinson surveillance data to the calculation of pressure-temperature limits. It is also important that the NRC be consistent in the copper and nickel contents it accepts in its PTS review for different plants that have the same weld wire heat number represented in their beltline materials.

Please have your staff review the enclosure and resolve the materials properties discrepancy between your PTS submittal dated February 4, 1986, and

your letter dated June 29, 1984, by a date mutually agreed upon with your project manager.

Our staff is available for meetings or discussions regarding this subject.

Sincerely,

/s/

Glode Requa, Project Manager
Project Directorate No. 2
Division of PWR Licensing-A
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
See next page

PWR-A:PAD#2	PWR-A:PAD#2	PWR-A:PAD#2
DMiller	GRequa	LRubenstein
8/26/86	8/26/86	8/26/86

REQUEST FOR INFORMATION 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
TAC NO. 59977

The controlling beltline material from the standpoint of PTS susceptibility was identified to be the upper circumferential weld, Weld 10-273 (Weld wire heat number W5214, plus Ni 200).

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	See below
Ni (nickel content, %)	=	0.66	
I (Initial RT_{NDT}, °F)	=	-56	
M (Margin, °F)	=	34	
CF (Chemistry Factor, °F)	=	--	

Discussion

The controlling material has been properly identified but the justifications given for the copper and nickel contents are not acceptable. As the basis for the copper and nickel contents, the CP&L submittal cites 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, an EPRI report* shows the Robinson surveillance weld has significantly higher copper and lower nickel than five other welds made with wire heat No. W5214 (some 22 measurements in all).

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* T. Marston et al, "Robinson 2 Reactor Vessel: Pressurized Thermal Shock Analysis for a Small Break LOCA." EPRINP-35735R, August 1984.

Moreover, a CP&L submittal of June 29, 1984 to H. R. Denton concluded that the best-estimate chemistry for the Upper Girth weld is 0.17% Cu and 1.0% Ni based on the following summary:

Upper Girth Weld

"The HBR2 upper girth welds is in a relatively low neutron flux area and has never been considered to be the limiting weld from a PTS standpoint. Carolina Power & Light Company examined the records of a number of Heat W5214, RACO 3 and Ni200 welds. Additionally, CP&L was able to sample and analyze a portion of the Millstone 1 surveillance weld which is also a W5214 weld. Finally CP&L took chip samples from the Torus to Flange weld on the HBR2 Reactor Vessel head which is also a Heat W5214 and Ni200 weld. The results from these investigations are shown below:

Source	% Cu	% Ni
Historical Records	.18	1.0
Millstone 1 Surveillance Weld	.19	.98
HBR2 Head Sample	.17	1.0

Based on the above, CP&L believes that the best estimate of the weld chemistry for the upper girth weld is a copper content of .17% and a nickel content of 1.0%.

It must be noted that these results do not coincide with measurements taken from the HBR2 surveillance weld which is also a W5214 weld. Carolina Power & Light Company believes that the above results represent the best chemistry. Even if the conservative results of the surveillance weld are utilized, however, HBR2 will not reach the PTS screening criteria during its design lifetime."

At a meeting on April 30, 1986 CP&L reported some more historical information. The upper girth weld in the vessel and the surveillance weld were both made in the time period Sept. - Oct. 1966, and the weld inspector's reports showed the same weld wire heat numbers (W5214 plus Ni200) recorded for both welds. Apparently there were no chemical analyses of the surveillance weld by Combustion Engineering, the vessel fabricators. The date on the chemical analysis obtained by Westinghouse, the NSSS vendor, was Nov. 14, 1973, seven years after the weld was made and more than two years after the surveillance capsules were prepared. A recheck of the chemical analysis performed on the broken Charpy bars from the surveillance program confirmed the analysis done in 1973.

CONCLUSIONS

1. The upper girth weld in the H. B. Robinson 2 vessel was made with weld wire heat No. W5214, plus Ni200, as shown on the inspector's report.

2. The composition of the Robinson surveillance weld, reportedly made with weld wire from heat W5214, plus Ni200, is approximately 0.34% copper and 0.66% nickel.

3. The composition of other welds made with W5214, plus Ni200, wire has been measured on several occasions with results averaging slightly under 0.20% copper and slightly over 1.0% nickel. Four of these measurements were made on chips taken from four locations on the outer surface of a weld in the head of the Robinson vessel.

4. It follows from conclusions 2 and 3 and other evidence as well that the probability that the material in the Robinson surveillance capsules is representative of the upper girth weld is small.

5. The utility should be asked to resolve the discrepancy between their PTS submittal and the letter of June 29, 1984. The discrepancy does not affect the outcome of this PTS review in a significant way. H. B. Robinson 2 will meet the screening criteria using either chemical composition to calculate RT_{PTS}. The discrepancy is important, however, because it affects the applicability of the Robinson surveillance data to the calculation of pressure-temperature limits. It is also important that the NRC be consistent in the copper and nickel contents it accepts in its PTS review for different plants that have the same weld wire heat number represented in their beltline materials.