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 FACIL: 50-261 H.B. Robinson Plant, Unit 2, Carolina Power & Light Co. 05000261
 AUTH. NAME: AUTHOR AFFILIATION
 CUTTER, A.B. Carolina Power & Light Co.
 RECIP. NAME: RECIPIENT AFFILIATION
 VARGA, S.A. Operating Reactors Branch 1

SUBJECT: Informs that efforts underway w/Exxon to develop long-term solution for error in T00DEE2 calculation portion of 10CFR50.46 LOCA analysis for Cycle 10. NRC will be advised of schedule when available.

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Carolina Power & Light Company

OCT 0 8 1985

SERIAL: NLS-85-363

Director of Nuclear Reactor Regulation
Attention: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
United States Nuclear Regulatory Commission
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
RECENT ERROR IN EXXON FUEL CALCULATIONS

Dear Mr. Varga:

Late Saturday night, September 28, 1985, Exxon Nuclear Company (Exxon) informed Carolina Power & Light Company that an error had been made in the 10 CFR 50.46 Loss of Coolant Accident (LOCA) analysis for Cycle 10. The error was in the TOODEE2 (heatup) calculation portion of the analysis. New TOODEE2 analyses have been performed and quality assurances applied to show that a reduction in peaking (F_Q) from 2.32 to 2.13 (~8 percent) insures that the peak clad temperature remains below 2200°F. The error was reported by Exxon as a 10 CFR 21 reportable event to Region V. A copy of Exxon's report is attached for your information.

This error resulted in H. B. Robinson Unit 2 operating outside the range covered by analysis and having a Technical Specification limit unsupported by analysis. After the plant was informed, it was determined the appropriate action was to administratively reduce power by 8 percent, reduce the allowable F_Q to 2.13, and reduce the high flux trips by 8 percent. Incore flux maps subsequent to the power reduction verified F_Q to be below the administratively reduced power dependent limit. The changes to the setting and parameters will ensure that no regulatory or safety limits are violated.

The specific error in TOODEE2, which calculates fuel heatup (hot rod) from the end of LOCA blowdown until the core thermal transient is terminated, was the failure to include decay heat in the outer ring of eight radial nodes of the fuel pellet which resulted in the peak clad temperature being under-predicted. The results of calculations with and without the error are shown in Table 1 and the results with $F_Q = 2.13$ in Table 2. Exxon's recommendation for an allowable K(Z) curve is shown in Table 3 and H. B. Robinson will not exceed those recommendations. No credit is taken for the reduced F_Q in the blowdown portion of the transient which would result in even lower temperatures.

Efforts are underway with Exxon to develop a long term solution to this situation. We will advise you of the schedule when it becomes available.

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Questions regarding this matter may be referred to Mr. Stephen D. Floyd at
(919) 836-6901.

Yours very truly,



A. B. Cutter - Vice President
Nuclear Engineering & Licensing

ABC/JSK/ccc (2009JSK)
Attachment

cc: Dr. J. Nelson Grace (NRC-RII)
Mr. G. Requa (NRC)
Mr. H. Krug (NRC Resident Inspector - RNP)

A. B. Cutter, having been first duly sworn, did depose and say that the information contained herein is true and correct to the best of his information, knowledge and belief; and the sources of his information are officers, employees, contractors, and agents of Carolina Power & Light Company.

Notary (Seal)
My commission expires: 11/27/89

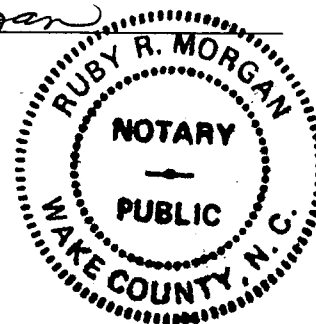
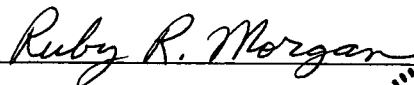


TABLE 1
H. B. ROBINSON UNIT 2 ERROR IN TOODEE 2 INPUT;
ROD RADIAL POWER DISTRIBUTION

<u>Case Description</u> <u>(Exposure/Power Shape)</u>	<u>Previous Peak Clad</u> <u>Temperature</u> <u>(°F)</u>	<u>Corrected Peak Clad</u> <u>Temperature</u> <u>(°F)</u>
BOL/Cosine	2042	> 2200
9 MWD/kg/Cosine	1815	1923
EOL/Cosine	1785	1888
BOL/Top Peaked	2197	> 2200
9 MWD/kg/Top Peaked	2183	> 2200

TABLE 2
H. B. ROBINSON UNIT 2 REANALYSIS WITH $F_Q=2.13$
IN TOODEE2 CALCULATION

<u>Case Description</u> <u>(Exposure/Power Shape)</u>	<u>Peak Clad Temperature</u> <u>(°F)</u>
BOL/Cosine	2064
BOL/Top Peaked	2195
9 MWD/kg/Top Peaked	2187

TABLE 3
H. B. ROBINSON UNIT 2 LOCA/ECCS LIMITS

<u>0 to 9 MWD/kg</u> <u>Peak Rod Average Exposure</u>			<u>9 to 49 MWD/kg</u> <u>Peak Rod Average Exposure</u>		
<u>X/L</u>	<u>$F_Q(Z)$</u>	<u>K(Z)</u>	<u>X/L</u>	<u>$F_Q(Z)$</u>	<u>K(Z)</u>
0.000	2.130	1.000	0.000	2.320	1.000
0.500	2.130	1.000	0.500	2.320	1.000
0.916	1.690	0.793	0.916	1.726	0.744
1.000	0.835	0.392	1.000	0.835	0.360