NRC FORM 195 (2-76) — U.S. NUCLEAR REGULATORY COMMISSION

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TO:	ROBERT W. REID
FROM:	H.B. ROBINSON E.E.UTLEY
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DESCRIPTION Ltr. re ltr from D.F. Ross to W.S. Nachodom dtd 11/23/76, and rpt (XN-76-54), dtd December'76 trans the following:

ENCLOSURE Consisting of table 1, furnishing HB Robinson increase Fission Gas LOCA results.

(40 cys rec'd)

PLANT NAME: H. B. Robinson

FOR ACTION/INFORMATION

SAFETY		ENVIRO
ASSIGNED AD:		ASSIGNED AD:
✓ BRANCH CHIEF:	Reid	BRANCH CHIEF:
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	MIPC		MACARRY		KIRKWOOD		ERNST
	CASE		BOSNAK				BALLARD
	HANAUER		SIHWEIL		OPERATING REACTORS		YOUNGBLOOD
	HARLESS		PAWLICKI		STELLO		
							SITE TECH.
	PROJECT MANAGEMENT		REACTOR SAFETY		OPERATING TECH.		GAMMILL
	BOYD	✓	ROSS	✓	EISENHUT		STEPP
	P. COLLINS	✓	NOVAK	✓	SHAO		HULMAN
	HOUSTON	✓	ROSZTOCZY	✓	BAER		
	PETERSON		CHECK	✓	BUTLER		SITE ANALYSIS
	MELTZ			✓	GRIMES		VOLLMER
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NRC FORM 195 (2-76)

CP&L
Carolina Power & Light Company

March 3, 1977

FILE: NG-3514(R) SERIAL: NG-77-237

Director of Nuclear Reactor Regulation
ATTN: Robert W. Reid, Chief
Operating Reactors Branch 4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT UNIT NO. 2
DOCKET NO. 50-261
FACILITY OPERATING LICENSE NO. DPR-23
EFFECTS OF INCREASED FISSION GAS RELEASES

Reference: (1) Letter from D. F. Ross (NRC) to W. S. Nachodom (ENC) dated November 23, 1976

(2) "LOCA Analysis for H. B. Robinson Unit No. 2 Using WREM Based PWR ECCS Evaluation Model with Reduced LPSI Flow, Steam Generator Plugging, and Increased Upper Head Temperature," XN-76-54, December, 1976

Dear Mr. Reid:

Your letter of November 29, 1976, requested information on the impact of a new fission gas release model on fuel design limits. Our response of December 31, 1976, provided information for the fuel supplied by the Westinghouse Electric Corporation, which is the only fuel in the unit which will have achieved a burnup of more than 20,000 MWD/MTU by June 1, 1977. The fuel supplied by the Exxon Nuclear Corporation has not yet achieved 20,000 MWD/MTU but will reach this burnup by the end of the current cycle. This letter provides the requested data for the Exxon Nuclear supplied fuel.

The impact of additional fission gas release after 20,000 MWD/MTU burnup has been investigated. This investigation was conducted for the H. B. Robinson Unit 2 15x15 fuel supplied by Exxon Nuclear using the NRC approved PWR fuel densification model with modifications to incorporate the fission gas release formula specified in Reference 1. The revised analysis uses a history which envelopes the power limits given in Reference 2. With the revised release formula, a peak pin pressure of 1855 psia is calculated, compared to 1445 psia with the present model. The maximum fission gas release fraction is calculated to be 0.24 with the revised model, compared to .05 with the present model.

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In both analyses, the fuel pellet-to-clad gap is closed for the power levels and exposures (>20,000 MWD/MTU); hence, fuel average temperatures were found to be very nearly the same for the same LHGR and exposure (less than 70°F increase due to the fission gas release model revision was calculated). It is also observed that pin pressure at end-of-life (EOL) did not exceed the system operating pressure.

To determine the LOCA impact of the increased fission gas release, a heatup calculation was performed. The blowdown and reflood boundary conditions were obtained from the limiting break (0.8 DECLG) as reported in Reference 2. RELAP4/HOTCHANNEL and TOODEE2/HOT ROD calculations were performed using the calculated exposed fuel geometry, fission gas inventory and stored energy. The limiting LOCA conditions were found to be those corresponding to beginning of life (BOL). Table 1 shows the BOL LOCA results as compared to the EOL results where the effect of the fission gas release model has maximum impact. Since the BOL LOCA results are still controlling, the new fission gas model has no impact on any of the plant safety analyses for this fuel.

Yours very truly,

E. E. Utley
Senior Vice President
Power Supply

CSB/MFP/dkm
Attachment

TABLE 1

H. B. ROBINSON INCREASE FISSION GAS LOCA RESULTS

	BOL	EOL
Peak Cladding Temperature, °F	2152	1885
Peak Temperature Location, ft	6.375	7.125
Time of PCT (sec)	123.5	129.5
Local Zr/H_wO Reaction (Max.), %	7.89	1.52
Local Zr/H_2O Location, ft	6.125	6.125
Total Zr/H_2O	<1%	<1%
Hot Rod Burst Time, sec	46.66	44.44
Hot Rod Burst Location, ft	6.125	6.125