		· · ·			·	yr.)
VRC FORM 195 2-76)	<b>.</b>	U.S. NUC	LEAR	REGULATORY COLOUISSION	م 5	скет NUMBER <b>0-261</b>
NRC DISTRIBU	TION FOR PAR	T 50 DOCKET N	ΙΑΤΕΙ	RIAL	FIL	ENUMBER
		ERONA: OD C T				
O: R. W. Reid	Raleigh, N.C. 27602				12-2-76	
	E.E. Utley		DATE RECEIVED 12-3-76			
	PROP		INPUT FORM	NUMBER OF COPIES RECEIVED		
DEORIGINAL BUNC	LASSIFIED		<b>.</b>			3 signed 37 CC
ESCRIPTION Ltr notariz	ed 12-2-76 re	their 11-17	ENCLO	SURE Amdt to Atta	chme	nt 1 of J.A. Jones
6 submittaltrans t	he following:		to	R.W. Reid Ltr dat	ed 1	1-17-76 re ECCS
	4		Ree	evaluation	•	•*
		· · · ·	,			
SAME DISTRICTION AS	11-17-76 STIRM	TTTAT ON	(4	) cys encl rec'd)	•	•
MATI. CONTROL 11743	11-17-70 SOBM		•		· .	. ,
		• *	•			
	· * ·					
	•		•		• •	Do Not Remove
· · · ·	•			· · ·		and a second
·	· . ·		۴.,	¥-		
PLANT NAME: H.B. ROBI	nson Plant			· · · ·	•	ACTINI FUBED
				· · · ·		MANUMAN
· · ·	•		· •.	· · · ·		
	•	•	•		•	•
•	· · ·			· · · · · · · · · · · · · · · · · · ·	•	
SAFETY		FOR ACTION/	NFOR	MATION ENVIRO	DH	L 12-4-76
ASSIGNED AD:	1 0			ASSIGNED AR:		
BRANCH CHIEF:	N KEI			BRANCH_CHIEF:		· · ·
PROJECT MANAGER:	- 6 we	72.9		PROJECT MANAGER:		
LIC. ASST.			<u></u>	LIC, ASSI, ;	····	<b></b>
		INTERNAL D	ISTRIE	BUTION		
REG FILE	SYSTEM	S SAFETY		PLANT SYSTEMS		SITE SAFETY &
NRC PDR	HEINEM	AN	X	TEDESCO		ENVIRO ANALYSIS
I&E <b>2</b>	SCHROEI	DER		BENAROYA		DENTON & MULLER
OELD			<b>X</b>	LAINAS	·	·
GOSSICK & STAFF	ENGINE	ERING		IPPOLITO		ENVIRO TECH.
MIPU	MACARR	<u>Y</u>		KIRKWOOD		BATTAPD
INANAUER	KNIGHT	r		OPERATING REACTORS		SPANGLER
HARLESS	DALIT TO	ы КТ		STELLO		
				· · · · ·		SITE TECH.
PROJECT MANAGEMENT	REACTO	R SAFETY		OPERATING TECH.		GAMMILL
BOYD	ROSS		X	EISENHUT		STEPP
P. COLLINS	NOVAK			SHAO		HULMAN
HOUSTON	ROSZTO	CZY		BAER		
PETERSON	CHECK			BUTLER	·	SITE ANALYSIS
MELTZ			· .	GRIMES		VOLLMER
HELTEMES	AT & I		<b> </b>			BUNCH
SKOVHOLT	SALTZM	<u>AN</u>				J. COLLERS
	RUTBER	UNSTRUCTOR	l			CONTROL NUMBER
Hartville, S.	CL STAR TAN		,	DOUTIANED STATE YA	_   _	
TTC.	DRC U TI	01	<b>!</b>	HAUNNAYEN NAL LA	LL a	T
INSIC:			├ <u></u>	MALINDON LONNEL		12252
ASLB:	CONSIL T	ANTS .	<u>  </u>			ECCC)
ACRS ACYS	VEENT CA	4. R				L
						t. -

NIC FORM 198 (2.78)

·

•



Dear Mr. Reid:

On November, 17, 1976, Carolina Power & Light Company (CP&L) submitted a partial response to the Order for Modification of License transmitted by your letter of August 27, 1976. Our letter contained the analyses for the Westinghouse fuel contained in H. B. Robinson Unit 2 and a summary of the analyses applicable to the Exxon fuel contained in the H. B. Robinson Plant. With this letter, CP&L formally submits the remainder of the information necessary to comply with the August 27, 1976, Order.

A modification to the Westinghouse analyses submitted in our November 17, 1976, letter is presented in Attachment 1. This modification was made to incorporate the Westinghouse break spectrum sensitivity study using the hot leg temperature ("Westinghouse ECCS Three Loop Plant [17x17] Sensitivity Studies," WCAP-8853, September, 1976 [Non-Proprietary]) as the method for determining the limiting break for H. B. Robinson.

On December 1, 1976, Exxon Report XN-76-54 was delivered to Mr. G. B. Zwetzig of your staff. This document contains the H. B. Robinson ECCS analyses required for compliance with the August 27, 1976, order. To expedite the NRC review of the information presented in this document, the Company hereby incorporates the report delivered to Mr. Zwetzig as an attachment to this letter and authorizes the Staff to make the assessments of the ECCS analyses based on that document. A complete transmittal of this report with forty (40) copies and three (3) originals as required by Commission regulations will be submitted when sufficient copies are available.

In the final phases of the review of material necessary to comply with the August 27, 1976 order, the Staff indicated that for the Exxon analysis, use of vessel outlet temperature for the upper vessel head temperature had not been established to be the conservative temperature. Additional information was requested on the effects of lower temperatures in the upper vessel head on the peak clad temperature (PCT). Exxon Nuclear Corporation provided a sensitivity study on the effects of lower temperatures of the upper vessel head on PCT for the D. C. Cook docket. This information is addressed in a letter from Mr. G. F. Owsley of Exxon Nuclear to Mr. D. L. Ziemann of the NRC dated November 30, 1976. The information on this subject contained in the attachment to that letter will provide the Staff with the information necessary to evaluate the effects of temperature of the upper vessel head on PCT.

It is our understanding that this submittal and the submittal of November 17, 1976, provide the necessary information to allow the Staff to complete their evaluation of the ECCS analysis submitted in compliance with the Order for Modification of License of August 27, 1976.

As required by Commission regulations, this submittal is signed under oath by a duly authorized officer of the Company.

Yours very truly, É. Utley

Jranklin M. Notary Public

Vice President Bulk Power Supply

MFP/dkm Attachments

Sworn to and subscribed before me this 2nd day of December, 1976.



My Commission Expires October 4, 1981

- 2 -

Regulatory Docket File



AMENDMENT TO ATTACHMENT 1 OF J. A. JONES TO R. W. REID LETTER DATED NOVEMBER 17, 1976 - 5 -

Figure 16

This figure provides the containment wall condensing heat transfer coefficient for the limiting case break.

In addition to the above, Tables 4 and 5 present reflood mass and energy release to the containment and the broken loop accumulator mass and energy flowrate to the containment, respectively.

The clad temperature analysis is based on a total peaking factor of 2.30. The analysis presented in this section was performed with a reactor vessel upperhead temperature equal to the RCS hot leg temperature. The effect of using the hot leg temperature in the reactor vessel upperhead is described in Reference (13). A break spectrum sensitivity study using the hot leg temperature is presented in Reference (15). The three cases were analyzed with 6% uniform steam generator tube plugging. The hot spot metal water reaction reached is 4.14%, which is well below the embrittlement limit of 17 percent, as required by 10CFR50.46. In addition, the total core metal-water reaction is less than 0.3 percent for all breaks as compared with the 1 percent criterion of 10CFR50.46.

The results of several sensitivity studies are reported in Reference (9). These results are for conditions which are not limiting in nature and hence are reported on a generic basis.

## 4.0 Conclusions - Thermal Analysis

For breaks up to and including the double ended severance of a reactor coolant pipe, the Emergency Core Cooling System will meet the Acceptance Criteria as presented in 10CFR50.46. That is:

- 1. The calculated peak fuel element clad temperature provides margin to the requirement of 2200°F, based on an  $F_0$  value of 2.30.
- The amount of fuel element cladding that reacts chemically with water or steam does not exceed 1 percent of the total amount of Zircaloy in the reactor.
- 3. The clad temperature transient is terminated at a time when the core geometry is still amenable to cooling. The clad oxidation limits of 17% are not exceeded during or after quenching.

Revised: December 2, 1976 (J. A. Jones to R. W. Reid letter dated November 17, 1976)

- Bordelon, F. M., et al., "Westinghouse ECCS Evaluation Model -Supplementary Information," WCAP-8471, April, 1975, (Proprietary) and WCAP-8472, April, 1975 (Non-Proprietary).
- Salvatori, R., "Westinghouse ECCS Plant Sensitivity Studies," WCAP-8340, July, 1974 (Proprietary) and WCAP-8356, July, 1974 (Non-Proprietary).
- 10. Buterbaugh, T. L., Julian, H. V., and Tome, A. E., "Westinghouse ECCS Three Loop Plant (17 x 17) Sensitivity Studies," WCAP-8572-P, (Proprietary) and WCAP-8573-NP (Non-Proprietary).
- 11. "Westinghouse ECCS Evaluation Model October 1975 Version," WCAP-8622, November, 1975, (Proprietary) and WCAP-8623, November, 1975, (Non-Proprietary).
- Letter from C. Eicheldinger of Westinghouse Electric Corporation to
  D. B. Vassallo of the Nuclear Regulatory Commission, Letter Number NS-CE-92, dated January 23, 1976.
- Letter from C. Eicheldinger of Westinghouse Electric Corporation to
  V. Stello of the Nuclear Regulatory Commission, Letter Number NS-CE-1163, dated August 13, 1976.
- 14. R. Solvatory, "Westinghouse Emergency Core Cooling System Evaluation Model - Sensitivity Studies," WCAP-8341, July, 1974 (Proprietary) and WCAP-8342, July, 1974 (Non-Proprietary).
- 15. Julian, H. V., Tabone, C. J., and Thompson, C. M., "Westinghouse ECCS -Three Loop Plant (17 x 17) Sensitivity Studies," WCAP-8853, September, 1976 (Non-Proprietary).

6.0 The purpose of the Reference 15 sensitivity study is to show that changing the upperhead water temperature does not change the limiting break type and location which is a double ended cold leg guillotine for a three loop plant. The three loop plant configuration used for this sensitivity study is sufficiently similar to the H. B. Robinson plant to assure that the limiting break is identified. The main difference between the plant configurations are fuel design, steam generator design, power level, vessel internals, and ECC system design. These differences do not change the basic effect resulting from higher upperhead temperature, that being the flash of water at the hot leg saturation pressure rather than the cold leg saturation pressure. In addition, all sensitivity studies (References 9, 10, and 15) performed for three loop plants have been consistent in verifying this limiting break type and location for Westinghouse plants whose designs reflect the differences noted between reference 15 and the H. B. Robinson Plant.