Duke Energy

Duke Energy Corporation
526 South Church Street
P.O. Box 1006
Charlotte, NC 28201-1006

May 19, 2003

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-001
Attention: Document Control Desk

Subject: Duke Energy Corporation
Oconee Nuclear Station, Units 1, 2, and 3
Docket Numbers 50-269, 50-270, and 50-287

Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model

References: 1) Letter, L. W. Barnett (USNRC) to J. F. Malloy (FANP), "Safety Evaluation of Framatome Technologies Topical Report BAW-10164-P, Revision 4 - RELAP5/MOD2-B&W, An Advanced Computer Program for Light Water Reactor LOCA and Non-LOCA Transient Analyses," April 9, 2002.

2) Letter, M. S. Tuckman (DEC) to USNRC, "Report Pursuant to 10 CFR 50.46, Error Related to Application of the LBLOCA Evaluation Model", May 31, 2002.

10 CFR 50.46 (a)(3)(ii) requires the reporting of changes to or errors in ECCS evaluation models (EM). This report covers the time period from January 1, 2002 to December 31, 2002.

During this time period, there were three changes made to the evaluation model or in the application of the model. Only one change had an impact on the calculated peak cladding temperatures (PCTs) and is classified as an insignificant change (ΔPCT < 50°F). This change is related to the implementation of the void-dependent cross-flow model used in the Small Break LOCA (SBLOCA) analysis which was approved by the NRC in Reference 1.

A001

Included in this report are three summary tables. Table 1 provides the changes/errors for which a PCT impact has been assessed. Table 2 presents changes/errors for which no PCT impact has been assessed. Table 3 provides a summary of the peak cladding temperatures for all three units.

Please address any comments or questions regarding this matter to J. S. Warren at (704) 382-4986.

Very truly yours,

W. R. McCollum, Jr.
Senior Vice President, Nuclear Support

Attachments

xc:

L. A. Reyes
U. S. Nuclear Regulatory Commission
Regional Administrator, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303-8931

L. N. Olshan (Addressee Only)
NRC Senior Project Manager (ONS)
U. S. Nuclear Regulatory Commission
Mail Stop O-8 H12
Washington, DC 20555-0001

Mr. M. C. Shannon
Senior Resident Inspector
Oconee Nuclear Station

Table 1

Errors/Evaluation Model Changes with PCT Impact

Implementation of the Void-Dependent Cross-Flow Model

The previous core cross-flow model provides flow coefficients between the hot channel and the average channel. The coefficients are fixed-valued, but specific to the flow location (above and below the mixture level) and the flow direction. The values of the coefficients were determined by the analyst's assessment of the time variance of the fluid conditions in the channels. The revised model adds a void-dependent transition zone (which varies in elevation with the time-dependent change in core mixture level) to interpolate the coefficient. The interpolation of the time and level dependent fluid conditions is automated, avoiding the possible inconsistencies introduced by different interpretations between analysts. The revised model was submitted to the NRC and approved in Reference 1. The PCT impact for this change was determined to be -12°F for the full power SBLOCA case and 0°F for the reduced power (50% FP) SBLOCA case.

Table 2

Errors/Evaluation Model Changes with no PCT Impact

Large Break LOCA (LBLOCA) Automation of the BEACH Blockage Limitation

The approved version of the BEACH methodology contains a credited flow blockage limitation of 60 percent, which is implemented by the analyst inspecting the results. A change was made to automate this limit in the BEACH coding. This automation is more convenient and makes implementation of the limitation and calculated results more reliable and consistent. This change was submitted to the NRC and approved in Reference 1. The nature of this change leads to an estimated PCT impact of 0°F.

Fuel Surface Roughness Change

A new common product specification for UO_2 pellets was developed to streamline the Lynchburg and Richland manufacturing practices. This new specification is being applied to all new batches of Mark-B11 fuel. The new specification results in a smaller fuel surface roughness. The current Oconee Mark-B11 LBLOCA and SBLOCA calculations were evaluated and determined to be applicable to the new specification. Therefore, the PCT impact of the change in the fuel surface roughness specification is estimated to be 0°F.

Table 3

Peak Cladding Temperature Summary - Oconee Units 1, 2 & 3

LBLOCA	PCT(°F)	Comments
Evaluation model: RELAP5/MOD2-B&W		
Analysis of record PCT	2037 2050	Mark-B11 (M5), 16.8 kW/ft At 6.021 ft elevation Mark-B10T, 16.8 kW/ft At 4.264 ft elevation
Prior errors (ΔPCT) 1. None	0	
Prior evaluation model changes (ΔPCT) 1. None	0	
Errors (ΔPCT) 1. None	0	
Evaluation model changes (ΔPCT) 1. None	0	
Absolute value of errors/changes for this report (ΔPCT)	0	
Net change in PCT for this report	0	
Final PCT	2037 2050	Mark-B11 Mark-B10T
SBLOCA	**PCT(°F)**	**Comments**
Evaluation model: RELAP5/MOD2-B&W		
Analysis of record PCT	1369	Full Power 0.15 ft^2 break
Prior errors (ΔPCT) 1. Change from min to max CFT level 2. SG primary tube region drag model input error 3. Limiting RCP type & two-phase degradation model(PSC 1-99) 4. RELAP5 water property and Unix operating system	 43 -14 -5 -25	 Reference 2[1] Reference 2 Reference 2 Reference 2
Prior evaluation model changes (ΔPCT) 1. None	0	
Errors (ΔPCT) 1. None	0	
Evaluation model changes (ΔPCT) 1. Implementation of void-dependent cross flow model	-12	PCT determined by analysis

Table 3 (Continued)

Peak Cladding Temperature Summary - Oconee Units 1, 2 & 3

SBLOCA	PCT(°F)	Comments
Absolute value of errors/changes for this report (ΔPCT)	12	
Net change in PCT for this report	-12	
Final PCT	1356	
Analysis of record PCT	1261	Reduced Power - 50% FP (1 HPI case) 0.06 ft^2 break
Prior errors (ΔPCT) 1. None	0	
Prior evaluation model changes (ΔPCT) 1. None	0	
Errors (ΔPCT) 1. None	0	
Evaluation model changes (ΔPCT) 1. Implementation of void-dependent cross flow model	0	PCT determined by analysis
Absolute value of errors/changes for this report (ΔPCT)	0	
Net change in PCT for this report	0	
Final PCT	1261	

(1) In Reference 2 this PCT change was listed as an estimate since it was based on calculations using a model that was under review (void-dependent cross-flow model). Given that this model is now approved, the ΔPCT value is no longer considered an estimate.

bxc:

L. E. Nicholson
J. S. Warren
G. B. Swindlehurst
R. C. Harvey
M. E. Henshaw
ELL
E-NRC-LOCA (R. C. Harvey)
Oconee Master File, Mail Code ON03DM (File OS 801.01)