

May 26, 2004

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, H. N. Berkow (USNRC) to J. Mallay (Framatome ANP), "Evaluation of Framatome ANP Preliminary Safety Concern (PSC) 2-00 Related to Core Flood Line Break and Operator Action Time," (TAC No. MA 9973), April 10, 2003.
  - 2) Letter, M. S. Tuckman (DEC) to USNRC, "Report Pursuant to 10 CFR 50.46, Error Related to Application of the LBLOCA Evaluation Model," July 16, 2001.
  - 3) Letter, H. N. Berkow (USNRC) to J. F. Mallay (Framatome ANP), "Issuance of Revised Safety Evaluation for Referencing of Appendices H and I to BAW-10166P-A, "BEACH - Best Estimate Analysis Core Heat Transfer, A Computer Program for Reflood Heat Transfer Analysis During LOCA," (TAC No. MC0341), November 7, 2003.
  - 4) 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.
  - 5) Letter, W. R. McCollum, Jr. (DEC) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model," May 19, 2003.

10 CFR 50.46 (a)(3)(ii) requires the reporting of changes to or errors in the Emergency Core Cooling system (ECCS) evaluation models (EM). This report covers the time period from January 1, 2003 to December 31, 2003.

During this time period, two error corrections were made to the application of the evaluation model. Both of these corrections had an impact on the calculated peak cladding temperatures (PCTs) and both are classified as insignificant errors ( $\Delta PCT < 50^\circ F$ ). The first error is related to an incorrect integrated mass and energy release used in the containment analysis. The calculated containment pressure is used as a boundary condition to the large break LOCA (LBLOCA) analysis. The second error was an incorrect core inlet area used in the BEACH analysis for the Mark-B10 fuel.

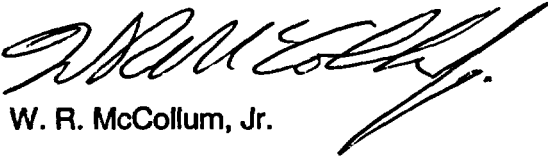
U. S. Nuclear Regulatory Commission  
May 26, 2004  
Page 2

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.

There are no regulatory commitments associated with this letter.

Please address any comments or questions regarding this matter to L. B. Jones at (704) 382-4753.

Very truly yours,



W. R. McCollum, Jr.

**Attachments**

- Table 1 – Errors/Evaluation Model Changes with PCT Impact
- Table 2 – Errors/Evaluation Model with no PCT Impact
- Table 3 – Peak Cladding Temperature Summary – Oconee Units 1, 2, and 3

xc (with Attachments)

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**Table 1**  
**Errors / Evaluation Model Changes with PCT Impact**

**Error Correction for Containment Pressure Input**

An error was discovered in the mass and energy release data input to the CONTEMPT containment analysis. The error originates from allowing the CONTEMPT code to linearly interpolate in the mass and energy data that was generated over distinct time intervals. This results in the CONTEMPT integrated mass and energy release that is not consistent with the system analysis. The net impact is that the containment pressure is overpredicted. Lowering the containment pressure increases the CFT injection flow during the refill period which shortens the adiabatic heat-up period. This leads to a reduction in the calculated PCT. The PCT impact for this error correction is estimated to be -25°F.

**Error Correction for BEACH Junction Area**

An error was discovered in the junction area between the core region and the lower plenum region for the Mark-B10T LBLOCA analyses. Correction of the error resulted in a slightly lower core reflood rate. The PCT change for this error correction is estimated to be +3°F.

**Table 2**  
**Errors / Evaluation Model Changes with no PCT Impact**

**Reactor Coolant Pump Degradation Model Change**

Preliminary Safety Concern (PSC) 2-00 investigated small break LOCAs (SBLOCAs) with reactor coolant pump (RCP) operation beyond the time of turbine trip. It was discovered that more severe consequences could be predicted for larger SBLOCA events when the RCPs were manually tripped at two minutes following loss-of-subcooling margin. In addition, the consequences were even worse when the M3-modified RCP degradation model (lower bound providing least pump degradation) was applied. The NRC, in Reference 1, approved the use of the M3-modified two-phase RCP degradation model in RELAP5/MOD2-B&W for resolution of PSC 2-00. This approval is contingent upon establishing that the M3-modified curve is conservative for each licensee's plant. This material is currently being reviewed and the NRC submittal is being prepared. Use of the M3-modified RCP degradation model was previously reported as an EM change in 2001. Thus, there is no new PCT impact associated with this change.

**BEACH Topical Report Revision**

AREVA (formerly Framatome-ANP), submitted a revision to the BEACH topical report for LBLOCA analyses to extend the range of application for 1) the maximum initial cladding limit to 2045°F, 2) the minimum reflood rate to 0.4 in/sec, and 3) the minimum applicable containment pressure to 14.7 psia. The extension of the initial cladding temperature limit was previously reported in Attachment 1 of the 2000 10 CFR 50.46 annual report (Reference 2). In Reference 3 the NRC approved revision 5 of the BEACH topical report, BAW-10166P, and its use with once-through steam generator LBLOCA evaluation models, BAW-10192P-A. For this evaluation model change there is no  $\Delta$ PCT determined since the analysis of record calculations are unaffected. The only change is to extend the applicable range of the BEACH computer code.

**Table 3**  
**Peak Cladding Temperature Summary – Oconee Units 1, 2 & 3**

<b>LBLOCA</b>	<b>PCT (°F)</b>	<b>Comments</b>
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 ( $\Delta$ PCT) 1. None	0	
Prior evaluation model changes ( $\Delta$ PCT) 1. None	0	
Errors ( $\Delta$ PCT) 1. Containment press. correction 2. BEACH inlet area correction	-25 +3	(PCT impacts estimated) Applies to both fuel types Applies to only Mark-B10
Evaluation model changes ( $\Delta$ PCT) 1. None	0	
Absolute value of errors/changes for this report ( $\Delta$ PCT)	25 28	Mark-B11 Mark-B10T
Net change in PCT for this report	-25 -22	Mark-B11 Mark-B10T
Final PCT	2012 2028	Mark-B11 Mark-B10T
<b>SBLOCA</b>	<b>PCT (°F)</b>	<b>Comments</b>
Evaluation model: RELAP5/MOD2-B&W		
Analysis of record PCT	1369	Full Power 0.15 ft <sup>2</sup> break
Prior errors ( $\Delta$ PCT) 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 5. Implementation of void-dependent cross flow model	43 -14 -5 -25 -12	Reference 4 <sup>(1)</sup> Reference 4 Reference 4 Reference 4 Reference 5
Prior evaluation model changes ( $\Delta$ PCT) 1. None	0	
Errors ( $\Delta$ PCT) 1. None	0	
Evaluation model changes ( $\Delta$ PCT) 1. None		
Absolute value of errors/changes for this report ( $\Delta$ PCT)	0	
Net change in PCT for this report	0	
Final PCT	1356	

<b>SBLOCA</b>	<b>PCT (°F)</b>	<b>Comments</b>
Analysis of record PCT	1261	Reduced Power - 50% FP (1 HPI case) 0.06 ft <sup>2</sup> break
Prior errors ( $\Delta$ PCT) 1. None	0	
Prior evaluation model changes ( $\Delta$ PCT) 1. None	0	
Errors ( $\Delta$ PCT) 1. None	0	
Evaluation model changes ( $\Delta$ PCT) 1. None	0	
Absolute value of errors/changes for this report ( $\Delta$ PCT)	0	
Net change in PCT for this report	0	
Final PCT	1261	

- (1) In Reference 4 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  $\Delta$ PCT value is no longer considered an estimate.