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May 3, 2001

U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555-0001  
Attention: Document Control Desk

**Subject:** Duke Energy Corporation  
McGuire Nuclear Station, Units 1 and 2  
Docket Number 50-369 and 50-370

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

Reference 1: Letter, M. S. Tuckman (DEC) to USNRC, "Report Pursuant to 10 CFR 50.46,  
Changes to or Errors in an ECCS Evaluation Model," October 27, 1999

10 CFR 50.46 (a)(3)(ii) requires the reporting of errors or changes in the Emergency Core Cooling System (ECCS) evaluation models at least annually. Previous submittals for McGuire Nuclear Station in regard to this regulation were submitted in October. In order to be consistent with the schedule of the new fuel vendor, Westinghouse, future submittals for McGuire will be made in April, covering the period of January through December of the preceding year. This report covers the time period from September 1, 1999 to December 31, 2000.

During this time period, there are no errors or changes in the Framatome Technologies Incorporated (FTI) evaluation models that form the licensing bases for McGuire Unit 1. As such, the licensing basis peak cladding temperature (PCT) results for McGuire Unit 1 are unchanged from the 1999 annual report (Reference 1). A summary of the peak cladding temperatures for McGuire Unit 1 is provided in Table 3.

For the same time period, McGuire Unit 2 implemented Westinghouse RFA fuel requiring a reanalysis of the UFSAR Chapter 15 safety analysis. Large break LOCA (LBLOCA) calculations were performed by Westinghouse using the WCOBRA/TRAC best estimate evaluation model. Westinghouse also performed small break LOCA (SBLOCA) analyses using the NOTRUMP evaluation model. No changes were made to the Westinghouse evaluation models during this period, however two errors which had an impact on the calculated PCTs were discovered. Neither of these errors is classified as significant per the 10 CFR 50.46 criterion.

The first error is related to the mixture level tracking in the NOTRUMP computer code. The impact of this error on the McGuire Unit 2 SBLOCA analysis is an increase in the PCT of 13 °F. The second error is in the decay heat uncertainty calculation in the Monte Carlo calculations performed as part of the best estimate LBLOCA analysis. The impact of this error on the

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McGuire Unit 2 LBLOCA analysis is an increase in the PCT of 8 °F. Details of these errors are presented in Table 1. A summary of the peak cladding temperatures for McGuire Unit 2 is provided in Table 4.

There were three other errors in the Westinghouse evaluation models for which no PCT impact was assessed. The nature of these errors is provided in Table 2. Since there was no PCT impact determined for these errors, they are not included in the McGuire Unit 2 PCT summary table.

This report is being submitted beyond the annual reporting requirement of 10 CFR 50.46. A licensee corrective action problem report (PIP M-01-02236) was issued to address the administrative failure to satisfy this requirement. This occurrence is currently being evaluated to identify appropriate corrective actions.

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

Very truly yours,



M. S. Tuckman

xc:

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Table 1  
Errors / Evaluation Model Changes with PCT Impact

Mixture Level Tracking/Region Depletion Errors (NOTRUMP SBLOCA Model)

Several closely related errors were discovered in the NOTRUMP computer code dealing with how the stack mixture level transitions across a node boundary in a stack of fluid nodes. The impact of this error was evaluated on a generic basis for all standard EM applications. A bounding PCT impact of 13 °F has been assigned.

Decay Heat Uncertainty Error in Monte Carlo Calculations (WCOBRA/TRAC LBLOCA Model)

An error was discovered in the calculation of the decay heat uncertainty in the Monte Carlo code used for the 95<sup>th</sup> percentile PCT for best estimate LBLOCA analyses. The impact of this error was evaluated on a plant specific basis. The impact for the McGuire/Catawba BE LBLOCA analysis was determined to be 4 °F for the first reflood phase (Reflood-1) and 8 °F for the second reflood phase (Reflood-2) with Reflood-2 remaining the limiting period. It should be noted that this error is generic in nature. Thus, the impact on the individual units would be less than or the same as the impact on the McGuire/Catawba composite plant model. Therefore the composite plant model, with the PCT penalty applied, remains bounding for the McGuire and Catawba units.

Table 2  
Errors / Evaluation Model Changes with no PCT Impact

LOTIC2 Nitrogen Addition Logic Error (WCOBRA/TRAC LBLOCA Model)

The LOTIC2 computer code calculates the minimum containment backpressure during a LBLOCA transient for plants with ice condenser containment designs. An error was discovered whereby some of the nitrogen was being released to the upper compartment instead of correctly being released entirely to the lower compartment. Representative calculations with this error corrected showed a negligible effect on containment pressure, which in turn would have a negligible effect on PCT. Therefore, this correction has been assigned a 0 °F value for 10 CFR 50.46 reporting purposes.

LOTIC2 Time Step Logic Error (WCOBRA/TRAC LBLOCA Model)

An error was discovered in the LOTIC2 computer code whereby the transient time was being adjusted twice in a typical time step, which led to negative time step sizes under certain conditions. Representative calculations with this error corrected showed a negligible effect on containment pressure, which in turn would have a negligible effect on PCT. Therefore, this correction has been assigned a 0 °F value for 10 CFR 50.46 reporting purposes.

NOTRUMP Core Heat Transfer Error (NOTRUMP SBLOCA Model)

An error was discovered in the NOTRUMP computer code, which resulted in either the code to abort or the use of invalid steam table properties and/or heat transfer correlation in the core region under certain conditions. This error can only occur when complete subcooling of the core cladding exists in conjunction with core uncover. The nature of this error leads to no PCT impact for all standard EM applications.

Table 3  
 Peak Cladding Temperature Summary – McGuire Unit 1

LBLOCA	Cladding Temp (°F)	Comments
Evaluation model : RELAP/MOD2-B&W		
Analysis of record PCT	2075	
Prior errors ( $\Delta$ PCT)		
1. Decay heat / actinide model correction	77	Reference A
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	2152	
SBLOCA		
Evaluation model : RELAP5/MOD2-B&W		
Analysis of record PCT	1254	
Prior errors ( $\Delta$ PCT)		
1. Decay heat / actinide model correction	89	Reference A
Prior evaluation model changes ( $\Delta$ PCT)		
1. None	0	
Errors ( $\Delta$ PCT)		
1. Mixture level tracking/region depletion	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	1343	

Reference:

- A) letter, M. S. Tuckman (DPC) to USNRC, "Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model", July 25, 1997.

Table 4  
 Peak Cladding Temperature Summary – McGuire Unit 2

LBLOCA	Cladding Temp (°F)	Comments
Evaluation model : WCOBRA/TRAC		
Analysis of record PCT	2028	MNS/CNS Composite Model
Prior errors ( $\Delta$ PCT) 1. None	0	
Prior evaluation model changes ( $\Delta$ PCT) 1. None	0	
Errors ( $\Delta$ PCT) 1. Decay heat in Monte Carlo calculations	8	
Evaluation model changes ( $\Delta$ PCT) 1. None	0	
Absolute value of errors/changes for this report ( $\Delta$ PCT)	8	
Net change in PCT for this report	8	
Final PCT	2036	
SBLOCA		
Evaluation model : NOTRUMP		
Analysis of record PCT	1177	Note (1)
Prior errors ( $\Delta$ PCT) 1. None	0	
Prior evaluation model changes ( $\Delta$ PCT) 1. None	0	
Errors ( $\Delta$ PCT) 1. Mixture level tracking/region depletion	13	
Evaluation model changes ( $\Delta$ PCT) 1. None	0	
Absolute value of errors/changes for this report ( $\Delta$ PCT)	13	
Net change in PCT for this report	13	
Final PCT	1190	

Note:

(1) The analysis of record PCT includes a 10 °F allowance for the presence of FCF fuel.

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