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U. S. Nuclear Regulatory Commission
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SUBJECT: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
**10 CFR 50.46 Annual Report - Errors in
Emergency Core Cooling System (ECCS) Evaluation Models**

References:

1. NYPA letter, M. J. Colomb to USNRC (JAFP-00-0164) dated July 21, 2000 regarding reporting of changes and errors in ECCS evaluation models.
2. Entergy Nuclear Operations, Inc. letter, M. Kansler to USNRC (JPN-01-010) dated June 4, 2001 regarding 10 CFR 50.46(a)(3)(ii) 30-day report, two errors in ECCS evaluation models.

Dear Sir:

The attached report summarizes changes and errors in emergency core cooling system (ECCS) evaluation models in accordance with 10 CFR 50.46(a)(3)(ii) for the period from July 1, 2000 to June 30, 2001 for Entergy's James A. FitzPatrick Nuclear Power Plant.

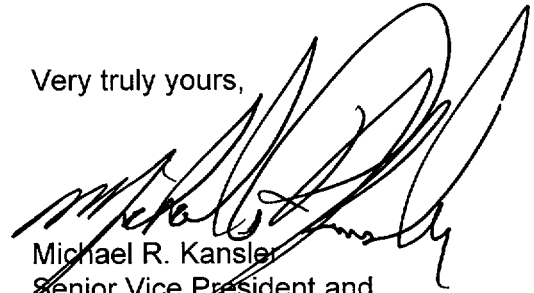
A total of four changes or errors to the FitzPatrick model have been identified since the last annual report (Reference 1). Two of these errors were recently reported to the NRC in a 30-day report (Reference 2). Thirty-day reports were not submitted for the two other errors because they do not qualify as a significant change (a peak cladding temperature change of greater than 50 °F) according to 10 CFR 50.46(a)(3)(i).

Corrected for these errors, estimated peak cladding temperatures (PCTs) remain below the 2200 °F requirement of 10 CFR 50.46(b)(1).

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No new commitments are contained in this letter. If you have any questions, please contact Ms. Charlene Faison at 914-272-3378.

Very truly yours,

A handwritten signature in black ink, appearing to read "Michael R. Kansler", written over the typed name and title.

Michael R. Kansler
Senior Vice President and
Chief Operating Officer

cc: Regional Administrator, Region I
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Attachment: Annual 10 CFR 50.46(a)(3)(ii) Report on Changes or Errors in Emergency Core Cooling System (ECCS) Evaluation Models for the period from July 1, 2000 to June 30, 2001

Annual 10 CFR 50.46(a)(3)(ii) Report on Changes or Errors in Emergency Core Cooling System (ECCS) Evaluation Models for the period from July 1, 2000 to June 30, 2001

Entergy Nuclear Operations Inc.
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333

INTRODUCTION

This report summarizes changes and errors in emergency core cooling system (ECCS) evaluation models in accordance with 10 CFR 50.46(a)(3)(ii) for the period from July 1, 2000 to June 30, 2001 for Entergy's James A. FitzPatrick Nuclear Power Plant.

A total of four changes or errors to the FitzPatrick model have been identified since the last annual report (Reference 1). Two of these errors were recently reported to the NRC in a 30-day report (Reference 2). Thirty-day reports were not submitted for the two other errors because they do not qualify as a significant change (a peak cladding temperature [PCT] change of greater than 50 °F) according to 10 CFR 50.46(a)(3)(i).

Table 1 summarizes the errors or changes to the current FitzPatrick ECCS evaluation models. The first three entries in Table 1 represent baseline ECCS evaluations for GE11 and GE12 fuels and FitzPatrick supplemental reloads. The next three entries in Table 1 represent changes or errors in ECCS evaluations and their effect on PCTs previously reported to the NRC. The last four entries represent ECCS evaluation changes or errors identified during the period July 1, 2000 to June 30, 2001.

Additional information on the four changes or errors identified during the reporting period is provided below.

DISCUSSION OF CHANGES OR ERRORS IDENTIFIED DURING REPORTING PERIOD

Time Step Size

In Reference 3, General Electric reported a -5 °F change in PCT for FitzPatrick related to a change in the time step size used in loss-of-coolant accident (LOCA) analysis with the SAFER code (References 4 and 5). A concern had been raised in an audit of GE by the BWROG (Boiling Water Reactor Owners' Group) that led to an evaluation of the time step size used in the code. The result of the evaluation was a reduction in the time step size that improved numerical convergence and reduced the PCT variations in SAFER.

This error changed PCT by less than 50 °F. Consequently it did not qualify as a significant change according to 10 CFR 50.46(a)(3)(i) and no 30-day report was submitted.

Estimated Affect of Condensation Error on PCT

A coding error was discovered in the SAFER computer program. As a result of this error, the program over-accounted for the amount of condensation that occurred in the lower plenum of the reactor pressure vessel in the thermal-hydraulic model. (The program accounted for

condensation in this region twice.) This over-accounting affected the mass and energy in this region. It also affected the calculated liquid and/or vapor flow to the core. Changes in core inventory affect the calculated PCT.

This error only affects plants with LPCI (low-pressure coolant injection) injected through the jet pumps into the lower plenum. Injection into other regions modeled by the SAFER code are calculated correctly.

Entergy submitted a 30-day report (Reference 2) for this error.

Estimated Affect of Pressure Rate Inconsistency Error on PCT

The SAFER program used an incorrect core exit steam flow value in the pressure equation when the two-phase level position in the core changed. This error propagated into the calculated vessel pressure. In some cases, this resulted in reduced flashing and the premature termination of ECCS condensation due to insufficient steam mass. Changes in core inventory affect the calculated PCT.

Entergy submitted a 30-day report (Reference 2) for this error.

Estimated Affect of Accounting Error on PCT

This error involved incorrect accounting for the FitzPatrick ECCS LOCA evaluation for GE 12 fuel. A +5 °F error was introduced in this evaluation when a 1993 code error correction was incorrectly applied to a 1996 report on GE12 PCT. The error affected the FitzPatrick cycle 15 reload report (GE-NE-J11-3757-09-01P) and the cycle 15 Supplemental Reload Licensing Report (Reference 6). The effect of this error was to reduce PCT by 5 °F.

This error changed PCT by less than 50 °F. Consequently it did not qualify as a significant change according to 10 CFR 50.46(a)(3)(i) and no 30-day report was submitted.

SUMMARY

Since the last annual 10 CFR 50.46 report (Reference 1), estimated FitzPatrick PCT increased by 95 °F for GE11 fuel, and increased by 100 °F for GE12 fuel. Estimated PCTs, corrected for these errors, remain well below the 2200 °F requirement of 10 CFR 50.46(b)(1).

**TABLE 1 - ACCOUNTING OF LICENSING BASIS
PEAK CLAD TEMPERATURES FOR FITZPATRICK**
For the period from July 1, 2000 to June 30, 2001

Report Period	ECCS Evaluation	Estimated PCT Change		Updated PCT	
		GE11 Fuel	GE12 Fuel	GE11	GE12 Fuel
Baseline Evals.	1993 Fitzpatrick LOCA Analysis (Ref. 7)	Baseline	N/A	1570°F	N/A
	Fitzpatrick Reload 12 Supplemental Report (Ref. 8)	N/A	Baseline	N/A	1370 °F
	Fitzpatrick Reload 13 Supplemental Report (Ref. 9).	Baseline		1570 °F	1370 °F
Prior to July 1, 2000	10 CFR 50.46 Notification Regarding Sensitivity To Small Input Parameter Changes (Ref. 10)	+50 °F		1620 °F	1420 °F
	10 CFR 50.46 Notification Regarding Minor Code Corrections (Ref. 10)	+5 °F		1625 °F	1425 °F
	10 CFR 50.46 Notification Regarding Bottom Head Drain (Ref. 11)	+10 °F		1635 °F	1435 °F
July 1, 2000 - June 30, 2001	10 CFR 50.46 Notification Regarding Time Step Size (Ref. 3)	-5 °F		1630 °F	1430 °F
	Estimated Effect Of Condensation Error On PCT (Ref. 12)	+90 °F		1720 °F	1520 °F
	Estimated Effect Of Pressure Rate Inconsistency Error On PCT (Ref. 13)	+10 °F		1730 °F	1530 °F
	Estimated Effect Of Accounting Error On PCT (Ref. 14)	N/A	-5 °F	1730 °F	1525 °F

REFERENCES

1. NYPA letter, M. J. Colomb to USNRC (JAFFP-00-0164), dated July 21, 2000, regarding reporting of changes and errors in ECCS evaluation models.
2. Entergy Nuclear Operations, Inc. letter, M. Kansler to USNRC, (JPN-01-010) dated June 4, 2001, regarding 10 CFR 50.46(a)(3)(ii) 30-day report, two errors in ECCS evaluation models.
3. Global Nuclear Fuel letter, A. Alzaben (GNF) to C. Franklin (NYPA), (AFA-00-N061 dated November 20, 2000) regarding 10 CFR 50.46 error report - impact of SAFER time step size on the peak clad temperature (PCT) for jet pump plant analyses. Includes General Electric/Global Nuclear Fuel 10 CFR 50.46 Notification Letter 2000-04 dated November 8, 2000 regarding "Impact of SAFER Time Step Size on the Peak Clad Temperature (PCT) for Jet Pump Plant Analyses." (Proprietary)
4. NEDC-23785-1-PA Rev. 1, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-Of-Coolant Accident Volume II, SAFER - Long Term Inventory Model for BWR Loss-Of-Coolant Analysis," October 1984.
5. NEDC-23785-1-PA Rev. 1, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-Of-Coolant Accident Volume III, SAFER/GESTR Application Methodology," October 1984.
6. General Electric Nuclear Energy Report, J11-03757SRL, August 2000, "Supplemental Reload Licensing Report for James A. FitzPatrick, Reload 14, Cycle 15."
7. General Electric Nuclear Energy, "James A. FitzPatrick Nuclear Power Plant SAFER/GESTR-LOCA, Loss-of-Coolant Analysis," Licensing Topical Report NEDC-31317P, Class III (proprietary), Revision 2, April 1993.
8. General Electric Nuclear Energy Report, J11-02914SRL, Revision 0, August 1996, "Supplemental Reload Licensing Report for James A. FitzPatrick, Reload 12, Cycle 13."
9. General Electric Nuclear Energy Report, J11-03359SRL, Revision 1, Class I, October 1998, "Supplemental Reload Licensing Report for James A. FitzPatrick, Reload 13, Cycle 14."
10. General Electric Nuclear Energy, MFN-090-93, June 30, 1993, "Reporting of Changes and Errors in ECCS Evaluation Models."
11. General Electric Nuclear Energy, MFN-020-96, February 20, 1996, "Reporting of Changes and Errors in ECCS Evaluation Models."
12. General Electric/Global Nuclear Fuel 10 CFR 50.46 Notification Letter 2001-01 dated May 8, 2001 (via E-mail) regarding "Impact of SAFER Condensation Error on the Peak Clad Temperature (PCT)." (Proprietary)

13. General Electric/Global Nuclear Fuel 10 CFR 50.46 Notification Letter 2001-02 dated May 10, 2001 (via E-mail) regarding "Impact of SAFER Pressure Rate Inconsistency Error on the Peak Clad Temperature (PCT)." (Proprietary)
14. Global Nuclear Fuel letter, A. Alzaben (GNF) to J. Head (Entergy Nuclear Operations, Inc.), (AFA-01-E004, June 29, 2001) regarding GE12 Upper Bound PCT for FitzPatrick, (Proprietary).