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June 4, 2001
JPN-01-010

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, DC 20555-0001

SUBJECT: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
10 CFR 50.46(a)(3)(ii)
30-Day Report, Two Errors in
Emergency Core Cooling System (ECCS) Evaluation Models

References:

1. 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)

2. 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)

Dear Sir:

Entergy Nuclear Operations, Inc. was recently notified of two errors (References 1 and 2) in the emergency core cooling system (ECCS) evaluation models for the James A. FitzPatrick nuclear power plant. The first error involves an overaccounting of condensation in one region of the evaluation model. The second error concerns the use of inconsistent core exit steam flow in the calculation of reactor pressure. Estimated peak clad temperatures (PCTs), corrected for these errors, remain below the 2200°F requirement of 10 CFR 50.46(b)(1).

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The attached report provides additional information on the nature of the errors, and their affect on the limiting ECCS analysis. No reanalysis is required to demonstrate compliance with 10 CFR 50.46. This information is submitted in accordance with the requirements of 10 CFR 50.46(a)(3)(ii) for FitzPatrick because the PCT increase is greater than 50°F and qualifies as a significant change according to 10 CFR 50.46(a)(3)(i).

If you have any questions, please contact Ms. Charlene Faison at 914-272-3378.

Very truly yours,

Michael R. Kansler
Senior Vice President and
Chief Operating Officer

cc: Next page.

Attachment:

Changes or Errors in Emergency Core Cooling System (ECCS) Evaluation Models, James A. FitzPatrick Nuclear Power Plant

cc:

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Attachment to JPN-01-010

Changes or Errors in Emergency Core Cooling System (ECCS) Evaluation Models

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

INTRODUCTION

Entergy Nuclear Operations, Inc. (Entergy) was recently notified of two errors in the emergency core cooling system (ECCS) evaluation models for the James A. FitzPatrick nuclear power plant. The first error involves an overaccounting of condensation in one region of the evaluation model. The second error concerns the use of inconsistent core exit steam flow in the calculation of reactor pressure.

On May 8, 2001, Entergy was notified (Reference 1) of an error in the computer program used to calculate peak clad temperatures (PCT) for FitzPatrick. This error concerns an overaccounting of condensation in one region of the model. According to this notice, licensing-basis PCT for FitzPatrick was underestimated by 90°F as a result of this error.

On May 10, 2001, Entergy was notified (Reference 2) of a second error in the same computer program. This second error concerns the use of inconsistent core exit steam flow in the pressure equation. According to the notice, licensing-basis PCT for FitzPatrick was underestimated by 10°F as a result of this error.

Estimated PCTs, after correction for these errors, remain below the 2200°F requirement of 10 CFR 50.46(b)(1).

This report provides additional details on the nature of these errors, and their affect on the limiting ECCS analysis. No reanalysis or other actions are required to demonstrate compliance with 10 CFR 50.46 requirements.

This information is submitted in accordance with the requirements of 10 CFR 50.46(a)(3)(ii) for FitzPatrick because the PCT increase is greater than 50°F and qualifies as a significant change according to 10 CFR 50.46(a)(3)(i).

NATURE OF ERRORS

Condensation Error (Reference 1)

A coding error was discovered in the SAFER computer program (References 3 and 4). 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.

Pressure Rate Inconsistency (Reference 2)

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.

ESTIMATED EFFECT ON LIMITING ECCS ANALYSIS

Table 1 summarizes the effect of this error on PCTs at FitzPatrick. Table 2 provides an accounting of the licensing basis peak clad temperatures for FitzPatrick based on the loss-of-coolant-accident analyses performed as part of the 1996 power uprate (operating licensing amendment number 239, References 5 and 6) and the supplemental reload report for reload 13 (Reference 9).

Discussion of Condensation Error

The potential effects of this error on PCT were evaluated for a number of representative plants for a range of event/failure combinations. This evaluation showed that the affect of this error on PCT depends on the relative amounts of core spray and LPCI flow. PCT was most affected in cases where LPCI provided most of the reflood flow. PCT was least affected when no LPCI flow was assumed to be available.

The error had an insignificant effect on small-break PCTs.

Discussion of Pressure Rate Inconsistency

The potential effect of this error was evaluated for a number of representative plants for a range of break locations and single failure combinations. This error had no effect on the determination of limiting break location and does not introduce a bias in single failure cases where ECCS condensation does not occur prematurely.

SCHEDULE FOR REANALYSIS OR OTHER ACTIONS (CORRECTIVE ACTIONS)

No reanalysis is required for FitzPatrick since estimated PCTs remain below the 2200°F acceptance criteria of 10 CFR 50.46(b)(1).

TABLE 1 - CUMULATIVE EFFECT OF ERRORS ON LICENSING BASIS PEAK CLAD TEMPERATURES

Plant/Fuel		Prior Licensing Basis PCT	Estimated Affect of Condensation Error on PCT (Ref. 1)	Estimated Affect of Pressure Rate Inconsistency Error on PCT (Ref. 2)	Updated PCT
FitzPatrick	GE 11 Fuel	1630°F (See Tbl.2)	+90°F	+10°F	1730°F
	GE 12 Fuel	1430°F (See Tbl.2)			1530°F

TABLE 2 - ACCOUNTING OF LICENSING BASIS PEAK CLAD TEMPERATURES FOR FITZPATRICK (Excludes Ref. 1 and Ref. 2 Errors)

ECCS Evaluation	Estimated PCT Change		Updated PCT	
	GE11 Fuel	GE12 Fuel	GE11 Fuel	GE12 Fuel
1993 FitzPatrick LOCA analysis (Ref. 6)	Baseline	N/A	1570°F	N/A
FitzPatrick reload 12 supplemental report (Ref. 10)	N/A	Baseline	N/A	1370 °F
FitzPatrick reload 13 supplemental report (Ref. 9).	0 °F		1570°F	1370°F
10 CFR 50.46 notification regarding sensitivity to small input parameter changes (Ref. 7)	+50 °F		1620 °F	1420 °F
10 CFR 50.46 notification regarding minor code corrections (Ref. 7)	+5 °F		1625 °F	1425 °F
10 CFR 50.46 notification regarding bottom head drain (Ref. 8)	+10 °F		1635 °F	1435 °F
10 CFR 50.46 notification regarding time step size (Ref. 11)	-5 °F		1630 °F	1430 °F

REFERENCES

1. 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)

2. 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)

3. 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.

4. 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.

5. USNRC letter, K. R. Cotton to W. J. Cahill, Jr. dated December 6, 1996 regarding "Issuance of Amendment for James A. FitzPatrick Nuclear Power Plant (TAC No. M92781)," Amendment No. 239.

6. General Electric Nuclear Energy, "James A. FitzPatrick Nuclear Power Plant SAFER/GESTER-LOCA, Loss-of-Coolant Analysis," Licensing Topical Report NEDC-31317P, Class III (proprietary), Revision 2, April 1993.

7. General Electric Nuclear Energy, MFN-090-93, June 30, 1993, "Reporting of Changes and Errors in ECCS Evaluation Models."

8. General Electric Nuclear Energy, MFN-020-96, February 20, 1996, "Reporting of Changes and Errors in ECCS Evaluation Models."

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 Report, J11-02914SRL, Revision 0, August 1996, "Supplemental Reload Licensing Report for James A. FitzPatrick, Reload 12, Cycle 13."

11. 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)