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50-364

NL-07-0379

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

Joseph M. Farley Nuclear Plant
10 CFR 50.46 ECCS Evaluation Model
Significant Change Report

Ladies and Gentlemen:

Pursuant to the reporting requirements of 10 CFR 50.46 (a)(3)(ii), Southern Nuclear Operating Company (SNC) is submitting the attached emergency core cooling system (ECCS) evaluation model significant change report for Farley Nuclear Plant Unit 2. Although the changes to the Unit 1 PCT do not meet the criteria for a significant change report, the evaluation results are included for completeness.

This report serves as a 30 day Significant Change Report for small-break LOCA PCT for Unit 2. The change is significant due to the fact that the resulting calculated temperature changes by greater than 50 °F. As shown in Table 1, the small-break LOCA analysis PCT results for both units remain below the 10 CFR 50.46 limit of 2200 °F and therefore, no reanalysis is required. However, as a separate initiative, SNC will perform reanalysis of the small-break LOCA PCT and report the results in the 2007 10 CFR 50.46 ECCS Evaluation Model Annual Report.

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,

A handwritten signature in black ink, appearing to read "B. J. George".

B. J. George
Manager, Nuclear Licensing

BJG/WAS/daj

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cc: Southern Nuclear Operating Company
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Mr. J. R. Johnson, Vice President – Farley
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Ms. K. R. Cotton, NRR Project Manager – Farley
Mr. E. L. Crowe, Senior Resident Inspector – Farley

Enclosure

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BACKGROUND

In accordance with 10 CFR 50.46(a)(3)(ii), this letter reports changes that have been made to the NOTRUMP Evaluation Model (EM) resulting in a change to the calculated small-break LOCA (SB LOCA) temperature of greater than 50 °F which meets the criteria for a Significant Change Report.

DISCUSSION

The following presents an assessment of the effect of modifications to the Westinghouse ECCS NOTRUMP Evaluation Model on the Farley SB LOCA analysis results.

Unit 2 implemented the Reactor Internals Upflow Conversion Program (Reference 2) in 2002, and as such a new PCT rack-up reflecting the new upflow configuration analysis is presented here for Unit 2.

Small-Break LOCA

Table 1 shows the SB LOCA PCT rack-ups for both Unit 1 and Unit 2.

A. SB LOCA ECCS MODEL ANALYSIS-OF-RECORD

The SB LOCA analyses for Farley Units 1 and 2 were examined to assess the effects of the above change to the Westinghouse SB LOCA ECCS Evaluation Model on PCT results. The SB LOCA ECCS analysis results were calculated using the NOTRUMP SB LOCA ECCS Evaluation Model (Reference 4). As noted earlier, the Unit 2 re-analysis reflects the Reactor Internals Upflow Conversion implemented in 2002 (Reference 2).

The Unit 1 and Unit 2 analyses assumed the following information important to the SB LOCA analyses:

- o 17x17 VANTAGE+ Fuel Assembly
- o Core Power = 1.02 * 2775 MWT
- o Upflow Configuration
- o $F_Q = 2.50$
- o $F_{\Delta H} = 1.70$

For Farley Units 1 and 2, the limiting size break analysis-of-record for the VANTAGE+ fuel analysis is a 3-inch diameter break in the cold leg. The limiting PCT values determined for the Unit 1 and Unit 2 17x17 VANTAGE+ small-break are shown in Table 1.

B. PRIOR SB LOCA ECCS MODEL ASSESSMENTS**Prior 10 CFR 50.46 Assessments Reported as Significant**

The following SB LOCA 10 CFR 50.46 assessment was reported in March 2000 as significant.

An overall PCT benefit of 62 °F for Unit 1 for the “Burst and Blockage/Time in Life” penalty resulted from the SPIKE computer code correlation revision. (Reference 8)

Prior 10 CFR 50.59 Assessments

The following three plant change assessments were reported in the last submittal (Reference 1) and occurred prior to 2001.

The addition of permanent storage boxes in containment was evaluated and found not to cause a change to PCT (Reference 5).

The finalization of Replacement Steam Generator Data resulted in a 62 °F benefit for Unit 1 (Reference 7).

Annular pellets were determined to have a 10 °F penalty for SB LOCA results for Unit 1 (Reference 6).

Note that the Unit 2 result (in Table 1) is unaffected by these prior 50.59 plant changes. The reason is that the Unit 2 Upflow Conversion implemented in 2002 required a SB LOCA re-analysis that included the above changes explicitly.

C. CURRENT SB LOCA ECCS MODEL ASSESSMENTS

The following changes and errors were identified:

Prior 10 CFR 50.46 Reported Assessments

The following assessments were reported in the last PCT submittal (Reference 1).

NOTRUMP Mixture Level Tracking/Region Depletion Errors

Several closely related errors have been discovered in how NOTRUMP deals with the stack mixture level transition across a node boundary in a stack of fluid nodes. As previously reported, the impact of this revision on the SB LOCA results has been determined to be a 13 °F penalty for Unit 1. In addition, the associated change in Burst and Blockage/Time in Life Components was an additional 12 °F penalty for Unit 1. Thus, the total change was a 25 °F penalty for Unit 1. This error does not impact Unit 2's

re-analysis result (see previously discussed Reactor Internals Upflow Conversion), since the re-analysis was performed with the corrected version of NOTRUMP.

Current 10 CFR 50.46 PCT Assessments

NOTRUMP-EM Refined Break Spectrum

During the course of reviewing several extended power uprate and replacement steam generator SB LOCA analyses, the Nuclear Regulatory Commission (NRC) questioned the break spectrum analyzed in the NOTRUMP evaluation model (EM). The NRC was concerned that the resolution of the break spectrum used in the NOTRUMP EM (1.5, 2, 3, 4, and 6 inch cases) may not be fine enough to capture the worst break with regard to limiting peak clad temperature as per 10 CFR 50.46. That is, the plant could be SB LOCA limited with regard to overall LOCA results.

In response to this, Westinghouse performed some preliminary work indicating that in some cases more limiting results could be obtained from non-integer break sizes; however, the magnitude of the impact was far less than that shown in preliminary work performed by the NRC. Based on this, Westinghouse performed evaluations to determine if Farley would maintain compliance with the 10 CFR 50.46 acceptance criteria when considering a refined SB LOCA break spectrum. It should be noted that use of a refined break spectrum is not an error, but a change, since evaluating only integer break sizes has been the standard practice since the initial licensing of NOTRUMP.

The application of this refined break spectrum resulted in a 17 °F benefit for Unit 1 and a 74 °F benefit for Unit 2.

D. CURRENT PLANNED PLANT CHANGE EVALUATIONS

Starting with the 2001 annual report, the 10 CFR 50.59 Plant Change PCT values have been considered to be a part of the 50 °F error reporting section. The 2005 annual report (Reference 1) was consistent with the change implemented in the 2001 annual report. No applicable changes have been made since that report.

Prior 10 CFR 50.59 Model Assessments

None.

Current Planned Plant Changes

None.

E. TOTAL RESULTANT SB LOCA PCT

As discussed above, the changes and errors in the Westinghouse SB LOCA ECCS Evaluation Model could affect the SB LOCA analysis results by altering the PCT. As shown in Table 1, the SB LOCA analysis PCT results for both units are below the 10 CFR 50.46 limit of 2200 °F.

CONCLUSION

As documented in the following table, the updated Farley SB LOCA analyses PCTs remain in compliance with 10 CFR 50.46(b)(1), specifically requiring that the PCT shall not exceed 2200 °F. As such, there is no need for reanalysis or taking any other actions in accordance with 10 CFR 50.46(a)(3)(ii) because compliance with 10 CFR 50.46(b)(1) has been maintained. However, as a separate initiative, SNC will perform reanalysis of the SB LOCA PCT. SNC will prepare a submittal to the NRC once this reanalysis is complete.

REFERENCES

1. Letter from H. L. Sumner, Jr. to USNRC (NL-06-2513), "Edwin I Hatch Nuclear Plant, Joseph M. Farley Nuclear Plant, Vogtle Electric Generating Plant 10 CFR 50.46 ECCS Evaluation Model Annual Reports for 2005," December 14, 2006.
2. ALA-02-039, "Transmittal of Reactor Internals Upflow Conversion Program Engineering Report, J. M. Farley Nuclear Plant Unit 2," June 2002 (also see WCAP-15974, November 2002).
3. LTR-LIS-06-117, "10 CFR 50.46 Annual Notification and Reporting for 2005," March 6, 2006.
4. "Westinghouse Small-break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A (Proprietary), WCAP-10081-A (Non-Proprietary), Lee, N., et. al, August 1985.
5. SECL-97-062. Rev. 1, "Effects on LOCA PCT of Adding Permanent Storage Boxes and Lead Blankets Inside Containment," October 17, 1997.
6. WCAP-15098, "Joseph M. Farley Nuclear Plant Units 1 and 2 RSG Program NSSS Licensing Report," November 1998.
7. ALA-01-01, "Southern Nuclear Operating Company, Joseph M. Farley Nuclear Plant Units 1 and 2, LBLOCA and SB LOCA Impacts Due to Final RSG Data for SGRP," February 11, 2000.
8. Letter from D. N. Morey to USNRC (NEL-00-0080), "Joseph M. Farley Nuclear Plant 10 CFR 50.46 Annual ECCS Evaluation Model Changes Report for 1999 and Significant Error Reports," March 29, 2000.
9. LTR-LIS-07-69, Revision 1, "10 CFR 50.46 Report for NOTRUMP-EM Refined Break Spectrum and Revised PCT Rackup Sheets for J. M. Farley Units 1 and 2," February 8, 2007.

TABLE 1
JOSEPH M. FARLEY NUCLEAR PLANT
TOTAL RESULTANT SMALL-BREAK LOCA PCT (°F)

A. <u>SB LOCA ECCS MODEL ANALYSIS-OF-RECORD</u>	<u>UNIT 1</u>	<u>UNIT 2</u>
1. ECCS Analysis	1883*	1868**
2. Burst and Blockage / Time in Life	137*	120**
Total Analysis-of-Record	<u>2020*</u>	<u>1988*</u>
B. <u>PRIOR SB LOCA ECCS MODEL ASSESSMENTS</u>		
1. Prior 10 CFR 50.46 Assessments Reported as Significant	-62*	0
2. Prior 10 CFR 50.59 Assessments		
a. Addition of Permanent Storage Boxes in Containment	0*	0
b. Finalization of Replacement Steam Generator Data	-62#	0
c. Annular Pellet Blanket	10*	0
Sum of Prior Assessments	<u>-114*</u>	<u>0</u>
C. <u>CURRENT SB LOCA ECCS MODEL ASSESSMENTS</u>		
1. NOTRUMP Mixture Level Tracking / Region Depl Errors	13*	**
2. Associated change in Burst and Blockage	12*	**
3. NOTRUMP-EM Refined Break Spectrum	-17##	-74##
D. <u>CURRENT PLANNED PLANT CHANGE EVALUATIONS</u>		
1. None	0	0
E. <u>TOTAL RESULTANT SB LOCA PCT</u>		
Total	<u>1914*</u>	<u>1914**</u>

The PCT values are rounded up to the next highest integer number to avoid reporting in decimal points.

* See References 1 and 3

** The revised analysis-of-record reflects the Unit 2's conversion of downflow to upflow configuration (see References 1 and 2).

See Reference 7

See Reference 9