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Omaha NE 68102-2247

April 8, 2009
LIC-09-0028

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

- References:
1. Docket 50-285
 2. EMF-2328(P)(A), Revision 0, "PWR Small Break LOCA Evaluation Model, S-RELAP5 Based," Framatome ANP, Inc., March 2001
 3. EMF-2103(P)(A), Revision 0, "Realistic Large Break LOCA Methodology for Pressurized Water Reactors," Framatome ANP, Inc., April 2003
 4. Letter from OPPD (R.P. Clemens) to NRC (Document Control Desk), Annual Report for 2008 Loss of Coolant Accident (LOCA)/Emergency Core Cooling System (ECCS) Models Pursuant to 10 CFR 50.46, dated April 3, 2009 (LIC-09-0026)

Subject: 30-Day Report of a Significant Change/Error in the Loss of Coolant Accident (LOCA)/Emergency Core Cooling System (ECCS) Models Pursuant to 10 CFR 50.46

In accordance with 10 CFR 50.46(a)(3)(ii), the Omaha Public Power District (OPPD) is submitting a 30-day 10 CFR 50.46 report of a significant change/error in the Small Break (SB) Loss-of-Coolant Accident (LOCA) and Large Break (LB) LOCA ECCS models and evaluations. 10 CFR 50.46(a)(3)(i) states that a significant change or error is one that results in a calculated peak fuel cladding temperature (PCT) different by more than 50°F from the temperature calculated for the limiting transient using the last acceptable model, or is an accumulation of changes and errors such that the sum of the absolute magnitudes of the respective temperature changes is greater than 50°F.

The attached report identifies an error in the SB LOCA portion and an accumulation of errors in the LB LOCA portion associated with the quantification of PCT associated with various code errors identified in the AREVA (formerly Framatome ANP) model for Fort Calhoun Station (FCS), Unit No. 1. References 2 and 3, respectively, describe the SB and LB LOCA analysis methodology used by AREVA for the FCS Analysis of Record (AOR).

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If you should have any questions, please contact Mr. Bill R. Hansher at (402) 533-6894.

Sincerely,

A handwritten signature in black ink, appearing to read 'R. P. Clemens', followed by a long, horizontal, slightly wavy line that extends across the page.

R. P. Clemens
Division Manager
Nuclear Engineering

Attachments:

1. 30-Day Report of Significant Change/Error in LOCA/ECCS Models
2. Fort Calhoun Station Small Break LOCA Margin Summary Sheet
3. Fort Calhoun Station Large Break LOCA Margin Summary Sheet

30-Day Report of Significant Change/Error in LOCA/ECCS Models

An issue was discovered during the development of a new radiation heat transfer model (for Revision 2 of the Realistic Large Break LOCA (RLBLOCA) methodology). A significant discrepancy between the currently used model in S-RELAP5 for the RLBLOCA methodology and other published models was discovered. A well-known industry model was documented and installed into TRAC-B. Part of the documentation for that model is a figure that shows radiation heat transfer data versus the TRAC-B model and the Thomson model. This figure has also been copied and published in other journals and documents.

The radiation to fluid heat transfer model currently employed in S-RELAP5 for LOCA analyses used the flawed figure as the data basis for determining coefficients for the correlation of emissivity of water vapor. The result is that the S-RELAP5 radiation to fluid correlation under predicts the radiative heat transfer. This issue has been caused by flawed data used within the industrial community.

An evaluation has been performed to determine the impact on PCT. For the Fort Calhoun SB LOCA analysis, the PCT impact was estimated to be -64°F . For the Fort Calhoun LB LOCA analysis, the PCT impact was estimated to be -27°F .

This error includes a change of greater than 50°F in the SB LOCA PCT. The accumulation of the sum of the absolute magnitude of the previous year errors and this error for the LB LOCA PCT results in a change of greater than 50°F . These changes for the SB and LB LOCA Analyses are subject to the 30-day reporting requirements of 10 CFR 50.46.

For previous years, the net change in the SB LOCA Analysis PCT 10 CFR 50.46 Model Assessment errors is -8°F and the absolute change is $+8^{\circ}\text{F}$ (Reference 4). For 2009, one error results in a net change in the SB LOCA PCT of -64°F . Attachment 2 provides the SB LOCA Margin Summary Sheet for FCS. Because of the -72°F total errors, the SB LOCA PCT changed from the baseline value (reported in the FCS Updated Final Safety Analysis Report) of 1537°F to 1465°F . The sum of the absolute values of the errors/changes in the SB LOCA analysis of record is $+72^{\circ}\text{F}$.

For previous years, the net change in the LB LOCA Analysis PCT 10 CFR 50.46 Model Assessment errors is -13°F and the absolute change is $+27^{\circ}\text{F}$ (Reference 4). For 2009, one error results in a net change in the LB LOCA PCT of -27°F . Attachment 3 provides the LB LOCA Margin Summary Sheet for FCS. Because of the -40°F total errors, the LB LOCA PCT changed from the baseline value (reported in the FCS Updated Final Safety Analysis Report) of 1636°F to 1596°F . The sum of the absolute value of the errors/changes in the LB LOCA analysis of record is $+54^{\circ}\text{F}$.

Since these results represent a quantification requiring no further analysis and FCS PCT values remain less than the 10 CFR 50.46(b)(1) acceptance criteria of 2200°F, no further analytical or operational mitigating strategies are required. The Omaha Public Power District will be reanalyzing the SB LOCA and LB LOCA analyses for Extended Power Uprate (EPU), and the code changes will be incorporated. EPU is scheduled to be implemented beginning with Cycle 28 operations in the fall of 2012.

Small Break LOCA Margin Summary Sheet – 30-day Report

Plant Name: Fort Calhoun Station
Utility Name: Omaha Public Power District

<i>Evaluation Model: Small Break LOCA</i>			
	Net PCT Effect		Absolute PCT Effect
	A. Prior 10 CFR 50.46 Changes or Error Corrections- Previous Years	Δ PCT =	-8°F
B. Prior 10 CFR 50.46 Changes or Error Corrections- This year	Δ PCT =	0°F	0°F
C. Current 10 CFR 50.46 Changes: - This Report			
1. S-RELAP5 radiation to fluid correlation under predicts the radiative heat transfer	Δ PCT =	-64°F	64°F
Absolute Sum of 10 CFR 50.46 Changes	Δ PCT =		72°F

The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of the PCT impact for changes and errors identified since this analysis is less than 2200°F.

Large Break LOCA Margin Summary Sheet – Annual Report

Plant Name: Fort Calhoun Station
Utility Name: Omaha Public Power District

Evaluation Model: Large Break LOCA

	Net PCT Effect		Absolute PCT Effect
	Δ PCT =		
A. Prior 10 CFR 50.46 Changes or Error Corrections- Previous Years	Δ PCT =	-13°F	27°F
B. Prior 10 CFR 50.46 Changes or Error Corrections- This year	Δ PCT =	0°F	0°F
C. Current 10 CFR 50.46 Changes: - This Report			
1. S-RELAP5 radiation to fluid correlation under predicts the radiative heat transfer	Δ PCT =	-27°F	27°F
Absolute Sum of 10CFR 50.46 Changes	Δ PCT =		54°F

The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of the PCT impact for changes and errors identified since this analysis is less than 2200°F.