Omaha Public Power District

444 South 16th Street Mall
Omaha, NE 68102-2247

April 6, 2011
LIC-11-0029

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

Subject: Annual Report for 2010 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) submits the annual 10 CFR 50.46 summary report for 2010. This summary report updates all identified changes or errors in the LOCA/ECCS codes, methods, and applications used by AREVA (formerly Framatome ANP) to model Fort Calhoun Station (FCS), Unit No. 1. References 2 and 3 respectively describe the Small Break (SB) and Large Break (LB) LOCA analysis methodology used by AREVA for the FCS Analysis of Record.

OPPD has received the 2010 AREVA 10 CFR 50.46 Annual Notification Report for the SB and LB LOCA Analyses that are subject to the reporting requirements of 10 CFR 50.46.

No SB LOCA Analysis Peak Clad Temperature (PCT) 10 CFR 50.46 Model Assessment errors were discovered in 2010. Attachment 1 provides the 2010 SB LOCA Margin Summary Sheet for FCS. As a result of the -68°F total errors reported in previous years, the SB LOCA PCT changed from the baseline value (reported in the FCS Updated Safety Analysis Report) of 1537°F to 1469°F. The

sum of the absolute values of the errors/changes in the SB LOCA analysis of record is 76°F.

One LB LOCA Analysis PCT 10 CFR 50.46 Model Assessment error of 0°F was discovered in 2010. This error is described in Attachment 2. Attachment 3 provides the 2010 LB LOCA Margin Summary Sheet for FCS. As a result of the -62°F total errors reported in previous years, the LB LOCA PCT changed from the baseline value (reported in the FCS Updated Safety Analysis Report) of 1636°F to 1574°F. The sum of the absolute value of the errors/changes in the LB LOCA analysis of record is 76°F.

In summary, the FCS PCT values for SB and LB LOCA remain less than the 10 CFR 50.46(b)(1) acceptance criteria of 2200°F.

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

No commitments to the NRC are made in this letter.

Sincerely,

J. B. Herman
Division Manager-Nuclear Engineering

Attachments:

1. Small Break LOCA Margin Summary Sheet – Annual Report
2. 10 CFR 50.46 Large Break LOCA Model Assessments
3. Large Break LOCA Margin Summary Sheet – Annual Report

c: E. E. Collins, Jr., NRC Regional Administrator, Region IV
L. E. Wilkins, NRC Project Manager
J. C. Kirkland, NRC Senior Resident Inspector

Small Break LOCA Margin Summary Sheet – Annual Report

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

Evaluation Model: Small Break LOCA			
		Net PCT Effect (ΔPCT)	Absolute PCT Effect
A.	Prior 10 CFR 50.46 Changes or Error Corrections-Previous Years	-68°F	76°F
B.	Prior 10 CFR 50.46 Changes or Error Corrections-This Year	0°F	0°F
C.	Absolute Sum of 10 CFR 50.46 Changes		76°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.

10 CFR 50.46 Large Break LOCA Model Assessments

RLBLOCA & S-RELAP5 – FIJ Multiplier & Underpredicting Liquid Entrained to SG Tubes

The Realistic Large Break LOCA (RLBLOCA) methodology uses a bias on interphase friction at the steam generator tube sheet entrance to insure an acceptable amount of liquid is entrained in the steam generator tubes during a large break LOCA. The bias determination was performed by comparing calculated results from S-RELAP5 with measured data from the Upper Plenum Test Facility (UPTF). The UPTF represents a full scale, four loop pressurized water reactor (PWR) complete with the necessary hardware that can be used to represent geometry specific phenomena that occurs during a large or small break LOCA. The S-RELAP5 parameter that controls entrainment is interphase friction. The range of interphase friction spans several orders of magnitude between the flow regimes occurring in the hot leg, hot leg riser, steam generator inlet plenum and steam generator tube sheet. Consequently, determining the uncertainty in interphase friction is not feasible so a conservative bias is used instead. The magnitude of the bias is determined by adjusting the S-RELAP5 RLBLOCA Multiplier "FIJ" until S-RELAP5 over predicts the entrainment observed in UPTF tests by an arbitrary amount. The current FIJ multiplier is invalid and under-predicts the measured entrainment. The re-evaluation of the S-RELAP5 entrainment yielded a value of 5.0 for the FIJ multiplier, which is more appropriate.

An evaluation of a Combustion Engineering (CE) plant with the new FIJ value of 5.0 was not explicitly performed due to the timing of the CE plants peak PCTs. The peak PCTs occur within the first 50 seconds of the transient (during early reflood phase) and the FIJ multiplier's impact on entrainment to the steam generator occurs later in the transient, generally after the accumulator empties (~50 to 70 seconds). Therefore, the change in the FIJ multiplier will have little impact on the CE 14x14 plant design and is estimated as 0°F for Fort Calhoun Station.

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 (ΔPCT)	Absolute PCT Effect
A.	Prior 10 CFR 50.46 Changes or Error Corrections-Previous Years	-62˚F	76˚F
B.	Prior 10 CFR 50.46 Changes or Error Corrections-This Year	0˚F	0˚F
C.	Absolute Sum of 10CFR 50.46 Changes		76˚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.