



March 1, 2011

ULNRC-05769

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

10 CFR 50.46

Ladies and Gentlemen:

**DOCKET NUMBER 50-483  
CALLAWAY PLANT  
UNION ELECTRIC COMPANY  
10 CFR 50.46 ANNUAL REPORT  
ECCS EVALUATION MODEL REVISIONS**

- References: 1) ULNRC-05260 dated 3-9-06  
2) ULNRC-05378 dated 3-7-07  
3) ULNRC-05475 dated 3-4-08  
4) ULNRC-05600 dated 3-4-09  
5) ULNRC-05683 dated 3-1-10

Ameren Missouri hereby submits the annual report required per 10 CFR 50.46(a)(3) for Callaway Plant. Attachment 1 to this letter describes changes to the Westinghouse ECCS Large Break and Small Break Loss of Coolant Accident (LOCA) Evaluation Models which have been implemented for Callaway during the time period from March 2010 to March 2011. Attachment 2 provides an ECCS Evaluation Model Margin Assessment which accounts for all peak cladding temperature (PCT) changes resulting from the resolution of prior issues as they apply to Callaway. No new PCT penalties are included in these attachments. References 1 through 5 provided annual 10 CFR 50.46 reports that were issued after the LOCA analyses were revised to reflect the installation of the replacement steam generators in 2005.

The PCT values determined in the Large Break and Small Break LOCA analyses of record, when combined with all PCT margin allocations, remain below the 2200°F regulatory limit. As such, no reanalysis is planned by Ameren Missouri.

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This letter does not contain any new commitments. If you have any questions on this report, please contact Mr. Tom Elwood at (314) 225-1905.

Very truly yours,

A handwritten signature in black ink that reads "Scott M" followed by a large, stylized flourish that loops back to the right.

Scott Maglio  
Regulatory Affairs Manager

GGY/nls  
Enclosure

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Our ref: LTR-LIS-11-40

January 26, 2011

**Callaway**  
**10 CFR 50.46 Annual Notification and Reporting for 2010**

Dear Sir or Madam:

This is a notification of 10 CFR 50.46 reporting information pertaining to the Westinghouse Electric Company Evaluation Models/analyses. As committed to in WCAP-13451, Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting, Westinghouse is providing an Annual Report for Emergency Core Cooling System (ECCS) Evaluation Model changes and errors for the 2010 model year. Standardized reporting pages for all changes and errors for the Evaluation Models utilized for your plant(s) are enclosed, consistent with the commitment following the NUPIC audit in early 1999. Peak Clad Temperature (PCT) sheets are enclosed. All necessary revisions for any non-zero, non-discretionary, PCT change to Section C have been included. Non-discretionary PCT impacts of 0°F will generally not be presented on the PCT sheet. Any plant-specific errors in the application of the model for 2010 will also be provided in Section C with discussion enclosed or cited. The Evaluation Model changes and errors (except any plant-specific errors in the application of the model) will be provided to the NRC via Westinghouse letter.

This information is for your use in making a determination relative to the reporting requirements of 10 CFR 50.46. The information that is provided in this letter was prepared in accordance with Westinghouse's Quality Management System (QMS).

Author: (Electronically Approved)\*  
J. D. Valeri  
LOCA Integrated Services I

Verified: (Electronically Approved)\*  
L. Nguyen  
LOCA Integrated Services I

Approved: (Electronically Approved)\*  
A. J. Colussy  
Manager, LOCA Integrated Services I

Attachment

*\*Electronically approved records are authenticated in the electronic document management system.*

**URANIA-GADOLINIA PELLETT THERMAL CONDUCTIVITY CALCULATION  
(Non-Discretionary Change)**

**Background**

Two errors were discovered in the pellet thermal conductivity calculation for urania-gadolinia pellets in the SBLOCTA code. First, the calculation did not include the terms required to adjust for pellet densities other than 95% of the theoretical density. Second, the conversion from Fahrenheit to Rankine used an adder of 459 instead of 459.67. These errors have been corrected and evaluated for impact on existing Small Break LOCA analysis results. These changes represent a closely-related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

**Affected Evaluation Model(s)**

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

**Estimated Effect**

SBLOCTA sensitivity calculations led to an estimated PCT effect of 0°F for existing Small Break LOCA analysis results.

**PELLET CRACK AND DISH VOLUME CALCULATION  
(Non-Discretionary Change)**

**Background**

Two errors were discovered in the calculation of the normalized pellet crack and dish volumes in the SBLOCTA code. First, an incorrect operator was used to select between two tables of normalized volume vs. linear heat generation rate. Second, the normalized volume at 18 kW/ft was incorrectly programmed in one of the tables as 1.58 instead of 1.59. These errors have been corrected in the SBLOCTA code and will be corrected (where applicable) in future versions of the BASH and LOCBART codes. These changes represent a closely-related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

**Affected Evaluation Model(s)**

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP  
1981 Westinghouse Large Break LOCA Evaluation Model with BASH

**Estimated Effect**

A combination of SBLOCTA sensitivity calculations and engineering judgment led to an estimated PCT effect of 0°F for existing Large and Small Break LOCA analysis results.

**TREATMENT OF VESSEL AVERAGE TEMPERATURE UNCERTAINTY  
(Non-Discretionary Change)**

**Background**

Historically, the overall vessel average temperature uncertainty calculated by Westinghouse considered only “-” instrument uncertainties, corresponding to the indicated temperature being lower than the actual temperature. This uncertainty was then applied as a “+/-” uncertainty in some LOCA analyses, rather than using specific “+” and “-” uncertainties. This discrepancy has been evaluated for impact on existing Large and Small Break LOCA analysis results, and its resolution represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

**Affected Evaluation Model(s)**

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model

1999 Westinghouse Best Estimate Large Break LOCA Evaluation Model, Application to PWRs with Upper Plenum Injection

2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

**Estimated Effect**

This issue was judged to have a negligible impact on existing Large and Small Break LOCA analysis results, leading to an estimated PCT impact of 0°F.

**GENERAL CODE MAINTENANCE  
(Discretionary Change)**

**Background**

Various changes have been made to enhance the usability of the codes and to help preclude errors in analyses. This includes items such as modifying input variable definitions, units, and defaults; improving the input diagnostic checks; enhancing the code output; optimizing active coding; and, eliminating inactive coding. These changes represent Discretionary Changes that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

**Affected Evaluation Model(s)**

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

**Estimated Effect**

The nature of these changes leads to an estimated PCT impact of 0°F.

## **CONSIDERATION OF SAFETY INJECTION PUMP HEAT (Discretionary Change)**

### **Background**

SCP-10-21 (Reference 1) is a Westinghouse issued Technical Bulletin documenting an evaluation for the consideration of the addition of auxiliary feedwater (AFW) pump heat on various non-LOCA transients. The Callaway plant has subsequently requested that Westinghouse also address the impact of Safety Injection (SI) pump heat addition on their Appendix K Small Break LOCA (SBLOCA) and Appendix K Large Break LOCA (LBLOCA) analyses of record.

### **Affected Evaluation Model(s)**

1981 Westinghouse Large Break LOCA Evaluation Model with BASH  
1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

### **Estimated Effect**

The effect of SI pump heat was considered for the Callaway Appendix K SBLOCA and Appendix K LBLOCA analyses. It was determined that the inclusion of SI pump heat will produce a negligible effect on the results of the large break and small break LOCA analyses, leading to an estimated PCT impact of 0°F for 10 CFR 50.46 reporting purposes.

### **Reference**

1. SCP-10-21, "TB-09-4, Rev. 1 – Impact of Auxiliary Pump Heat on Westinghouse and Combustion Engineering Analyses/Methodologies," April 13, 2010.



**Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break**

**Plant Name:** Callaway  
**Utility Name:** Ameren UE  
**Revision Date:** 1/14/11

**Analysis Information**

**EM:** NOTRUMP                      **Analysis Date:** 10/8/03                      **Limiting Break Size:** 4 inch  
**FQ:** 2.5                              **FdH:** 1.65  
**Fuel:** Vantage 5                      **SGTP (%):** 5

**Notes:**

	Clad Temp (°F)	Ref.	Notes
<b>LICENSING BASIS</b>			
<b>Analysis-Of-Record PCT</b>	1043	1	
<b>PCT ASSESSMENTS (Delta PCT)</b>			
<b>A. PRIOR ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>B. PLANNED PLANT MODIFICATION EVALUATIONS</b>			
1 . None	0		
<b>C. 2010 ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>D. OTHER*</b>			
1 . None	0		
<b>LICENSING BASIS PCT + PCT ASSESSMENTS</b>	<b>PCT = 1043</b>		

\* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

**References:**

- 1 . SCP-04-73/SCP-RSG-04-30, "Transmittal of Final Engineering Report for NSSF RSG Analyses," July 16, 2004.

**Notes:**

None

**RACKUP eRoom Check:**

**EMs applicable to Callaway:**

**Appendix K Large Break – BASH**

**Appendix K Small Break – NOTRUMP**

**2010 Issues**

<b>Transmittal Letter</b>	<b>Issue Description</b>
LTR-LIS-10-304	Consideration Of Safety Injection Pump Heat - Appendix K Small Break LOCA And Appendix K Large Break LOCA Evaluation
LTR-LIS-10-708	Treatment of Vessel Average Temperature Uncertainty