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Callaway Plant

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March 9, 2005

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555-0001

ULNRC-05129

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT
UNION ELECTRIC COMPANY
AMENDED 10 CFR 50.46 THIRTY DAY REPORT
ECCS EVALUATION MODEL REVISIONS

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 2004 to March 2005. 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. References 1-20, listed below, include prior 10 CFR 50.46 reports.

Based on the criteria and reporting requirements of 10 CFR 50.46(a)(3)(ii), as clarified in Section 5.1 of WCAP-13451, "Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting," the cumulative absolute value of the PCT penalty assessments since the last Small Break LOCA 30-day report, Reference 8, are significant and require a new 30-day report. The regulation also requires a "proposed schedule for providing a reanalysis or taking other action as may be needed to show compliance with Section 50.46 requirements." The Small Break LOCA PCT value determined in the analysis of record, when combined with all PCT margin allocations, remains over 400°F below the 2200°F regulatory limit.

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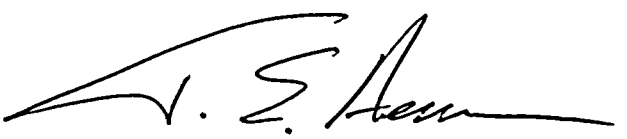
As such, no reanalysis is currently planned by AmerenUE to address the specific issues raised in Attachment 1. AmerenUE has previously submitted new Large Break LOCA and Small Break LOCA analyses for the replacement steam generators (ULNRC-05056 dated September 17, 2004) to be installed during Refuel 14 (fall 2005).

This is an amended report from that contained in Reference 20. Westinghouse notified AmerenUE that an additional Non-Discretionary change with no PCT impact should have been reported. The additional change is marked with revision bars in Attachment 1. Should you have any questions regarding this letter, please contact us.

Sincerely,



Timothy E. Herrmann
Manager-Nuclear Engineering Services

Attachments

References:

1) ULNRC-2141 dated 1-19-90
2) ULNRC-2373 dated 2-28-91
3) ULNRC-2439 dated 7-19-91
4) ULNRC-2664 dated 7-16-92
5) ULNRC-2822 dated 7-15-93
6) ULNRC-2892 dated 10-22-93
7) ULNRC-3087 dated 10-19-94
8) ULNRC-3101 dated 11-23-94
9) ULNRC-3295 dated 11-22-95
10) ULNRC-3499 dated 11-27-96
11) ULNRC-3552 dated 3-21-97
12) ULNRC-3761 dated 3-6-98
13) ULNRC-3975 dated 3-5-99
14) ULNRC-4146 dated 11-4-99
15) ULNRC-4338 dated 11-2-00
16) ULNRC-4551 dated 11-2-01
17) ULNRC-4751 dated 10-14-02
18) ULNRC-4834 dated 4-8-03
19) ULNRC-04968 dated 3-26-04
20) ULNRC-05123 dated 3-8-05

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STATE OF MISSOURI)
) S S
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Timothy E. Herrmann, of lawful age, being first duly sworn upon oath says that he is Manager, Nuclear Engineering Services, for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By T. E. Herrmann

Timothy E. Herrmann
Manager - Nuclear Engineering Services

SUBSCRIBED and sworn to before me this 9th day of March, 2005.

PAULA A. JOHNSON
Notary Public - Notary Seal
STATE OF MISSOURI
Callaway County
My Commission Expires: July 31, 2007

Paula A. Johnson
Notary Public

ATTACHMENT ONE

CHANGES TO THE WESTINGHOUSE

ECCS EVALUATION MODEL

AND PCT PENALTY ASSESSMENTS

TABLE OF CONTENTS

* **New PCT penalty assessment**

1. LOCBART FLUID PROPERTY LOGIC

Several minor discrepancies related to the LOCBART fluid property logic were discovered and corrected. For example, the routine used to calculate the enthalpy and specific volume of superheated steam was renamed to resolve a naming conflict with a library routine that uses different logic to calculate the same parameters. These changes represent a closely-related group of Non-Discretionary Changes for large break LOCA analyses in accordance with Section 4.1.2 of WCAP-13451.

Representative plant calculations using the LOCBART code generally showed either no effect or a negligible effect on results, with some tendency for a small increase in peak cladding temperature (PCT) for plants with an early-reflood or mid-reflood PCT. For Callaway, an early-reflood PCT plant, a +10°F PCT penalty assessment was assigned for the large break loss of coolant accident (LOCA).

2. MAIN FEEDWATER ISOLATION VALVE LEAKAGE EVALUATION

During the review of plant computer data following the plant trip on 1/19/05, a peculiarity was discovered in the data for the feedwater temperature downstream of the 'C' loop main feedwater regulating valve (MFRV). The temperature dropped significantly compared to the 'A,' 'B,' and 'D' loops. It was determined that the cause of this temperature drop is the 'C' loop main feedwater isolation valve (MFIV) leaking back into the main feedwater system. Relatively cold auxiliary feedwater (AFW) caused the temperature drop. The observed temperature change in the feedwater pipe volume was attributed to a leak rate of 4.5 gpm. Under accident analysis conditions this leak rate was extrapolated to 7.1 gpm. An operability determination was performed using a conservative leak rate of 15 gpm. This operability determination resulted in a finding that the 'C' MFIV remains operable; however, the effects of this amount of AFW flow diversion away from the 'C' loop steam generator in the event of a small break LOCA require the conservative assessment of a +31°F PCT penalty assessment.

A previously documented evaluation was performed for leakage from two MFIVs. That evaluation is applicable to the current degraded condition of the 'C' MFIV since it was based on leakage rates of 50 gpm and 20 gpm, a total of 70 gpm, for two loops in both forward and reverse flow directions. Since that evaluation resulted in the assessment of a +31°F PCT penalty assessment for small break LOCA, it is conservative in the current situation to assign this penalty assessment.

The small break LOCA analysis models both main feedwater (MFW) isolation and AFW delivery. The effect of a leaking MFIV is to allow additional MFW to enter the affected steam generator and reduce the delivered AFW flow through back-leakage. Only the turbine-driven AFW pump, which delivers to all four steam generators was modeled in the small break LOCA analysis to remove potential asymmetric effects. As such, the asymmetric valve leakage can be considered a reduction in overall delivered flow.

MFW leakage occurs until the MFW pumps have coasted down. MFW displaces and delays delivery of the colder AFW to the steam generators. As such, the effect of both in-leakage of MFW and back-leakage of AFW is to raise the enthalpy of the steam generator secondary, thereby reducing its ability to transfer heat from the primary.

Energy from the decay heat is removed either by venting through the break or by secondary mass releases through the steam generator main steam safety valves (MSSV). As such, the degraded primary-to-secondary heat transfer performance requires that more energy be vented out of the break. The time required to vent this energy tends to extend the period of clad heatup. This results in a calculated PCT increase of 31°F for small break LOCA.

The large break LOCA analysis does not explicitly model either MFW isolation or AFW delivery. The secondary side is considered isolated at the beginning of the accident. Because of the rapid primary depressurization, the secondary becomes a heat source early in the transient and superheats steam traveling through the steam generator tubes. As such, explicitly modeling MFW isolation or MFIV in-leakage would not have a significant effect on the overall transient. Similarly, AFW is conservatively neglected such that AFW loss due to MFIV back-leakage has no effect on the analysis. There is no PCT penalty assessment for large break LOCA.

3. REACTOR COOLANT PUMP REFERENCE CONDITIONS

Various discrepancies were identified in the reference conditions used with the reactor coolant pump homologous curves. The differences were evaluated for impact on current licensing-basis analysis results and will be incorporated into the plant-specific input databases on a forward-fit basis. These changes represent a closely-related group of Non-Discretionary Changes for large break and small break LOCA analyses in accordance with Section 4.1.2 of WCAP-13451.

The identified discrepancies were evaluated as having a negligible effect on analysis results and will be assigned a 0°F PCT impact for 10 CFR 50.46 reporting purposes.

4. STEAM GENERATOR INLET/OUTLET PLENUM FLOW AREAS

The basis for calculating the steam generator inlet and outlet plenum flow areas used with the SATAN-VI momentum flux model has been redefined as the average area over the plenum height. This change resolves a discrepancy in the original calculation and provides a more appropriate basis for the corresponding flow area terms. This change represents a Non-Discretionary Change for large break LOCA analyses in accordance with Section 4.1.2 of WCAP-13451.

Calculations using the SATAN-VI code indicated that this change has a negligible effect on the blowdown thermal-hydraulic transient results that will be assigned a 0°F PCT impact for 10 CFR 50.46 reporting purposes.

5. LBLOCA INITIAL CONTAINMENT RELATIVE HUMIDITY ASSUMPTION

Large break LOCA analyses have historically used maximum initial relative humidity to specify the initial containment air and steam partial pressures. This assumption is conservative for a given total initial containment pressure, but is non-conservative for a given initial containment air partial pressure. The historical assumption has been revised to reflect this distinction, and the analysis input guidelines have been updated accordingly. This change represents a Non-Discretionary Change for large break LOCA analyses in accordance with Section 4.1.2 of WCAP-13451.

An evaluation concluded that no PCT assessments are required, leading to an estimated PCT effect of 0°F for 10 CFR 50.46 reporting purposes.

6. GENERAL CODE MAINTENANCE

Various changes in code input and output format have been made to enhance usability and help preclude errors in analyses. This includes both input changes (e.g., more relevant input variables defined and more common input values used as defaults) and input diagnostics designed to preclude unreasonable values from being used, as well as various changes to code output which have no effect on calculated results. In addition, various updates were made to eliminate inactive coding, improve active coding, and enhance commenting, both for enhanced usability and to facilitate code debugging when necessary. These changes represent Discretionary Changes for large break and small break LOCA analyses that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

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

ATTACHMENT TWO

ECCS EVALUATION MODEL

MARGIN ASSESSMENT FOR CALLAWAY

Attachment 2

LARGE BREAK LOCA

A.	ANALYSIS OF RECORD (AOR)	PCT = 2014°F
B.	1989 LOCA MODEL ASSESSMENTS (refer to ULNRC-2141 dated 1-19-90)	+ 10°F
C.	1990 LOCA MODEL ASSESSMENTS (refer to ULNRC-2373 dated 2-28-91)	+ 0°F
D.	1991 LOCA MODEL ASSESSMENTS (refer to ULNRC-2439 dated 7-19-91)	+ 10°F
E.	1992 LOCA MODEL ASSESSMENTS, MARGIN ALLOCATIONS, AND SAFETY EVALUATIONS (refer to ULNRC-2664 dated 7-16-92 and ULNRC-2892 dated 10-22-93)	+ 29°F
F.	1993 LOCA MODEL ASSESSMENTS (refer to ULNRC-2822 dated 7-15-93 and ULNRC-2892 dated 10-22-93)	- 65°F
G.	1994 LOCA MODEL ASSESSMENTS (refer to ULNRC-3087 dated 10-19-94 and ULNRC-3101 dated 11-23-94)	- 6°F
H.	1995 LOCA MODEL ASSESSMENTS (refer to ULNRC-3295 dated 11-22-95)	+ 39°F
I.	1996 LOCA MODEL ASSESSMENTS (refer to ULNRC-3499 dated 11-27-96)	+ 0°F
J.	1997 LOCA MODEL ASSESSMENTS (refer to ULNRC-3552 dated 3-21-97)	+ 15°F
K.	1998 LOCA MODEL ASSESSMENTS (refer to ULNRC-3761 dated 3-6-98)	+ 0°F
L.	1999 SAFETY EVALUATIONS (refer to ULNRC-3975 dated 3-5-99)	+ 30°F[5]

LARGE BREAK LOCA (cont.)

M.	1999 LOCA MODEL ASSESSMENTS, MARGIN ALLOCATIONS, AND SAFETY EVALUATIONS	
	1. LOCBART ZIRC-WATER OXIDATION ERROR (This PCT assessment is tracked separately since it will change depending on future margin allocations.)	+197°F
	2. NET CHANGE OF OTHER ALLOCATIONS (refer to ULNRC-4146 dated 11-4-99)	-139°F[8]
N.	2000 LOCA MODEL ASSESSMENTS AND MARGIN ALLOCATIONS (refer to ULNRC-4338 dated 11-2-00)	- 14°F
O.	2001 LOCA MODEL ASSESSMENTS (refer to ULNRC-4551 dated 11-2-01)	- 10°F
P.	2002 LOCA MODEL ASSESSMENTS (refer to ULNRC-4751 dated 10-14-02)	+ 0°F
Q.	2003 LOCA MODEL ASSESSMENTS (refer to ULNRC-4834 dated 4-8-03)	+ 0°F
R.	2004 LOCA MODEL ASSESSMENTS (refer to ULNRC-04968 dated 3-26-04)	+ 0°F
S.	CURRENT LOCA MODEL ASSESSMENTS - March 2005	+ 10°F
	LICENSING BASIS PCT + MARGIN ALLOCATIONS	2120°F
	ABSOLUTE MAGNITUDE OF MARGIN ALLOCATIONS SINCE LAST LBLOCA 30-DAY REPORT (ULNRC-04834)	10°F

SMALL BREAK LOCA

A.	ANALYSIS OF RECORD (AOR)	PCT = 1528°F
B.	1989 LOCA MODEL ASSESSMENTS (refer to ULNRC -2141 dated 1-19-90)	+229°F
C.	1990 LOCA MODEL ASSESSMENTS (refer to ULNRC-2373 dated 2-28-91)	+ 0°F
D.	1991 LOCA MODEL ASSESSMENTS (refer to ULNRC-2439 dated 7-19-91)	+ 0°F[1]
E.	1992 LOCA MODEL ASSESSMENTS AND SAFETY EVALUATIONS (refer to ULNRC-2664 dated 7-16-92)	+ 0°F
F.	1993 LOCA MODEL ASSESSMENTS (refer to ULNRC-2892 dated 10-22-93)	- 13°F[2]
G.	1993 SAFETY EVALUATIONS (refer to ULNRC-2822 dated 7-15-93)	+ 0°F[3]
H.	BURST AND BLOCKAGE/TIME IN LIFE (This PCT assessment is tracked separately since it will change depending on future margin allocations.)	+ 0°F[1]
I.	1994 LOCA MODEL ASSESSMENTS (refer to ULNRC-3087 dated 10-19-94 and ULNRC-3101 dated 11-23-94)	-282°F[4]
J.	1995 LOCA MODEL ASSESSMENTS (refer to ULNRC-3295 dated 11-22-95)	+ 0°F

SMALL BREAK LOCA (cont.)

K.	1996 LOCA MODEL ASSESSMENTS - (refer to ULNRC-3499 dated 11-27-96)	+30°F[6]
L.	1997 LOCA MODEL ASSESSMENTS - (refer to ULNRC-3552 dated 3-21-97)	+ 0°F
M.	1998 LOCA MODEL ASSESSMENTS - (refer to ULNRC-3761 dated 3-6-98)	+ 0°F
N.	1999 SAFETY EVALUATIONS* (refer to ULNRC-3975 dated 3-5-99)	+120°F[7] + 22°F[6] + 40°F[5]
O.	1999 LOCA MODEL ASSESSMENTS (refer to ULNRC-4146 dated 11-4-99)	+ 0°F
P.	2000 LOCA MODEL ASSESSMENTS - (refer to ULNRC-4338 dated 11-2-00)	+ 13°F
Q.	2001 LOCA MODEL ASSESSMENTS - (refer to ULNRC-4551 dated 11-2-01)	+ 0°F
R.	2002 LOCA MODEL ASSESSMENTS - (refer to ULNRC-4751 dated 10-14-02)	+ 0°F
S.	2003 LOCA MODEL ASSESSMENTS - (refer to ULNRC-4834 dated 4-8-03)	+ 0°F
T.	2004 LOCA MODEL ASSESSMENTS - (refer to ULNRC-04968 dated 3-26-04)	+ 0°F
U.	CURRENT MFIV LEAKAGE ASSESSMENT - March 2005	+ 31°F
	LICENSING BASIS PCT + MARGIN ALLOCATIONS	1718°F
	ABSOLUTE MAGNITUDE OF MARGIN ALLOCATIONS SINCE LAST SBLOCA 30-DAY REPORT	0°F

NOTES:

1. See Attachment 1 to ULNRC-3101. The 1991 assessments have been eliminated as a result of the new SBLOCTA calculation. The Small Break Burst and Blockage penalty is a function of the base PCT plus margin allocations and has been reduced to 0°F since the total PCT has been reduced to a value below that at which burst would occur.

2. Addendum 2 to WCAP-10054 has been submitted to NRC. It references the improved condensation model (COSI) described in WCAP-11767 and provides justification for application of this model to small break LOCA calculations. Union Electric tracks the Peak Cladding Temperature (PCT) change reported in ULNRC-2892 (+150°F/-150°F) as a permanent change to Callaway's calculated PCT. See WCAP-10054, Addendum 2, "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code: Safety Injection into the Broken Loop and COSI Condensation Model," August 1994.

3. +4.0°F Cycle 6 crud deposition penalty has been deleted. A PCT penalty of 0°F has been assessed for 4 mils of crud, provided BOL conditions remain limiting. In the event that the SBLOCA cumulative PCT becomes ≥ 1700°F, this issue must be reassessed.

4. Based on the limiting case clad heatup reanalysis with axial offset reduced from 30% to 20%, as discussed in ULNRC-3101.

5. Based on a safety evaluation for a 5°F reduction in full-power T_{avg} (from 588.4°F to 583.4°F), a +30°F PCT penalty is established for LBLOCA and a +40°F PCT penalty is established for SBLOCA.

6. The 1996 safety evaluation reported a +10°F PCT penalty for a feedwater temperature reduction from 446°F to 410°F. This is replaced by a new safety evaluation. The 1996 assessment is reduced from +40°F to +30°F and a new +22°F PCT penalty is established for SBLOCA associated with a feedwater temperature reduction from 446°F to 390°F.

7. See Amendment No. 128 dated October 2, 1998.

8. Included in this value is an estimated PCT benefit of 100°F associated with reducing the F_Q limit from the AOR value of 2.5 to a value of 2.45 for core average burnups between 0 and 8000 MWd/MTU. After a burnup of 8000 MWd/MTU, the F_Q limit returns to 2.5 with no PCT penalty. This applies for the current operating cycle.