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ULNRC-04338

Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT
UNION ELECTRIC COMPANY
10CFR50.46 ANNUAL 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 October 1999 to October 2000. In addition, prior PCT penalty assessments have been revised. Attachment 2 provides an ECCS Evaluation Model Margin Assessment which accounts for the peak cladding temperature (PCT) changes resulting from the resolution of the issues described in Attachment 1 as they apply to Callaway. References 1-14, listed below, include prior 10CFR50.46 reports.

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 currently planned by Union Electric.

Should you have any questions regarding this letter, please contact us.

Very truly yours,

David Shafer
for Alan C. Passwater
Manager-Corporate Nuclear Services

GGY/mlo
Attachments

A001

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

ATTACHMENT ONE

CHANGES TO THE WESTINGHOUSE

ECCS EVALUATION MODEL

AND PCT PENALTY ASSESSMENTS

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***New PCT Penalty Assessments**

1. INCREASE IN CONTAINMENT PURGE PCT ASSESSMENT

A +10°F PCT penalty assessment was originally reported in ULNRC-2664 dated 7-16-92. The magnitude of the penalty was based on an earlier Evaluation Model (EM) and a containment mini-purge valve stroke time increase from 3 to 5 seconds. The longer valve stroke time of 5 seconds was calculated to result in a 0.25 psi decrease in the containment pressure following a postulated large break LOCA. The original PCT penalty of +10°F was based on an Evaluation Model prior to BASH. It was concluded that the original +10°F penalty was conservatively bounding for the BASH Evaluation Model. However, BASH is less sensitive to containment pressure than previous Evaluation Models, with a typical sensitivity on the order of 10°F PCT/1 psi reduction in containment pressure. This sensitivity for the BASH EM was applied in ULNRC-4146 dated 11-4-99 to reduce this penalty from +10°F to +3°F.

However, a recent review of the calculation that determined the 0.25 psi containment pressure decrease has revealed an error. That calculation assumed a response of 7 seconds, 2 seconds for instrumentation delays and 5 seconds for the mini-purge valve stroke time discussed above. As discussed in LER 99-002-00 (ULNRC-4003 dated 4-8-99), the calculation should have assumed 4 seconds for instrumentation delays. The mini-purge valves close upon receipt of a containment purge isolation signal (CPIS). Following a large break LOCA, a safety injection signal (SIS) generates a Phase A containment isolation signal (CIS-A). The CIS-A then generates the CPIS. As listed in FSAR Table 16.3-2, the response time limit for generation of a CIS-A after an SIS is 2 seconds. An additional 2 second response time limit applies for the generation of a CPIS after the CIS-A, including delays for BOP-ESFAS circuitry. The total delay, including the time to reach containment pressure High-1 (2 seconds) after the onset of a large break LOCA, instrumentation delays (4 seconds), and valve stroke time (5 seconds), is 11 seconds. The effect of this error is a 0.40 psi reduction in containment pressure (rather than 0.25 psi as previously calculated) which, using the above 10°F PCT/1 psi sensitivity, results in an increase of this penalty from +3°F to +4°F (for a net increase of +1°F in this report). This is not an Evaluation Model change. Per Section 3.5 of WCAP-13451, "Westinghouse Methodology for Implementation of 10CFR50.46 Reporting," October 1992, this PCT change is not counted toward the cumulation of changes pertaining to the reporting requirements related to a significant change (>50°F).

2. SMALL BREAK LOCA BURST AND BLOCKAGE/TIME IN LIFE (SPIKE CORRELATION REVISION)

The SPIKE computer program and the associated methodology are used as an evaluation tool in the 10 CFR 50.46 plant licensing process to estimate fuel rod burst peak cladding temperature penalties for small break LOCA analyses. This evaluation tool was previously discussed in Reference 1. The SPIKE code has been revised to reflect more recent data generated using the current small break LOCA Evaluation Model and methodology. The revision could result in a net PCT penalty for small break LOCA analyses which have utilized the SPIKE code. This revision was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

The current small break LOCA Evaluation Model was employed, and a series of plant types was considered at varying beginning-of-life non-burst PCTs to develop a new database of burst "data" points. The evaluation tool was updated and validated to reflect the new database information. Small break LOCA analyses which include burst and blockage effects based on direct burnup studies are not impacted by the revision to SPIKE. Also, burst and blockage effects do not adversely impact small break LOCA analyses with PCTs less than 1700°F, such as at Callaway. There is no PCT penalty for this item at Callaway.

Reference

1. NSD-NRC-98-5575, "1997 Annual Notification of Changes to the Westinghouse Small Break LOCA and Large Break LOCA ECCS Evaluation Models, Pursuant to 10 CFR 50.46 (a)(3)(ii)", H.A. Sepp, April 8, 1998.

3. LUCIFER2 DOWNCOMER AZIMUTHAL FLOW PATH CALCULATIONS

The LUCIFER2 code generates component databases that are used by the SATIMP, BASHER, and SPADES input processors to develop plant-specific input models for large and small break LOCA analyses. An error was discovered in LUCIFER2 whereby a vessel diameter below the hot/cold leg elevation was used for calculations that apply above the hot/cold leg elevation, resulting in incorrect values for various downcomer azimuthal flow path parameters. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

For SBLOCA, this error has no impact on the calculated PCT for standard Westinghouse plant calculations, since the downcomer azimuthal flow paths defined in LUCIFER2 are not used.

For LBLOCA, this error only affects the SATAN6 code, since the downcomer azimuthal flow paths defined in LUCIFER2 are not used in BASH. Representative plant calculations using the SATAN6 code have shown that this error correction has a negligible impact on end-of-blowdown results which is being reported as a 0°F PCT effect.

4. BASH VAPOR FILM FLOW REGIME HEAT TRANSFER ERROR

As discussed in Reference 2, the Berenson model for film boiling is used in BASH to compute the cladding-to-fluid heat transfer coefficient for conduction across the vapor film in the vapor film flow regime, which occurs near the quench front and is assumed to consist of a conduction component and a radiation component. An error was discovered in BASH whereby the multiplier on this correlation was programmed incorrectly, resulting in a relatively minor underprediction of the cladding-to-fluid heat transfer coefficient. This error correction was determined to be a Non-Discretionary Change in

accordance with Section 4.1.2 of WCAP-13451.

Representative plant calculations using the BASH code have shown that this error correction has a negligible effect on the core inlet flooding rate during reflood which is being reported as a 0°F PCT effect.

Reference

2. WCAP-9561-P-A, "BART-A1: A Computer Code for the Best Estimate Analysis of Reflood Transients", M.Y. Young et. al., March 1984.

5. BASH BROKEN LOOP ACCUMULATOR EMPTY TIME LOGIC ERROR

An error was discovered in the BASH code that caused almost immediate emptying of the broken loop accumulator upon entry into the reflood phase of the transient, as opposed to the more gradual emptying that would generally be expected based on the accumulator conditions at the end of refill. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

For typical cases where the broken loop accumulator empties prior to entry into the reflood phase of the transient, this change has no effect on results. For atypical cases where the broken loop accumulator empties during reflood, correcting this error will have a very minor effect on the containment pressure early in reflood that would be expected to result in a negligible effect on the core inlet flooding rate. As a result, for any potentially affected cases, this correction is being reported as a 0°F PCT effect.

6. BASH PUMPED INJECTION SPILL LOGIC ERROR

An error was discovered in BASH that resulted in an underprediction of the spilling flow to containment for dry containment plants with accumulator/SI interaction that use interactive COCO. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-132451.

Representative plant calculations using the BASH code have shown that this error correction has a very minor effect on the containment pressure during the reflood which leads to a negligible effect on the core inlet flooding rate. As a result, this correction is being reported as a 0°F PCT effect.

7. LOCBART PELLET DIAMETER ADJUSTMENT ERROR

To account for small differences between the LOCA models and the fuel rod design models (PAD), part of the initialization process for the LOCTA-IV (Reference 3) fuel rod model involves making small adjustments to the fuel pellet diameter such that the pellet average temperature at steady-state full-power operation matches the data from the PAD code. To compensate for this adjustment to the pellet diameter, a factor is applied

to the core power such that the ratio of core power to UO_2 mass remains constant. During review of the LOCBART code (which is based upon the LOCTA-IV model), it was discovered that a second compensating adjustment had also been programmed in, whereby a similar factor was being applied to the pellet density to achieve the same purpose. In order to avoid double-counting for the pellet diameter adjustment effect, the code was corrected to use only the power adjustment per the original WCAP. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

In general, double-counting for the pellet diameter adjustment effect results in too high a power-to-pellet-mass ratio, so correcting the error would be expected to result in a small decrease in PCT that will be reported as 0°F.

Reference

3. WCAP-8301, "LOCTA-IV Program: Loss-of-Coolant Transient Analysis", F. M. Bordelon et. al., June 1974.

8. SPADES TRUNCATION ERROR

Various methods exist for entering input data to the SPADES code, which is used to generate the plant-specific input models for NOTRUMP. An error was discovered in SPADES whereby different methods of entering the input data could lead to minor differences in the resulting NOTRUMP input values, due to differences in the truncation methods. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451. The nature of this change leads to an estimated PCT impact of 0°F.

9. NOTRUMP ARRAY BOUNDARY ERROR

An error was discovered that could potentially affect the data stored within arrays of the NOTRUMP executable. Areas of the NOTRUMP code, and the user externals, were coded such that references to data locations beyond defined array boundaries could possibly have been utilized. This could have led to inappropriate values being used instead of the intended values. To correct this problem, array range checking is now being enabled (during execution) via the use of specific compiler options. With these compiler options activated, attempts to use data outside of defined array boundaries result in code termination with the offending source code line identified to the user. To activate these compiler options, the dimensions on several dummy argument one-dimensional arrays were changed to utilize appropriate coding conventions. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

NOTRUMP models that were considered to encompass the range of array storage requirements were chosen and executed with both the erroneous and corrected code

versions. From the results it was determined that the nature of these changes leads to an estimated PCT impact of 0°F.

10. NOTRUMP VOLUMETRIC/MASS BASED CONSISTENCY ERROR

NOTRUMP contains user input options for either mass or volumetric flow bases in the momentum conservation equations. The latter is used in NOTRUMP for the AP600 Evaluation Model (EM) due to the low pressures experienced in the AP600 SBLOCA transient. When evaluating the use of certain AP600 model features for potential use in the standard Appendix K Evaluation Model, it was discovered that undesirable numerical oscillations were occurring when flow direction changes were predicted in certain flow links, causing the code to abort. The cause of the problem was determined to be an inconsistent method of updating certain mass and volumetric rate variables during portions of the SBLOCA transient. When reviewing the details of this error, it was discovered that other code locations were also affected by this error, which meant that both the standard NOTRUMP EM and the AP600 EM were affected. To correct the problem, several subroutines were modified to correctly update volumetric and mass-based flow calculations on a consistent basis. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451. Representative plant calculations show that the nature of these changes leads to an estimated PCT impact of 0°F.

11. LOCBART TRANSIENT TERMINATION

Recent analyses using the BASH Evaluation Model have predicted downcomer boiling to occur before the cladding temperature and/or oxidation transients have been conclusively terminated. A method has been developed to extend the transient beyond the onset of downcomer boiling by correlating the boiling-induced reduction in downcomer driving head to a corresponding reduction in the core inlet flooding rate. This was determined to be a Discretionary Change in accordance with Section 4.1.1 of WCAP-13451.

Experience to date indicates that the PCT will occur prior to the onset of downcomer boiling for the majority of anticipated applications. If the PCT were to occur following the onset of downcomer boiling, the cladding temperature excursion will already have leveled off sufficiently that any increase in PCT that occurs following the onset of downcomer boiling would be expected to be insignificant. As such, this method of extending the transient beyond the onset of downcomer boiling will be implemented on a forward-fit basis.

12. NOTRUMP INCONEL-690 TUBE PROPERTIES

With the introduction of Alloy 690 tube material in replacement steam generators, NOTRUMP tube material properties were updated to reflect the small differences between Alloy 600 and Alloy 690. This improvement was determined to be a Discretionary Change in accordance with Section 4.1.1 of WCAP-13451.

The differences in material properties between Alloy 600 and Alloy 690 are expected to have a negligible effect on results, so this change will be implemented on a forward-fit basis. This issue does not apply to the current steam generators installed at Callaway.

13. IMPROVED CODE I/O AND DIAGNOSTICS, AND GENERAL CODE MAINTENANCE

Various changes in code input and output format have been 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 calculational results. In addition, various blocks of coding were rewritten to eliminate inactive coding, optimize the active coding, and improve commenting, both for enhanced usability and to facilitate code debugging when necessary. These changes were determined to be Discretionary Changes in accordance with Section 4.4.1 of WCAP-13451. The nature of these changes leads to an estimated PCT impact of 0°F.

14. LOCBART VAPOR FILM FLOW REGIME HEAT TRANSFER ERROR

As discussed in Reference 4, the Berenson model for film boiling is used in LOCBART to compute the cladding-to-fluid heat transfer coefficient for conduction across the vapor film in the vapor film flow regime, which occurs near the quench front and is assumed to consist of a conduction component and a radiation component. An error was discovered in LOCBART whereby the multiplier on this correlation was programmed incorrectly, resulting in a relatively minor underprediction of the cladding-to-fluid heat transfer coefficient. This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451. This error correction results in a -15°F PCT benefit for Callaway since we experience a burst-node-limited PCT occurring coincident with the onset-of-entrainment in reflood.

Reference

4. WCAP-9561-P-A, "BART-A1: A Computer Code for the Best Estimate Analysis of Reflood Transients", M.Y. Young et. al., March 1984.

15. 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. First, when the mixture level attempts to transition a node boundary in a stack of fluid nodes, it can occasionally have difficulty crossing the interface (i.e. level hang). When a mixture level hang occurs at a node boundary, this leads to situations where the flow for a given time step is reset and becomes inconsistent with the matrix solution of the momentum equation for an excessive period of time. This results in local mass/energy errors being generated. In addition, it was discovered that the code was not properly updating metal

node temperatures as a result of the implementation of the nodal region depletion logic which can be incurred when a fluid node empties or fills. It is noted that several aspects of these errors, namely mixture level tracking and flow resets, are not directly tied to erroneous coding; rather, they are a direct result of modeling choices made and documented in the original code development/licensing. These errors affect all code versions up to and including NOTRUMP Version 37.0. These error corrections were determined to contain both Discretionary and Non-Discretionary Change aspects in accordance with Sections 4.1.1 and 4.1.2 of WCAP-13451. The nature of this error leads to a bounding +13°F increase in the calculated PCT for all standard EM applications such as used for Callaway.

16. CYCLE 11 F_Q

As F_Q sensitivity was initially employed to gain offsetting large break LOCA PCT margin for Cycle 11 operation (see ULNRC-4146 dated 11-4-99). Reducing the F_Q limit from the analysis of record (AOR) value of 2.5 to 2.45 yielded an estimated PCT benefit of 100°F. This F_Q reduction was implemented at the beginning of Cycle 11. In Cycle 11 COLR Revision 2 (ULNRC-4268 dated 6/16/00), the F_Q limit was revised to specify a value of 2.45 for core average burnups between 0 and 8000 MWd/MTU and a value of 2.50 for core average burnups between 8000 and 22,450 MWd/MTU. After a minimum burnup of 8000 MWd/MTU, the F_Q limit was returned to 2.50 with a 0°F PCT penalty.

ATTACHMENT TWO

ECCS EVALUATION MODEL

MARGIN ASSESSMENT FOR CALLAWAY

LARGE BREAK LOCA

A.	ANALYSIS OF RECORD	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]

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

N. CURRENT LOCA MODEL ASSESSMENTS AND MARGIN ALLOCATIONS - OCTOBER 2000

1. Increase in Containment Purge PCT Assessment (refer to Item 1 of Attachment 1)	+ 1°F
2. LOCBART Vapor Film Flow Regime Heat Transfer Error (refer to Item 14 of Attachment 1)	- 15°F
3. Cycle 11 F_Q (refer to Item 16 of Attachment 1)	+ 0°F

LICENSING BASIS PCT + MARGIN ALLOCATIONS	=	2120°F
ABSOLUTE MAGNITUDE OF MARGIN ALLOCATIONS SINCE LAST LBLOCA 30-DAY REPORT (ULNRC-4146)		15°F

SMALL BREAK LOCA

A.	ANALYSIS OF RECORD	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.	CURRENT LOCA MODEL ASSESSMENTS - OCTOBER 2000	
	1. NOTRUMP Mixture Level Tracking/Region Depletion Errors (refer to Item 15 of Attachment 1)	+ 13°F

LICENSING BASIS PCT + MARGIN ALLOCATIONS	= 1687°F
ABSOLUTE MAGNITUDE OF MARGIN ALLOCATIONS SINCE LAST SBLOCA 30-DAY REPORT (ULNRC-3101)	= 43°F*

* Per Section 3.5 of WCAP-13451, intentional changes to plant input parameters evaluated per 10 CFR 50.59 (such as the March 1999 safety evaluations) are not tracked against the 10 CFR 50.46 reporting requirements related to a significant change (i.e., > 50°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.