

WOLF CREEK NUCLEAR OPERATING CORPORATION

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Vice President Engineering

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ET 99-0045

U. S. Nuclear Regulatory Commission
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- Reference: 1) Westinghouse Letter SAP-99-148, dated September 22, 1999, from P. J. McDonough, Westinghouse, to WCNOG
2) Letter ET 99-0024, dated June 11, 1999, from R. A. Muench, WCNOG, to NRC

Subject: Docket No. 50-482: 10 CFR 50.46 Thirty Day Report of ECCS Model Changes

Gentlemen:

In Reference 1 Westinghouse Electric Company submitted to Wolf Creek Nuclear Operating Corporation (WCNOG) a mid-year notification of 10 CFR 50.46 reporting information pertaining to the Westinghouse BART/BASH Evaluation Model for Large Break Loss of Coolant Accident (LOCA) analyses. WCNOG has reviewed Reference 1 information concerning changes to and errors discovered in the Large Break LOCA evaluation model used for the Wolf Creek Generating Station (WCGS). WCNOG has concluded that the cumulative effect of changes to, or errors in, the evaluation model on the limiting Large Break LOCA Peak Cladding Temperature (PCT), is significant, as defined in 10 CFR 50.46. Therefore, this report of the Emergency Core Cooling System (ECCS) Evaluation Model changes is being submitted within 30 days according to the reporting requirements set forth in 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."

Attachment I provides a description of the specific errors identified by Westinghouse in Reference 1.

Attachment II provides an update of WCGS PCT margin utilization for both Large Break and Small Break LOCA analyses. The Reference 1 information affects only the Large Break LOCA PCT margin utilization. The Small Break LOCA PCT margin utilization has not been changed from that reported in Reference 2, but is provided in this report for completeness. The PCT margin utilization for both Large Break and Small Break LOCA analyses demonstrates that the PCT values remain well below the 10 CFR 50.46 regulatory limit of 2200 degrees Fahrenheit. Therefore, WCGS is in compliance with 10 CFR 50.46 requirements and no reanalysis or any other action is required.

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PDR ADOCK

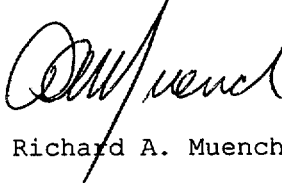
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Attachment III provides a summary of actions committed to by WCNOG in this document.

If you have any questions concerning this matter, please call me at (316) 364-4034, or Mr. Michael J. Angus at (316) 364-4077.

Very truly yours,



Richard A. Muench

RAM/rlr

Attachments

cc: J. N. Donohew (NRC), w/a
W. D. Johnson (NRC), w/a
E. W. Merschoff (NRC), w/a
Senior Resident Inspector (NRC), w/a

ATTACHMENT I
ECCS EVALUATION MODEL
DESCRIPTIONS OF MODEL ERRORS FOUND

LOCBART ZIRC-WATER OXIDATION ERROR

Background

Westinghouse identified a potential issue related to a logic error discovered in the LOCBART code. The 1981 Evaluation Model with BASH used for Wolf Creek Generating Station (WCGS) uses the LOCBART computer code to calculate the thermal and hydraulic response of the hot assembly and hot rod to a postulated Large Break loss of coolant accident. Consistent with Appendix K requirements, the Baker-Just model is used to calculate the cladding metal-water reaction rate. As discussed in Reference 1, a logic error in the LOCBART code caused the Baker-Just metal-water reaction calculations to be performed three times per timestep. Correcting the error was found to reduce the total cladding oxidation while increasing the heat deposition in the cladding. This could potentially affect the 10 CFR 50.46 acceptance criterion for peak cladding temperature.

This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Estimated Effect

The assessment was derived using a correlation of peak cladding temperature (PCT) changes that were based on sensitivity studies using the corrected code version. The PCT changes were taken from a number of representative PWR Large Break LOCA transient calculations, and suitably grouped into early/late PCT and burst node limited/non-burst node limited behavior. The appropriate correlation branch was then implemented for the existing plant specific analysis results. The effect of this error on existing results was determined to be a 33°F penalty.

LOCBART SPACER GRID SINGLE-PHASE HEAT TRANSFER ERROR

Background

As discussed in Reference 2, the Yao-Hochreiter-Leech correlation is used in the LOCBART code to compute the single-phase heat transfer enhancement for axial elevations located downstream of spacer grids. The Safety Evaluation Report for Reference 2 requires that a length-averaged value be used to specify the heat transfer coefficient for a given fluid cell, since use of a local value corresponding to the forward edge or the rear edge of the cell could be non-conservative. It was determined that the length-averaging in LOCBART was not being done correctly in all cases. This error affects the 1981 Westinghouse Large Break LOCA Evaluation Model with BASH used for WCGS.

This error correction was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Estimated Effect

The PCT assessment was selected to bound the results of nine LOCBART sensitivity calculations for typical PWR Large Break LOCA transients using the corrected code version. The effect of this error on existing results was determined to be a 15°F penalty.

ACCUMULATOR LINE/PRESSURIZER SURGE LINE DATA

Background

An issue was identified where the accumulator line piping schedule installed at a plant was different than the design value. Specifically, a discrepancy was found at a Westinghouse 4-loop plant, where parameters for Schedule 140 pipe for the accumulator discharge piping were used in the accident analyses instead of parameters for the Schedule 160 pipe that was actually installed in the plant. The impact from using parameters associated with a higher pipe schedule includes a reduction of the inside diameter of the pipe, which reduces the flow area. Consequently, pipe losses are increased with a resultant decrease in flow. These parameters, which are used as input to accident analyses performed by Westinghouse, could affect the results of the analyses.

This discovery led to a review of various geometric data related to the accumulator lines and pressurizer surge lines, and these revised data were compared to the LOCA analysis values to determine the effect on existing analysis results.

This change affects both the 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP and the 1981 Westinghouse Large Break LOCA Evaluation Model with BASH used for WCGS.

For cases where erroneous data were identified, this issue was determined to be a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Estimated Effect

For Small Break LOCA, the nature of this issue leads to an estimated PCT impact of 0°F. For Appendix K Large Break LOCA, the effect of this issue on existing results was determined on a plant specific basis. Evaluation of the plant specific analysis of the record (AOR), based on a comparison between the values used in the analysis and the parameter values associated with the installed piping, shows that the plant was within screening criteria established for this issue. As such, the estimated impact to the LBLOCA analysis is 0°F.

SUPPLEMENTAL PCT INFORMATION FOR WCGS

Rebaseline of Limiting AOR Case

The previous PCT rackup sheets for WCGS were submitted to the NRC in Reference 3. Reference 3 reported the cumulative Large Break LOCA PCT as 2081°F. A previous (12/96) LOCBART rebaseline run for the limiting AOR case resulted in a peak clad temperature benefit of 63°F. This benefit was never credited on the PCT rackup and is being credited now. This 63°F benefit appears in the PCT rackup sheet in Attachment II entitled "Large Break Loca Peak Clad Temperature (Pct) Margin Utilization," Section F, OTHER MARGIN ALLOCATIONS, Item 3, "Rebaseline of Limiting AOR Case."

References

1. NSD-NRC-99-5845, "Closure of Westinghouse Interim Report No. 98-029", H.A. Sepp, August 27, 1999.
2. WCAP-10484-P-A, "Spacer Grid Heat Transfer Effects During Reflood", M.Y. Young et. al., March 1991.
3. Letter ET 99-0013, dated March 17, 1999, R. A. Muench, WCNO, to NRC

ATTACHMENT II
ECCS EVALUATION MODEL
PEAK CLADDING TEMPERATURE (PCT)
MARGIN ASSESSMENTS

***** LARGE BREAK LOCA PEAK CLAD TEMPERATURE (PCT) MARGIN UTILIZATION *****

Evaluation Model:	1981 EM with BASH
Fuel:	17X17 V5H w/IFM, non-IFBA 275 psig
Peaking Factor:	FQ=2.50, F _{dH} =1.65
SG Tube Plugging:	10%
Power Level:	3565 MW _{th}
Limiting transient:	C _D =0.4, Min. SI, Reduced Tav _g

A. ANALYSIS OF RECORD (Rerating 8/92)

Peak Cladding Temperature (PCT): 1916°F (1)

B. PRIOR PERMANENT ECCS MODEL ASSESSMENTS Δ PCT = 0°F (2)

C. 10 CFR 50.59 SAFETY EVALUATIONS

- | | |
|--|-------------------------|
| 1. Loose Parts | Δ PCT = 20°F (3) |
| 2. Containment Purge Evaluation | Δ PCT = 0°F (4) |
| 3. Cycle 10 Fuel Assembly Design Changes | Δ PCT = 95°F (5) |
| 4. Fuel Rod Crud | Δ PCT = 0°F (6) |

TOTAL 10 CFR 50.59 LARGE BREAK ASSESSMENTS Δ PCT = 115°F

D. 1999 10 CFR 50.46 MODEL ASSESSMENTS

- | | |
|---|-------------------------|
| (Permanent Assessment of PCT Margin) | |
| 1. LOCBART Zirc-Water Oxidation Error | Δ PCT = 33°F (9) |
| 2. LOCBART Spacer Grid Single-Phase Heat Transfer Error | Δ PCT = 15°F (9) |

E. TEMPORARY ECCS MODEL ISSUES Δ PCT = 0°F

F. OTHER MARGIN ALLOCATIONS

- | | |
|--|--------------------------|
| 1. Transition Core (STD to V5H) | Δ PCT = 50°F (7) |
| 2. Cold Leg Streaming Temperature Gradient | Δ PCT = 0°F (8) |
| 3. Rebaseline of Limiting AOR Case (12/96) | Δ PCT = -63°F (9) |

LICENSING BASIS PCT + MARGIN ALLOCATIONS PCT = 2066°F

CUMULATIVE ABSOLUTE MAGNITUDE OF PCT CHANGES SINCE LAST 30-DAY REPORT (LETTER ET 95-0096) $\Sigma|\Delta$ PCT| = 63°F (10)

Notes:

- Westinghouse Topical Report WCAP-13456, "Wolf Creek Generating Station NSSS Rerating Licensing Report," October 1992.
- Westinghouse to WCNOG letter SAP-99-114, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, 10 CFR 50.46 Annual Notification and Reporting for 1998," March 5, 1999.
- Westinghouse to WCNOG letter SAP-90-148, "Wolf Creek Nuclear Operating Corporation, RCS Loose Parts Evaluation," April 18, 1990.
- Westinghouse to WCNOG letter SAP-94-102, "Containment Mini purge Isolation Valve Stroke Time Increase," January 12, 1994.
- Westinghouse to WCNOG letter 97SAP-G-0009, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, Safety Assessment for the Wolf Creek Generating Station with ZIRLO™ Fuel Assemblies," February 7, 1997.

6. Westinghouse to WCNOG letter 97SAP-G-0075, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, Wolf Creek Crud Deposition/Axial Offset Anomaly Safety Evaluation," September 29, 1997. (This penalty will be carried until such time it is determined to no longer apply).
7. Westinghouse to WCNOG letter SAP-93-111, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, LOCA PCT Summary Sheets," April 14, 1993. (Transition core penalty applies on a cycle-specific basis for reloads utilizing both V5H (with IFMs) and STD fuel until a full core of V5H is achieved).
8. Westinghouse to WCNOG letter SAP-93-701, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, 10 CFR 50.46 Notification and Reporting Information," January 25, 1993. [A PCT benefit of <2.5 degrees Fahrenheit was assessed; however, a benefit of zero (0) degrees Fahrenheit will be tracked for reporting purposes].
9. Westinghouse to WCNOG Letter SAP-99-148, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, 10 CFR 50.46 BART/BASH Evaluation Model Mid-Year Notification and Reporting for 1999," September 22, 1999.
10. Includes the cumulative PCT effect of 15°F reported in Letter ET 99-0024, dated June 11, 1999, from R. A. Muench, WCNOG, to NRC.

***** SMALL BREAK PEAK CLAD TEMPERATURE (PCT) MARGIN UTILIZATION *****

Evaluation Model: 1985 EM with NOTRUMP
Fuel: 17X17 V5H w/IFM, non-IFBA 275 psig
Peaking Factor: FQ=2.50, F_{dH}=1.65
SG Tube Plugging: 10%
Power Level: 3565 MW_{th}
Limiting transient: 3-inch Break

A. ANALYSIS OF RECORD (Rerating 8/92)

Peak Cladding Temperature (PCT): 1510°F (1)

B. PRIOR PERMANENT ECCS MODEL ASSESSMENTS Δ PCT = 31°F (2)

C. 10 CFR 50.59 SAFETY EVALUATIONS

- 1. Loose Parts Δ PCT = 45°F (3)
- 2. Cycle 10 Fuel Assembly Design Changes Δ PCT = 1°F (6)
- 3. Reduced Feedwater Inlet Temperature Δ PCT = 10°F (4)
- 4. Fuel Rod Crud Δ PCT = 4°F (5)

TOTAL 10 CFR 50.59 SMALL BREAK ASSESSMENTS Δ PCT = 60°F

D. 1999 10 CFR 50.46 MODEL ASSESSMENTS
(Permanent Assessment of PCT Margin)

- 1. None Δ PCT = 0°F

E. TEMPORARY ECCS MODEL ISSUES

- 1. None Δ PCT = 0°F

F. OTHER MARGIN ALLOCATIONS

- 1. Cold Leg Streaming Temperature Gradient Δ PCT = 7°F (7)

LICENSING BASIS PCT + MARGIN ALLOCATIONS PCT = 1608°F

CUMULATIVE ABSOLUTE MAGNITUDE OF PCT CHANGES $\Sigma|\Delta$ PCT| = 22°F
(Reported in last 30-DAY REPORT, LETTER ET 99-0024)

Notes:

1. Westinghouse Topical Report WCAP-13456, "Wolf Creek Generating Station NSSS Rerating Licensing Report," October 1992.
2. Westinghouse to WCNO letter SAP-99-114, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, 10 CFR 50.46 Notification and Reporting for 1997," March 5, 1999.
3. Westinghouse to WCNO letter SAP-90-148, "Wolf Creek Nuclear Operating Corporation, RCS Loose Parts Evaluation," April 18, 1990.
4. Westinghouse to WCNO letter SAP-96-119, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, Small Break LOCA Evaluation for Reduced Feedwater Temperature," May 30, 1996.
5. Westinghouse to WCNO letter 97SAP-G-0075, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, Wolf Creek Crud Deposition/Axial Offset Anomaly Safety Evaluation," September 29, 1997. (This penalty will be carried until such time it is determined to no longer apply).

6. Westinghouse to WCNOC letter 97SAP-G-0009, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, Safety Assessment for the Wolf Creek Generating Station with ZIRLO™ Fuel Assemblies," February 7, 1997.
7. Westinghouse to WCNOC letter SAP-93-701, "Wolf Creek Nuclear Operating Corporation, Wolf Creek Generating Station, 10 CFR 50.46 Notification and Reporting Information," January 25, 1993.

LIST OF COMMITMENTS

The following table identifies those actions committed to by Wolf Creek Nuclear Operating Corporation (WCNOC) in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Michael J. Angus, Manager Licensing and Corrective Action at Wolf Creek Generating Station, (316) 364-4077.

COMMITMENT	Due Date/Event
None	N/A