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AUTH. NAME AUTHOR AFFILIATION
 TUCKMAN, M.S. Duke Power Co.
 RECIP. NAME RECIPIENT AFFILIATION
 Document Control Branch (Document Control Desk)

SUBJECT: Provides NRC w/brief summary of events that occurred since issued favorable SER for current rev of B&W ECCS evaluation model in Oct 1987, per 10CFR50.46. Two significant changes or errors in model reported.

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Duke Power Company
Nuclear Production Dept.
P.O. Box 1007
Charlotte, N.C. 28201-1007

M.S. TUCKMAN
Vice President
Nuclear Operations
(704)373-3851



DUKE POWER

February 7, 1991

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
10CFR50.46

Gentlemen:

The B&W Owners Group has reviewed the reporting requirements regarding errors or changes in the Emergency Core Cooling System (ECCS) Evaluation Models as specified in 10CFR50.46. Since no minor changes have been made to the B&W ECCS Evaluation Model, an annual report is not required. However, I would like to take this opportunity to provide the NRC with a brief summary of the events that have occurred since the NRC issued a favorable Safety Evaluation Report for the current revision of the B&W ECCS Evaluation Model in October 1987. In accordance with 10CFR50.46(a)(3) two "significant" changes or errors in the B&W ECCS Evaluation Model were reported to the NRC (Attachment 1). In addition, Oconee specific inputs which may affect the LOCA analyses performed with the B&W ECCS Evaluation Model are addressed in Attachment 2.

Very truly yours,

M. S. Tuckman

PJN/49

xc: S. D. Ebnetter, Regional Administrator
U. S. Nuclear Regulatory Commission, Region II
101 Marietta Street, NW Suite 2900
Atlanta, GA 30323

L. A. Wiens, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
One White Flint North, Mail Stop 9H3
Washington, D. C. 20555

P. H. Skinner, Resident Inspector
Oconee Nuclear Station

Adol
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PDR ADDCK 05000269
PDR

SUMMARY OF "SIGNIFICANT" CHANGES OR ERRORS IN
THE B&W ECCS EVALUATION MODEL

In compliance with 10CFR50.46(a)(3) the NRC has previously been notified of the following two "significant" changes or errors in the B&W ECCS Evaluation Model:

1. Notification:

The reevaluation of the REFLOD3 portion of the B&W ECCS Evaluation Model that incorporated a) steam condensation by ECCS-injected liquid in the reactor vessel downcomer and b) the separation of the core and the core bypass control volumes during post-LOCA core reflooding (Reference 1).

Disposition:

The NRC was briefed on these issues on May 5, 1988, and a report that provided the results of the evaluation performed by B&W for the B&W Owners Group was forwarded to the NRC (Reference 2). The conclusions obtained from this evaluation were that the currently approved B&W ECCS Evaluation Model still conservatively predicts peak clad temperature response and that there is no safety concern regarding the current REFLOD3 model.

Therefore as a result of this evaluation, no model changes were made to the B&W ECCS Evaluation Model.

2. Notification:

LOCA limits for 177 FA lowered loop operating plants (Reference 3).

Disposition:

The NRC has been notified of a "significant" change in the application of the B&W ECCS Evaluation Model with respect to the replacement of the BAW-2 critical heat flux (CHF) correlation with the BWC CHF correlation. Evaluations of the BWC CHF correlation have been completed and reported in references 3 and 4. There are no cases which indicated that peak cladding temperature (PCT) exceeded 2200F, but there are cases which showed a PCT increase of greater than 50F over previous results. In compliance with 10CFR50.46, the NRC was notified of the change in PCT (References 3 and 4).

In addition, a change to the EM has recently been made by replacing the TAC02 steady state fuel pin performance code with TAC03. The NRC was notified of the transition from TAC02 to TACO 3 fuel pin model, Reference 5, for the B&W ECCS Evaluation Model (Reference 6). The NRC approved of this transition in Reference 7.

REFERENCES

1. Letter to Mr. G. Holahan, USNRC, from Mr. P. F. Guill, Chairman B&W Owners Group Analysis Committee, B&W Owners Group (BWO) ECCS Evaluation Model REFLOD3, May 13, 1988.
2. Letter to Mr. R. F. Dudley, USNRC, from Mr. P. F. Guill, Chairman B&W Owners Group Analysis Committee, Transmittal of an Evaluation of Two Models in the REFLOD3 Computer Code, November 14, 1988.
3. Letter to Dr. T. E. Murley, USNRC, from Mr. J. H. Taylor, B&W, LOCA Limits for 177FA Lowered Loop Operating Plants, March 19, 1990.
4. Letter to Dr. T. E. Murley, USNRC, from Mr. J. H. Taylor, B&W, LOCA Limits for 177FA Lowered Loop Operating Plants, August 23, 1990.
5. Letter to Dr. T. E. Murley, USNRC, from Mr. J. H. Taylor, Transition to TAC03 Fuel Pin Model for Fuel Performance Input to ECCS Analysis, July 12, 1990.
6. BAW-10104A, Rev. 5, B&W Topical Report, B&W's ECCS Evaluation Model, Revision 5, November 1988.
7. Letter from Dr. T. E. Murley, USNRC, to Mr. J. H. Taylor, Acceptance for Incorporating TAC03 in the Evaluation Model for the Emergency Core Cooling System (ECCS), August 2, 1990.
8. Letter to NRC Document Control Desk, from Mr. H. B. Tucker (Duke), Docketing Reference 3, July 18, 1990.
9. Letter to NRC Document Control Desk, from Mr. M. S. Tuckman (Duke), Docketing Reference 4, January 14, 1991.

SUMMARY OF CHANGES IN OCONEE SPECIFIC INPUTS
FOR THE B&W ECCS EVALUATION MODEL

1. Increased ECCS Delay Time (Reference B-1)

Duke requested that B&W evaluate a 48 second delay for ECCS injection; previous licensing assumptions included a 35 second ECCS delay. The additional ECCS delay time resulted in increased PCT temperatures, however, the maximum PCT increase was less than 50F and no PCT was found to exceed 2200F. Therefore, the 48 second ECCS delay time was found to be acceptable. These results were based on the 4-ft core elevation calculation in Reference B-2.

2. Reduced Low Pressure Injection (LPI) Flow Rates (Reference B-3)

While replacing LPI flow instrumentation in 1989, Duke determined that LPI flow delivery capability, when error adjusted, was slightly less than that assumed for licensing LBLOCA calculations. A subsequent assessment, hand calculation, showed that the existing LPI capacity, while slightly lower than that assumed for existing LBLOCA calculations, was sufficient to maintain core reflooding and resulted in negligible PCT differentials.

4. Tube Plugging Impact on LBLOCA (References B-4 and B-9)

The impact of plugging up to 3000 SG tubes in any of the Oconee nuclear plants relative to LOCA results was evaluated. No impact was estimated for LOCA calculations.

5. Burnup Dependent Limits (Reference B-5)

The burnup dependent LOCA limits have been modified such that the BOL limits for the 6-ft elevation are now applicable throughout the entire fuel cycle. The LOCA limits at the 2-ft and 4-ft elevations are allowed to increase 1kW/ft and .5 kW/ft, respectively, above the BOL values at a burnup of 1000 MWD/MTU. Calculations are currently being performed to justify the LOCA linear heat rate (LHR) limit increases at the 2-ft and 4-ft elevations.

Historically the LOCA limits at the 2-ft, 4-ft, and 6-ft elevations have been ruptured node limited with respect to peak clad temperatures (PCTs). In addition, the linear heat rates at the 2-ft, 4-ft, and 6-ft elevations were allowed to increase with burnup due to the reduction in stored energy of the fuel and the subsequent impact on the ruptured node. However, recent modifications to the B&W ECCS Evaluation Model (e.g., NUREG-0630, FLECSSET, BWC, etc.) have resulted in unruptured node limited PCT's at the 6-ft elevation; the 2-ft and 4-ft elevations have remained ruptured node limited.

Traditionally an extrapolation technique, which was constructed in 1982 and was based upon burnup dependent LOCA calculations from 1980, was used to establish burnup dependent LOCA limits for all B&W operating plants. However, recent modifications to the B&W ECCS Evaluation Model have rendered the extrapolation technique inappropriate. Therefore, the extrapolation technique will no longer be used to establish burnup dependent LOCA limits.

6. Oconee ECCS Delay Time With BWC CHF Correlation
(References B-6, B-7, and B-8)

The base 4-ft calculation, at 16.1kW/ft, was re-evaluated based on the BWC CHF correlation and TAC02. The new PCTs were 2160F and 1946F in the ruptured and un-ruptured nodes, respectively. This evaluation was repeated at 15.9 kW/ft. The new PCTs were 1856F and 1916F in the ruptured and un-ruptured nodes. A third analysis was performed with TAC03 at 16.1 kW/ft. The PCTs were 1627F and 1786F in the ruptured and un-ruptured nodes. These additional calculations justified the 48 second ECCS delay time.

REFERENCES

- B-1. B&W Document 86-1176201-00, 177FA-LL 48 Sec ECCS Delay Time, M. A. MA, 9/27/89
- B-2. BAW-1915A, B&W Document 77-1173653-00, Bouding Analytical Assessment of NUREG-0630 Models on LOCA kW/ft Limits with use of FLECSET, Nov. 1988
- B-3. B&W Document 51-1175341-00, LPI Flow Instr. Error Evaluation, J. C. Seals, 7/14/89
- B-4. B&W Document 86-1172593-00 DPCo SG Tube Plugging Evaluation, 8/5/88
- B-5. B&W Document 51-1200407-00, Oconee ECCS LOCA Limits, January 1991
- B-6. B&W Document 32-1178625-00, 177FA-LL 4 Ft. LOCA Eval., April 1990
- B-7. B&W Document 32-1178625-01, 177FA-LL 4 Ft. LOCA Eval., October 1990
- B-8. B&W Document 86-1201110-00, TAC03 4 Ft. LOCA LHR Limit, December 1990
- B-9. OSC-3630 Steam Generator Tube Plugging Evaluation, June 6, 1989.