



May 29, 1992

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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 & 50-368
License Nos. DPR-51 & NFP-6
Errors or Changes in the Emergency
Core Cooling System Evaluation;
Annual Report for 1991

Gentlemen:

10CFR50.46(a)(3)(ii) requires the licensee to report each change to or error discovered in an acceptable evaluation model or in the application of such a model for the emergency cooling system (ECCS) at least annually and its estimated effect these changes or errors have on the limiting ECCS analysis. The purpose of this submittal is to provide the information required by 10CFR50.46(a)(3)(ii) for Arkansas Nuclear One, Units 1 and 2 (ANO-1&2) for the reporting period from December, 1990 through December, 1991.

ANO-1

One significant error (peak cladding temperature change of greater than 50°F) was previously reported to the NRC by Babcock and Wilcox (B&W) during this reporting period. A summary of the notification is provided in Attachment 1. No minor changes have been made to the B&W ECCS evaluation model. A brief summary of the changes in the ANO-1 specific inputs for the B&W ECCS evaluation model that have been made since the 1990 annual ECCS report (OCAN109107, dated October 3, 1991) is provided in Attachment 2.

ANO-2

No reportable changes or errors have been identified for the Combustion Engineering evaluation models used for ANO-2 during this reporting period.

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Should you have any questions regarding this submittal, please contact me.

Very truly yours,



for James J. Fisicaro
Director, Licensing

JJF/RWC/sjf
Attachments

cc: Mr. Robert Martin
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-8064

NRC Senior Resident Inspector
Arkansas Nuclear One - ANO-1 & 2
Number 1, Nuclear Plant Road
Russellville, AR 72801

Mr. Thomas W. Alexion
NRR Project Manager, Region IV/ANO-1
U. S. Nuclear Regulatory Commission
NRR Mail Stop 13-H-3
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852

Ms. Sheri Peterson
NRR Project Manager, Region IV/ANO-2
U. S. Nuclear Regulatory Commission
NRR Mail Stop 13-H-3
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852

ATTACHMENT 1

SUMMARY OF SIGNIFICANT ERROR IN THE B&W EVALUATION MODEL REPORTED TO THE NRC AND ITS DISPOSITION

In compliance with 10CFR50.46(a)(3), the NRC has previously been notified of the following "significant" error in an input to CRAFT2, one of the computer codes in the B&W ECCS evaluation model:

Notification:

The continued acceptability of the current LOCA linear heat rate (LHR) limits for both the raised and lowered loop 177-FA plants, despite an error in the core crossflow model inputs to the CRAFT2 computer code.

Disposition:

The NRC was notified of the core crossflow error in the CRAFT2 input model in September, 1991 (Reference 1). The error resulted in the core crossflow paths being modeled incorrectly for all elevations, except for the 6-foot elevation, in the analyses defining the current beginning-of-life (BOL) LHR limits for all 177-FA plants. A lowered-loop LOCA analysis performed at the 4-foot elevation with the corrected input resulted in a peak cladding temperature (PCT) that remained below the 2200°F limit, but the change was greater than 50°F, and thus required NRC notification. A B&W evaluation of the error concluded that the previously accepted LHRs remain conservative despite the crossflow modeling error. This conclusion was based on the temperature decrease calculated with fuel data input from TACO3. As a result of this evaluation, the LHRs were not changed.

The B&W Owners Group has no immediate plan to provide reanalysis of the LOCA LHR limits correcting the input error. The PCTs associated with the current LOCA LHR limits were shown to be conservative, accounting for the input error correction and TACO3, such that 10CFR50.46 and 10CFR50, Appendix K requirements are met. Additionally, it is expected that all of the utilities will be transitioning to the Mk-B9 or later fuel design over the next few fuel cycles. The analyses supporting the Mk-B9 fuel do not contain this input error.

REFERENCE

1. Letter to Dr. T. E. Murley, USNRC, from Mr. J. H. Taylor, B&W, "LOCA LHR Limits for 177-FA Lowered Loop and Raised Loop Operating Plants", JHT/91-142, September 3, 1991.

ATTACHMENT 2

SUMMARY OF CHANGES IN ANO-1 SPECIFIC INPUTS FOR THE B&W ECCS EVALUATION MODEL SINCE THE 1990 ANNUAL REPORT

1. 6-Foot BOL LOCA LHR Limit (Reference 1)

Previously, the 6-foot LHR limit was 16.5 kW/ft until 1000 MWd/mtU, when the limit increased to 18.0 kW/ft. Reference 2 reduced the burnup dependent limit to 16.5 kW/ft. The 6-foot BOL LOCA LHR limit was then reduced from 16.5 to 16.1 kW/ft to gain additional margin to 2200°F for the Mk-BZ fuel, due to the metal-water reaction (Reference 3). To ensure that the estimated reduction was adequate, a set of LOCA analyses was performed using the modified FLECSSET code and fuel input from the TACO2 code. The results showed that for an LHR of 16.1 kW/ft at the 6-foot elevation, the PCT remained below the limit of 2200°F. Reference 4 further reduced the burnup dependent 6-foot LHR limit to 16.1 kW/ft, equal to the BOL LHR limit.

2. LHR Increases at the 2- and 4-Foot Elevations (Reference 5)

The BOL LOCA LHR limits at the 2- and 4-foot core elevations are 14.5 and 16.1 kW/ft, respectively. At a burnup corresponding to 1000 MWd/mtU, the 2-foot LHR limit is increased to 15.5 kW/ft and the 4-foot LHR limit is increased to 16.6 kW/ft. The increased LHR limits were extrapolated from the BOL limits. A set of time in life LOCA analyses were performed to verify these LHR increases. The analyses were performed to verify these LHR increases. The analyses used the approved ECCS fuel input code, TACO3, and the Mk-B8 fuel design.

The LOCA analyses verified that the current LHR increases at the 2- and 4-foot elevations are acceptable from the 1000 MWd/mtU to a burnup corresponding to a pin pressure of 2200 psia. Beyond this time in life, the LHR is reduced to maintain the pin pressure below the RCS pressure, the current TACO3 SER internal pin pressure restriction.

3. 4-Foot LOCA LHR Limit (Reference 6)

The 4-foot LOCA LHR limit of 16.1 kW/ft was reevaluated using the revised fuel pin performance code, TACO3. The previous, generic 4-foot analysis at 16.1 kW/ft, using TACO2 fuel data, resulted in a PCT of 2160°F. To allow for continued justification of plant parameter variations, the approved TACO3 fuel performance code was used to reevaluate the 4-foot case. The analyses resulted in a PCT below the limit of 2200°F, thus confirming the 4-foot LHR limit of 16.1 kW/ft. This analysis was later revised because of the discovery of a core crossflow modeling error in the CRAFT2 inputs, as discussed in Attachment 1 of this letter.

REFERENCES

1. B&W Document 32-1177157-01, "FLECSET Impact on BZ Fuel".
2. B&W Document 1171136-02, "ANO-1 ECCS Reload Cycle 9".
3. B&W Document 51-1174782-00, "Mk-BZ ECCS LOCA Limits".
4. B&W Document 51-1178633-00, "ANO-1 Cycle 10 ECCS Reload".
5. B&W Document 32-1200400-00, "2- and 4-Foot Time in Life Study".
6. B&W Document 86-1201110-00, "LOCA with TACO3 4-Foot 16.1 kW/ft".