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Subject: Annual Report of Changes to the Emergency Core Cooling System Evaluation Model In Accordance With 10 CFR 50.46(a)(3)

Ladies and Gentlemen:

In accordance with 10 CFR 50.46(a)(3), the FirstEnergy Nuclear Operating Company (FENOC) herewith submits the attached annual report for changes and errors to the Emergency Core Cooling System (ECCS) Evaluation Model (EM) used at the Davis-Besse Nuclear Power Station (DBNPS). This report covers the period of January 1, 2003 to December 31, 2003.

If you have any questions or require additional information, please contact Mr. Gregory A. Dunn, Manager, Regulatory Affairs, at (419) 321-8450.

Very truly yours,

AWB/s

Attachments

cc: Region III Administrator
DB-1 NRC Senior Resident Inspector
DB-1 NRC Senior Project Manager
Utility Radiological Safety Board of Ohio

A001

Annual Report of Changes to the 10 CFR 50.46 Emergency Core Cooling System Evaluation Model for the Davis-Besse Nuclear Power Station

10 CFR 50.46(a)(3) states that each holder of an operating license shall report to the Nuclear Regulatory Commission (NRC) at least annually each change or error in an acceptable Emergency Core Cooling System (ECCS) Evaluation Model (EM) or in the application of such a model that affects the Peak Cladding Temperature (PCT) calculation.

EM Description

This model is applicable to all Babcock &Wilcox (B&W) designed pressurized water reactors for large and small break LOCA analyses. The NRC approved topical report for this evaluation model was BAW-10192P-A (Reference 1).

The large break loss of coolant accident (LBLOCA) Evaluation Model consists of four computer codes: (1) BAW-10164P-A, RELAP5/MOD2-B&W to compute the system, core, and hot control rod response during blowdown (Reference 2), (2) BAW-10171P-A, REFLOD3B to calculate the time for refill of the lower plenum and core reflood rate (Reference 3), (3) BAW-10095-A, CONTEMPT to compute the containment pressure response (Reference 4), and (4) BAW-10166P-A, BEACH (RELAP5/MOD2-B&W reflood heat transfer package) to determine the hot pin thermal response during refill and reflood phases (Reference 5 and Reference 6). The small break loss of coolant accident (SBLOCA) Evaluation Model consists of two codes: (1) BAW-10164P-A, RELAP5/MOD2-B&W to compute the system, core, and hot control rod response during the transient and (2) BAW-10095-A, CONTEMPT to compute the containment pressure response, if needed. A NRC-approved fuel code (currently BAW-10162P-A, TACO3 [Reference 7] or BAW-10184P-A, GDTACO [Reference 8]) is used to supply the fuel rod steady-state conditions at the beginning of the small or large break LOCA. These codes are approved for use with M5 cladding via the Safety Evaluation Report (SER) on BAW-10227P-A (Reference 9).

EM Changes or Errors

Change of RELAP5/MOD2-B&W for Mark-B-HTP Fuel

The BHTP Critical Heat Flux (CHF) correlation from BAW-10241P (BHTP DNB Correlation Applied with LYNXT, Reference 10) was implemented into the RELAP5/MOD2-B&W code for analysis of Mark-B-HTP fuel. This change was made to support the EM requirement in Section 4.3.4.8 of Volume 1 of BAW-10192P-A (Reference 1), which states that the LOCA analyses will use the same CHF correlation that is used for the fuel pin Departure from Nucleate Boiling (DNB) analyses.

- EM Change – Include BHTP CHF correlation in RELAP5/MOD2-B&W.
- A PCT change is not applicable to non-Mark-B-HTP fuel assemblies because introduction of this correlation does not affect the temperature calculation for those analyses.
- There are no changes to Davis-Besse PCT as a result of changes to RELAP5/MOD2-B&W code for Mark-B-HTP Fuel (CHF Correlation).

EM Application Changes or Errors

Reduced High Pressure Injection (HPI) Flows

In response to surveillance tests of the modified HPI pumps, an additional three percent reduction in the HPI flows was analyzed and assessed to determine the impact on the SBLOCA spectrum results. The analyses were performed based on EM R0.6 to allow for a potential Appendix K uprate during Cycle 14 with credit of the Caldon instrumentation (used to measure Feedwater flow). With the reduction in the HPI flow rate, the PCT for the limiting SBLOCA (full area HPI line) was analyzed to be 1504.8 degrees Fahrenheit (F), for an increase of 77.3 F. The results of the HPI line break analysis were used to evaluate the full LOCA spectrum. It was determined that the full area HPI line break remained limiting. The analyses and evaluations were performed in Reference 11 and the results reported to FirstEnergy Nuclear Operating Company via Reference 12. Since the analysis resulted in a PCT increase greater than 50 F, this change was reported to the NRC in Reference 13.

The HPI is not directly credited in the LBLOCA PCT analyses.

- Plant Change – Reduced HPI flows for modified HPI pump.
- The SBLOCA PCT was analyzed to be 1504.8 F for this plant change, an increase of 77.3 F.

References

1. AREVA Topical Report BAW-10192P-A, Rev. 0 "BWNT LOCA - BWNT Loss-of-Coolant Accident Evaluation Model for Once-Through Steam Generator Plants," June 1998.
2. AREVA Topical Report BAW-10164P-A, Rev. 4, "RELAP5/MOD2-B&W – An Advanced Computer Program for Light Water Reactor LOCA and Non-LOCA Transient Analysis," November 2002.
3. AREVA Topical Report BAW-10171P-A, Rev. 3, "REFLOD3B – Model for Multinode Core Reflooding Analysis," December 1995.
4. AREVA Topical Report BAW 10095-A, Rev. 1, "CONTEMPT – Computer Program for Predicting Containment Pressure-Temperature Response to a LOCA," April 1978.
5. AREVA Topical Report BAW- 10166P , Rev. 5, "BEACH - A Computer Program for Reflood Heat Transfer During LOCA," December 2001.
6. Letter dated November 7, 2003 from H. N. Berkow USNRC to J. F. Mallay (Areva), "Issuance of Revised Safety Evaluation for Referencing of Appendices H and I to BAW-10166P-A, "BEACH – Best Estimate Analysis Core Heat Transfer, A Computer Program for Reflood Heat Transfer During LOCA", (TAC No. MC0341), USNRC ADAMS Accession Number ML033140275.
7. AREVA Topical Report BAW-10162P-A, Rev. 0, "TACO3 Fuel Pin Thermal Analysis Code," October 1989.
8. AREVA Topical Report BAW-10184P-A, Rev. 0, "GDTACO Urania – Gadolinia Fuel Rod Thermal Analysis Code," February 1995.
9. AREVA Topical Report BAW-10227P-A, Rev. 1, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," June 2003.
10. AREVA Topical Report BAW-10241P, "BHTP DNB Correlation Applied with LYNXT," December 2002.
11. AREVA Proprietary Document 32-5004328-03, "DB Mk-B10K SBLOCA Spectrum", December 10, 2003.
12. AREVA Letter FANP-03-3586 dated December 10, 2003, from J. A. Klingenfus (AREVA) to K. S. Zellers (FirstEnergy), "Project Number 4160529, 'Full Double-Ended Guillotine HPI Line Break with 4.5% HPI Head Reduction'".
13. Letter to NRC, Serial Number 3017, dated January 5, 2004, Subject: Notification of Significant Change of Input to the Emergency Core Cooling System Evaluation Model in Accordance with 10 CFR 50.46(a)(3)

COMMITMENT LIST

The following list identifies those actions committed to by the Davis-Besse Nuclear Power Station in this document. Any other actions discussed in the submittal represent intended or planned actions by Davis-Besse. They are described only as information and are not regulatory commitments. Please notify the Manager – Regulatory Affairs (419-321-8450) at Davis-Besse of any questions regarding this document or associated regulatory commitments.

COMMITMENTS	DUE DATE
None	N/A