



Entergy Operations, Inc.  
17265 River Road  
Killona, LA 70066  
Tel 504 739 6379

Everett P. Perkins, Jr.  
Director, Nuclear Safety Assurance  
Waterford 3

W3F1-2000-0053  
A4.05  
PR

May 12, 2000

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

Subject: Waterford 3 SES  
Docket No. 50-382  
License No. NPF-38  
Annual Report on ABB CE ECCS  
Performance Evaluation Models

Gentlemen:

Pursuant to 10 CFR 50.46(a)(3)(ii), Entergy Operations, Inc. (EOI) hereby submits for the Waterford Steam Electric Station Unit 3 an annual evaluation of changes and errors identified in ABB Combustion Engineering (ABB CE) Emergency Core Cooling System (ECCS) performance evaluation models used for Loss-of-Coolant Accident (LOCA) analyses. The results of the annual evaluation for the calendar year 1999 are detailed in the attached copy of CENPD-279, "Annual Report on ABB CE ECCS Performance Evaluation Models," Supplement 11, dated March 2000.

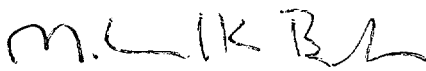
The sum of the absolute magnitude of peak cladding temperature changes for the Large Break LOCA evaluation model, from all reports to date remained less than 1°F in 1999. The sum of the absolute magnitude of the peak cladding temperature changes for the Small Break LOCA evaluation model from all reports to date, excluding changes to facility/fuel inputs, remained less than 3°F in 1999. The effects of facility/fuel inputs are not included in this report since they are evaluated under the provisions of 10 CFR 50.59. No changes or errors were reported by ABB CE in the post-LOCA Long Term Cooling evaluation model. Per the criteria of 10 CFR 50.46, no action beyond this annual report is required.

ADD1

Annual Report on ABB CE ECCS Performance Evaluation Models  
W3F1-2000-0053  
Page 2  
May 12, 2000

There no commitments contained in this submittal. Should you have any questions regarding the attached report, please contact T.M. Manzella, at (504) 739-6882.

Very truly yours,

A handwritten signature in dark ink, appearing to read "E.P. Perkins, Jr." with a stylized flourish at the end.

<sup>fr</sup>  
E.P. Perkins, Jr.  
Director,  
Nuclear Safety Assurance

EPP/TMM/rtk  
Attachment: CENPD-279 Supplement 11

cc: E.W. Merschoff, NRC Region IV  
N. Kalyanam, NRC-NRR  
J. Smith  
N.S. Reynolds  
NRC Resident Inspectors Office

**CENPD-279**  
**Supplement 11**

# **ANNUAL REPORT ON ABB CENP ECCS PERFORMANCE EVALUATION MODELS**

**CEOG Task 1144**

Prepared for the  
C-E OWNERS GROUP

**March 2000**

© Copyright 2000, ABB C-E Nuclear Power, Inc. All Rights reserved

**ABB C-E Nuclear Power  
Engineering Services**

### LEGAL NOTICE

This report was prepared as an account of work sponsored by the Combustion Engineering Owners Group and ABB C-E Nuclear Power, Inc. Neither ABB C-E Nuclear Power, Inc. nor any person acting on its behalf:

- A. makes any warranty or representation, express or implied including the warranties of fitness for a particular purpose or merchantability, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or
- B. assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method or process disclosed in this report.

ABB C-E Nuclear Power, Inc.

## ABSTRACT

This report describes changes and errors in the ABB C-E Nuclear (CENP) models for PWR ECCS performance analysis in calendar year 1999 per the requirements of 1CFR50.46. For this reporting period, there were no changes or errors in the evaluation models or application of the models that affect the cladding temperature calculation.

The sum of the absolute magnitude of the peak cladding temperature (PCT) changes for the large break LOCA June 1985 EM from all reports to date continues to be less than 1°F excluding plant specific effects. The total effect relative to the 50°F definition of a significant change in PCT is the sum of <1°F and plant specific effects, if any, described in Appendix A. The sum of the absolute magnitude of the maximum cladding temperature changes for the small break LOCA S1M evaluation model from all reports to date is less than 3°F. The accumulated change in cladding temperature for the small break LOCA S2M evaluation model is 0°F. No change occurred in the PCT due to post-LOCA long term cooling issues.

## TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	<u>INTRODUCTION</u>	1
2.0	<u>ABB CENP ECCS EVALUATION MODELS AND CODES</u>	3
3.0	<u>EVALUATION MODEL CHANGES AND ERROR CORRECTIONS</u>	4
4.0	<u>CONCLUSIONS</u>	5
5.0	<u>REFERENCES</u>	6

### APPENDIX (Plant Specific Considerations)

#### A. ENTERGY OPERATIONS, INCORPORATED – Waterford Unit 3

## 1.0 INTRODUCTION

This report addresses the NRC requirement to report changes or errors in ECCS performance evaluation models. The ECCS Acceptance Criteria, Reference 1, spell out reporting requirements and actions required when errors are corrected or changes are made in an evaluation model or in the application of a model for an operating licensee or construction permittee of a nuclear power plant.

The action requirements in 10CFR50.46(a)(3) are:

1. Each applicant for or holder of an operating license or construction permit shall estimate the effect of any change to or error in an acceptable evaluation model or in the application of such a model to determine if the change or error is significant. For this purpose, a significant change or error is one which results in a calculated peak fuel cladding temperature (PCT) different by more than 50°F from the temperature calculated for the limiting transient using the last acceptable model, or is a cumulation of changes and errors such that the sum of the absolute magnitudes of the respective temperature changes is greater than 50°F.
2. For each change to or error discovered in an acceptable evaluation model or in the application of such a model that affects the temperature calculation, the applicant or licensee shall report the nature of the change or error and its estimated effect on the limiting ECCS analysis to the Commission at least annually as specified in 10CFR50.4.
3. If the change or error is significant, the applicant or licensee shall provide this report within 30 days and include with the report a proposed schedule for providing a reanalysis or taking other action as may be needed to show compliance with 10CFR50.46 requirements. This schedule may be developed using an integrated scheduling system previously approved for the facility by the NRC. For those facilities not using an NRC approved integrated scheduling system, a schedule will be established by the NRC staff within 60 days of receipt of the proposed schedule.
4. Any change or error correction that results in a calculated ECCS performance that does not conform to the criteria set forth in paragraph (b) of 10CFR50.46 is a reportable event as described in 10CFR50.55(e), 50.72 and 50.73. The affected applicant or licensee shall propose immediate steps to demonstrate compliance or bring plant design or operation into compliance with 10CFR50.46 requirements.

This report documents all the errors corrected in and/or changes to the presently licensed ABB CENP ECCS performance evaluation models for PWRs, made in the year covered by this report, which have not been reviewed by the NRC staff. This document is provided to satisfy the reporting requirements of the second item above. ABB CENP reports for earlier years are given in References 2-12.



## 2.0 ABB CENP ECCS EVALUATION MODELS AND CODES

Four ABB CENP evaluation models (EM) for ECCS performance analysis of PWRs are described in topical reports, are licensed by the NRC, and are covered by the provisions of 10CFR50.46. The evaluation model for large break LOCA (LBLOCA) is the June 1985 EM. There are two evaluation models for small break LOCA (SBLOCA): the original SBLOCA Evaluation Model (S1M) and the S2M SBLOCA EM accepted by the NRC in 1997. Post-LOCA long term cooling (LTC) analyses are performed with the LTC evaluation model.

ABB CENP uses several digital computer codes to do ECCS performance analyses of PWRs for the evaluation models described above that are covered by the provisions of 10CFR50.46. Those for LBLOCA calculations are CEFLASH-4A, COMPERC-II, HCROSS, PARCH, STRIKIN-II, and COMZIRC. CEFLASH-4AS is used in conjunction with COMPERC-II, STRIKIN-II, and PARCH for SBLOCA calculations. The codes for post-LOCA LTC analysis are BORON, CEPAC, NATFLOW, and CELDA.

### 3.0 EVALUATION MODEL CHANGES AND ERROR CORRECTIONS

This section discusses all error corrections and model changes to the ABB CENP ECCS performance evaluation models for PWRs which may affect the calculated PCT.

There were no changes to or errors in the ECCS evaluation models for PWRs or changes to their application for calendar year 1999 that affect the cladding temperature calculation.

#### 4.0 CONCLUSIONS

There were no changes or errors in the ABB CENP ECCS evaluation models for PWRs or their application for LBLOCA, SBLOCA, or post-LOCA long term cooling that affect the cladding temperature calculation during 1999. The sum of the absolute magnitude of the changes in PCT calculated using the ABB CENP June 1985 EM for LBLOCA, including those from previous annual reports, References 2-12, remains less than 1°F relative to the 50°F criterion for a significant change in PCT. The total LBLOCA PCT impact for a given plant is < 1°F plus the plant specific effects, if any, discussed in Appendix A.

The sum of the absolute magnitude of the changes in maximum cladding temperature for the SBLOCA S1M evaluation model (due to the change in application of the SBLOCA S1M evaluation model described in Reference 11) is less than 3°F. The accumulated change in cladding temperature for the S2M evaluation model is 0°F. Plant specific SBLOCA considerations for each plant, if any, are discussed in Appendix A.

The sum of the absolute magnitude of the changes in cladding temperature for the post-LOCA long term cooling evaluation model is zero.

## 5.0 REFERENCES

1. "Acceptance Criteria for Emergency Core Cooling Systems for Light Water Nuclear Power Reactors," Code of Federal Regulations, Title 10, Part 50, Section 50.46.
2. "Annual Report on C-E ECCS Codes and Methods for 10CFR50.46," CENPD-279, April, 1989.
3. "Annual Report on C-E ECCS Codes and Methods for 10CFR50.46," CENPD-279, Supplement 1, February, 1990.
4. "Annual Report on C-E ECCS Codes and Methods for 10CFR50.46," CENPD-279, Supplement 2, April, 1991.
5. "Annual Report on C-E ECCS Codes and Methods for 10CFR50.46," CENPD-279, Supplement 3, April, 1992.
6. "Annual Report on C-E ECCS Codes and Methods for 10CFR50.46," CENPD-279, Supplement 4, April, 1993.
7. "Annual Report on C-E ECCS Codes and Methods for 10CFR50.46," CENPD-279, Supplement 5, February, 1994.
8. "Annual Report on ABB C-E ECCS Performance Evaluation Models," CENPD-279, Supplement 6, February, 1995.
9. "Annual Report on ABB C-E ECCS Performance Evaluation Models," CENPD-279, Supplement 7, February, 1996.
10. "Annual Report on ABB CE ECCS Performance Evaluation Models," CENPD-279, Supplement 8, March, 1997.
11. "Annual Report on ABB CE ECCS Performance Evaluation Models," CENPD-279, Supplement 9, February, 1998.
12. "Annual Report on ABB CE ECCS Performance Evaluation Models," CENPD-279, Supplement 10, February, 1999.

## APPENDIX A

### ENTERGY OPERATIONS, INCORPORATED

#### Plant Specific Considerations for Waterford Unit 3

There are no outstanding plant specific considerations for Waterford Unit 3.