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A. Edward Scherer
Manager of
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December 23, 2004

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

Subject: **Docket Nos. 50-361 and 50-362, 2003 Emergency Core Cooling System Annual 10 CFR 50.46 Report, San Onofre Nuclear Generating Station, Units 2 and 3.**

References:
1. Letter from A. E. Scherer (SCE) to Document Control Desk (NRC), dated December 15, 2003, Subject: Docket Nos. 50-361 and 50-362, 2002 Emergency Core Cooling System Annual 10 CFR 50.46 Report, San Onofre Nuclear Generating Station, Units 2 and 3

2. CENPD-279, Supplement 15, "Annual Report on Combustion Engineering ECCS Performance Evaluation Models for PWRs," March 2004

Gentlemen:

This letter transmits as Enclosures 1 and 2 the San Onofre Units 2 and 3 annual report for the 2003 calendar year required by paragraph (a)(3)(ii) of 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors." This regulation requires Southern California Edison (SCE) to annually report to the NRC for San Onofre Units 2 and 3 the nature of each change to or error discovered in the Emergency Core Cooling System (ECCS) evaluation model or in the application of this model that affects the temperature calculation and estimated effects of any such changes, errors, or applications on the limiting ECCS analysis. Any significant change or error is required to be reported to the NRC within 30 days.

The previous Emergency Core Cooling System Annual 10 CFR 50.46 Report was submitted to the NRC in Reference 1.

Reference 2 (included as Enclosure 1) describes the codes and methodology used by Westinghouse Electric Company for the San Onofre Units 2 and 3 ECCS analyses for this reporting period. Reference 2, Appendix C summarizes the plant specific evaluation for San Onofre Units 2 and 3. Appendices A, B, D, E, F, and G of Reference 2 apply to plants other than San Onofre, and therefore, are not included.

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Reference 2, Appendix C describes a plant-specific issue concerning suction leg elevation. This issue had no effect on Peak Cladding Temperature (PCT) for the Large Break Loss of Coolant Accident (LBLOCA) and a 3°F effect on the Small Break Loss of Coolant Accident (SBLOCA). This item was previously reported by SCE to the NRC in Reference 1.

SCE made no changes to the LOCA evaluation models.

Enclosure 2 provides a summary of the effect on PCT of the errors or changes to the ECCS evaluation model reported under 10 CFR 50.46 for this reporting period. While not limiting with regard to PCT, detailed information for the Small Break LOCA is also included in Enclosure 2 (in accordance with Supplement 1 to Information Notice 97-15).

Operating Cycle Information

Unit 2 and Unit 3 operation for the current reporting period is outlined below.

Unit	Year	Cycle 11	Cycle 12
2	2003	N/A	January 1, 2003 through December 31, 2003
3	2003	January 1, 2003 To January 6, 2003	February 16, 2003 through December 31, 2003

SONGS Units 2 and 3 Large Break LOCA Evaluation Model - **2003 Reporting Period**

The Large Break LOCA analysis uses the evaluation model approved on June 1985. The limiting Large Break LOCA PCT did not exceed the 10 CFR 50.46(b)(1) acceptance criterion of 2,200 °F. This is documented in Table 1 (Enclosure 2).

The cumulative (sum of the absolute magnitudes of PCT changes) Large Break LOCA "10 CFR 50.46 model changes and model errors, since the approval of the "June 1985 Evaluation Model," remains less than 1 °F. This is documented in Table 2 (Enclosure 2).

SONGS Units 2 and 3 Small Break LOCA Evaluation Model - **2003 Reporting Period**

The Small Break LOCA analysis uses the Supplement 2 Model (S2M) SBLOCA evaluation model approved on February 22, 2000. The limiting Small Break LOCA PCT did not exceed the 10 CFR50.46(b)(1) acceptance criterion of 2,200 °F, and remained bounded by the large break LOCA PCT. This is documented in Table 3 (Enclosure 2).

The cumulative (sum of the absolute magnitudes of PCT changes) Small Break LOCA 10 CFR50.46 model changes and model errors, since the approval of the "S2M Evaluation Model", is 19 °F. This is documented in Table 4 (Enclosure 2).

An authorization for the NRC to reproduce the copyrighted Reference 2 is provided in Enclosure 1 in the "Copyright Notice" Section.

If you have any questions or need additional information on this subject, please contact Mr. J. L. Rainsberry at 949/368-7420.

Sincerely,

cc: B. S. Mallett, Regional Administrator, NRC Region IV
B. M. Pham, NRC Project Manager, San Onofre Units 2 and 3
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 and 3

Enclosure 1

(12 pages including this page)

Westinghouse Non-Proprietary Class 3

CENPD-279, Supplement 15 March 2004

Annual Report on Combustion Engineering ECCS Performance Evaluation Models for PWRs

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ABSTRACT

This report describes changes and errors in the ECCS performance evaluation models (EM) for PWRs developed by Combustion Engineering in calendar year (CY) 2003 per the requirements of 10CFR50.46. 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 generic 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 generic impact on the peak cladding temperature for the large break LOCA 1999 EM is less than 1.2°F. The generic sum of the absolute magnitude of the peak cladding temperature changes for the small break LOCA S1M evaluation model from all reports to date is less than 3°F. There is no generic accumulated change in peak cladding temperature for the small break LOCA S2M evaluation model. No change occurred in the PCT due to post-LOCA long term cooling issues. The total effect relative to the 50°F definition of a significant change in PCT for each evaluation model is the sum of the generic effects for that model and plant specific effects, if any, described in Appendices A-G.

TABLE OF CONTENTS

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 ECCS performance evaluation models for PWRs developed by Combustion Engineering, 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. Reports for earlier years are given in References 2-16.

2.0 COMBUSTION ENGINEERING ECCS EVALUATION MODELS AND CODES

Five evaluation models (EM) for ECCS performance analysis of PWRs developed by Combustion Engineering are described in topical reports, are licensed by the NRC, and are covered by the provisions of 10CFR50.46. The evaluation models for large break LOCA (LBLOCA) are the June 1985 EM and the 1999 EM. There are two evaluation models for small break LOCA (SBLOCA): the SBLOCA Evaluation Model (S1M) and the S2M SBLOCA EM. Post-LOCA long term cooling (LTC) analyses use the LTC evaluation model.

Several digital computer codes are used 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 analyses 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 ECCS performance evaluation models for PWRs described in Section 2.0 that may affect the calculated PCT.

There were no changes to or errors in the ECCS evaluation models for PWRs or changes to their operation for calendar year (CY) 2003 that affect the calculated cladding temperature.

4.0 CONCLUSIONS

There were no changes to or errors in the ECCS evaluation models for PWRs or their application for LBLOCA, SBLOCA, or post-LOCA long term cooling that affect the calculated cladding temperature during CY 2003.

The sum of the absolute magnitude of the changes in PCT calculated using the June 1985 EM for LBLOCA, including those from previous annual reports, References 2-16, remains less than 1°F. The maximum impact on PCT calculated with the 1999 EM is less than 1.2°F. Plant specific LBLOCA considerations for each plant are discussed in Appendices A through G.

Previous plant specific PCT effects for both the S1M and S2M SBLOCA evaluation models are discussed in Appendices A through G of Reference 15. In addition, there is a generic effect on maximum cladding temperature for the SBLOCA S1M (due to the change in application of the SBLOCA S1M described in Reference 11) that is less than 3°F. There is no previous generic accumulated change in cladding temperature for the S2M. The overall plant specific PCT effects for SBLOCA are summarized in Appendices A through G.

There is no PCT effect for the post-LOCA long term cooling evaluation model.

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, February, 1997.
11. "Annual Report on ABB CE ECCS Performance Evaluation Models," CENPD-279, Supplement 9, March, 1998.
12. "Annual Report on ABB CE ECCS Performance Evaluation Models," CENPD-279, Supplement 10, February, 1999.
13. "Annual Report on ABB CE ECCS Performance Evaluation Models," CENPD-279, Supplement 11, March, 2000.
14. "Annual Report on Combustion Engineering ECCS Performance Evaluation Models for PWRs," CENPD-279, Supplement 12, April, 2001.
15. "Annual Report on Combustion Engineering ECCS Performance Evaluation Models for PWRs," CENPD-279, Supplement 13, Rev. 1, April, 2002.
16. "Annual Report on Combustion Engineering ECCS Performance Evaluation Models for PWRs," CENPD-279, Supplement 14, Rev. 1, April, 2003.

APPENDIX C

SOUTHERN CALIFORNIA EDISON COMPANY

Plant Specific Considerations for SONGS Units 2 and 3

Appendix C of the CY 2002 10CFR50.46 report for SONGS Units 2 and 3 in Reference 16 was revised in Reference C.1 to address a plant specific issue concerning the suction leg elevation. It concluded that there was no PCT effect for LBLOCA and a 3°F effect for SBLOCA.

The total effect on PCT is less than 1°F for all LBLOCA analyses of SONGS Units 2 and 3 done to date with the 1985 EM.

There are no new SBLOCA errors for Calendar Year 2003. The suction leg elevation error discussed in Reference C.1 produced a 3°F effect. There is an additional 16°F plant specific effect due to the CEFLASH-4AS leak flow error previously reported in Appendix C of Reference 15. The total PCT effect for SBLOCA is |3°F| + |16°F| or 19°F.

Reference:

C.1 DAR-OA-03-14, Rev. 0, "Calendar Year 2002 10CFR50.46 Report for SONGS Units 2 & 3," P. K. Doherty, September 15, 2003.

Enclosure 2

(5 pages including this page)

2003 REPORTING PERIOD

LOSS OF COOLANT ACCIDENT (LOCA) MARGIN SUMMARY
SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3

Large Break LOCA

Table 1 provides a time line of the items which could affect the Large Break LOCA peak cladding temperature (PCT) for this reporting period. The 10 CFR 50.46 PCT limit of 2,200°F was not exceeded.

Table 1

Limiting Large Break LOCA PCT

	Unit 2	Unit 3
Limiting Large Break LOCA PCT ***End of 2002***	2,135 °F	2,136 °F
Changes in PCT ***during 2003*** due to:		
a) Model changes or Model errors		
• Cycle 11	N/A	0 °F
• Cycle 12	0 °F	0 °F
b) Cycle Dependent Input Changes		
• Cycle 11	N/A	0 °F
• Cycle 12	0 °F	-7 °F
Limiting Large Break LOCA PCT ***End of 2003***	2,135 °F	2,129 °F

The cumulative 10CFR50.46 model changes and model errors for the "Large Break LOCA June 1985 Evaluation Model" are shown in Table 2.

Table 2

Cumulative LBLOCA 10 CFR 50.46
Model Changes and Model Errors
$\sum |\Delta PCT|$ *

	Unit 2	Unit 3
Cumulative LBLOCA 10 CFR 50.46 Model Changes and Model Errors *Prior to 2003*	< 1 °F	< 1 °F
Changes in LBLOCA PCT due to Model Changes and Model Errors *Discovered in 2003*		
• Cycle 11	N/A	0 °F
• Cycle 12	0 °F	0 °F
Cumulative LBLOCA 10 CFR 50.46 Model Changes and Model Errors *End of 2003*	< 1 °F	< 1 °F

* Sum of the absolute magnitude of the 10 CFR 50.46 model changes and model errors.

Small Break LOCA

Table 3 provides a time line of the items which could affect the Small Break LOCA peak cladding temperature (PCT) for this reporting period. The SBLOCA 10 CFR 50.46 PCT limit of 2200°F was not exceeded, and remained bounded by the LBLOCA.

Table 3

Limiting Small Break LOCA PCT

	Unit 2	Unit 3
Limiting Small Break LOCA PCT *End of 2002*	1,903 °F	1,903 °F
Changes in PCT *during 2003* due to:		
a) Model changes or Model errors		
Cycle 11	N/A	0 °F
Cycle 12	0 °F	0 °F
b) Cycle Dependent Input Changes		
Cycle 11	N/A	0 °F
Cycle 12	0 °F	0 °F
Limiting Small Break LOCA PCT *End of 2003*	1,903 °F	1,903 °F

The cumulative 10CFR50.46 model changes and model errors for the "Small Break LOCA S2M Evaluation Model" are shown in Table 4.

Table 4

Cumulative SBLOCA 10 CFR 50.46
Model Changes and Model Errors
$\sum |\Delta PCT|$ *

	Unit 2	**Unit 3**
Cumulative SBLOCA 10 CFR 50.46 Model Changes and Model Errors *Prior to 2003*	19 °F	19 °F
Changes in SBLOCA PCT due to Model Changes and Model Errors *Discovered in 2003*		
• Cycle 11	N/A	0 °F
• Cycle 12	0 °F	0 °F
Cumulative SBLOCA 10 CFR 50.46 Model Changes and Model Errors *End of 2003*	19 °F	19 °F

* Sum of the absolute magnitude of the 10 CFR 50.46 model changes and model errors.