



PECO NUCLEAR

A Unit of PECO Energy

10 CFR 50.46 (a)(3)(i) and (ii)

PECO Energy Company
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

November 4, 1998

Docket Nos. 50-277
50-278

License Nos. DPR-44
DPR-56

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

Subject: Peach Bottom Atomic Power Station, Units 2 and 3
10 CFR 50.46 Reporting Requirements

- References: 1) Letter from G. A. Hunger, Jr. (PECO Energy Company (PECO Energy)) to U. S. Nuclear Regulatory Commission (USNRC), dated January 30, 1997
- 2) Letter from G. D. Edwards (PECO Energy) to USNRC dated March 20, 1998

Dear Sir/Madam:

In accordance with 10 CFR 50.46 (a)(3)(i) and (ii), the following is a revision to the licensing basis Loss-of-Coolant Accident (LOCA) peak clad temperatures (PCTs) for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. Additionally, PECO Energy is revising its method of reporting changes in the licensing basis PCT. Rather than identifying changes in licensing basis PCT by a single value based on the most limiting fuel type, changes will be reported by each fuel type. This change in reporting will ensure greater accuracy in reporting changes in the peak cladding temperatures. Tables 1 and 2 (attached) provide the revised PCT values and the applicable changes for PBAPS, Units 2 and 3, respectively. Based on the accumulated changes which result in a temperature difference of greater than 50° F from the calculated baseline temperature, this report is being submitted within 30 days. *Acc 1*

A change to the PCT was previously reported in a 10 CFR 50.46 report as discussed in the Reference 1 letter. The Reference 1 letter discussed a 45° F increase in the licensing basis PCT, which was conservatively applied to all the fuel types analyzed for PBAPS, Units 2 and 3. This 45° F change represented the composite of three previous changes (identified in the attached General Electric Nuclear Energy (GENE) letters as MFN 090-93, 278-95, and 088-96). Each of

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these changes does not necessarily apply to all fuel types. Table 1 (PBAPS, Unit 2) and Table 2 (PBAPS, Unit 3) reflect the appropriate application to each fuel type.

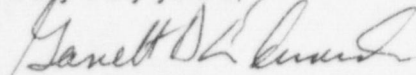
Table 1 reflects the impact of the incorporation of the Recirculation Pump Trip (RPT) modification on the baseline PCTs for PBAPS, Unit 2. The installation of the RPT modification results in a 45° F PCT increase for the limiting fuel type (P8X8R). This change was discussed in the Reference 2 letter. The analysis performed by GENE in 1994 to support this modification is considered to be a new baseline as shown in Table 1. This modification was not installed on PBAPS, Unit 2 until the most recent refueling outage (2R12, October, 1998). The recirculation pump trip modification is currently scheduled to be installed in PBAPS, Unit 3 during refueling outage 3R12 (October, 1999). Therefore, Table 2 does not reflect the effect of RPT on the current Unit 3 baseline PCTs.

In a letter dated October 5, 1998, GENE provided PECO Energy Company a summary of the revisions in the PCTs. As identified in the attachments, these changes and errors have been previously reported to the U. S. Nuclear Regulatory Commission (USNRC) in accordance with 10 CFR 50.46(a)(3)(ii) as identified in the Attached letters. The 50° F change resulting from the input parameter study was not previously identified to PECO Energy Company. However, this change is reflected in this report.

The attached Tables provide, by fuel type, the new baseline (calculated) PCTs, the applicable errors, and the resultant estimated licensing basis PCTs. The estimated licensing basis peak clad temperatures for the most limiting fuel types at PBAPS, Units 2 and 3 are 1795° F (P8X8R) and 1755° F (P8X8R), respectively. This represents more than 400° F margin to the 2200° F limit specified in 10 CFR 50.46. Additionally, the upper bound peak clad temperature remains below the 1600° F limit specified in the USNRC acceptance of the SAFER/GESTR methodology.

If you have any questions, please do not hesitate to contact us.

Very truly yours,



G. D. Edwards
Director - Licensing

Attachments

cc: H. J. Miller, Administrator, Region I, USNRC
A. C. McMurtry, USNRC Senior Resident Inspector, PBAPS

TABLE 1

**BASELINE PCT VALUES AND APPLICABLE CHANGES
(PBAPS, UNIT 2 - WITH THE RPT MODIFICATION)**

	P8x8R	GE8	GE9	GE 11/13
BASELINE PCT °F	1735	1624	1624	1645
CHANGES				
1. MFN 090-93* (Flow initialization/sign error)	0	0	0	5
2. MFN 278-95* (Bottom head drain)	10	10	10	10
3. MFN 088-96* (Incorrect number of fuel rods)	0	0	30	30
4. MFN 090-93* (Input parameter sensitivity)	50	50	50	50
TOTAL	60	60	90	95
ESTIMATED LICENSING BASIS PCT	1795	1684	1714	1740

*See attachment for the associated GENE letter which reported this change. The GENE letter is identified with a "MFN" designation.

TABLE 2

**BASELINE PCT VALUES AND APPLICABLE CHANGES
(PBAPS, UNIT 3 - NO RPT MODIFICATION)**

BASELINE PCT °F	P8x8R 1690	GE8 1575	GE9 1575	GE 11/13 1645
CHANGES				
1. MFN 090-93* (Flow initialization/sign error)	5	5	5	5
2. MFN 278-95* (Bottom head drain)	10	10	10	10
3. MFN 088-96* (Incorrect number of fuel rods)	0	0	30	30
4. MFN 090-93* (Input parameter sensitivity)	50	50	50	50
TOTAL	65	65	95	95
ESTIMATED LICENSING BASIS PCT	1755	1640	1670	1740

*See attachment for the associated GENE letter which reported this change. The GENE letter is identified with a "MFN" designation.

ATTACHMENT
GENE LETTERS

MFN 090-93

MFN 278-95

MFN 088-96



June 30, 1993
MFN #090-93

Office of Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Mail Station P1-137
Washington, DC 20555

ATTN: Document Control Desk

**SUBJECT: REPORTING OF CHANGES AND ERRORS
IN ECCS EVALUATION MODELS**

REFERENCE: 1) Letter, SJ Stark to the Office of Nuclear Reactor Regulation,
"Reporting of Changes and Errors in ECCS Evaluation Models"
dated June 26, 1992 (MFN # 058-92)

The purpose of this letter is to report, in accordance with 10CFR50.46 (a) (3) (ii), the impact of changes and errors in the Emergency Core Cooling Systems (ECCS) evaluation methodology used by GE. This report covers the period from the last report (Reference 1) to the present. It is noted that Peak Cladding Temperature (PCT) variations resulting from plant specific system or fuel changes are not addressed in this letter. These should be treated, as appropriate, on a plant specific basis in accordance with other sections of 10CFR50.

There have been no changes or errors identified for the SAFER/REFLOOD model described in NEDE 20566-P-A "Analytical Model for Loss-of-Coolant Analysis in Accordance with 10CFR50 Appendix K".

Two minor coding errors were corrected in the SAFER Code. The SAFER/GESTR methodology is described in NEDE 23785-1-P-A, "The GESTR-LOCA and SAFER Models for the Evaluation of Loss-of-Coolant Accidents", and NEDE 30996-P-A, "SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-Jet Pump Plants"...The first error corrected was improper upper plenum flow initialization. This error caused a flow discontinuity at the beginning of the transient. A second error was corrected that impacts the latter part of a small break LOCA. A sign error in the pressure drop balance caused the top of the hot channel to remain uncovered even after the upper plenum and bypass were full. The impact of these errors on predicted pct is $\pm 5^{\circ}\text{F}$.

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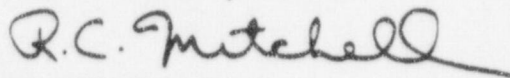
The observation that ECCS evaluation models can be sensitive to small input parameter changes under some circumstances was reported in Reference 1. Based on the SAFER cases analyzed at the time, the range of impact on the predicted PCT was reported as $\pm 50^{\circ}\text{F}$. Recent studies have indicated that the impact could be slightly larger than $\pm 50^{\circ}\text{F}$ for some BWR/4 plants with LPCI injection into the lower plenum using the SAFER model. These studies indicated a total variation of less than 85°F for most cases but with one case showing a range of 102°F (i.e., greater than $\pm 50^{\circ}\text{F}$).

The identified sensitivity is related to the explicit numerical treatment in SAFER combined with rapid and simultaneous variations of multiple parameters. Work is underway to limit this sensitivity through better control of time steps in the computation. This will provide assurance that such sensitivities are well within the previously stated $\pm 50^{\circ}\text{F}$. Any changes resulting from this activity will be reviewed with the NRC at the appropriate time. It should be noted that existing PCT predictions are valid (i.e., within the stated uncertainty band) and no change to any plant specific evaluation is required.

By copy of this letter, Licensees utilizing the GE ECCS methodology in their plant licensing are informed of the status of changes in the evaluation methodology. Since no reanalysis or technical specification modifications are required, this submittal is believed to satisfy 10CFR50.46 (a) (3) (ii) for evaluation model changes without further reporting on the part of the individual utilities.

If you have any questions, please call me or HC Pfefferlen at (408) 925-3392.

Sincerely,



RC Mitchell, Manager
Safety & Communications
(408) 925-2755 M/C 487

CC: HC Pfefferlen



December 15, 1995

RJR-95-118
MFN-278-95

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: R. C. Jones, Jr.

Subject: **Reporting of Changes and Errors in ECCS Evaluation Models**

- Reference:
1. Letter, J. F. Klapproth to the Document Control Desk (R. C. Jones, Jr., *Reporting of Changes and Errors in ECCS Evaluation Models*, dated June 24, 1995 (MFN-087-95).
 2. Letter, R. C. Mitchell to the Office of Nuclear Reactor Regulation, *Reporting of Changes and Errors in ECCS Evaluation Models*, dated July 1, 1994 (MFN No. 088-94).

GE is submitting this letter which revises the Reference 1 letter. Revisions are marked by change bars in the margin.

The purpose of this letter is to report, in accordance with 10 CFR 50.46 (a) (3) (ii), the impact of changes and errors in the Emergency Core Cooling Systems (ECCS) evaluation methodology used by GE. This report covers the period from the last report (Reference 2) to the present. It is noted that Peak Cladding Temperature (PCT) variations resulting from plant specific system or fuel changes are not addressed in this letter. These should be treated, as appropriate, on a plant specific basis in accordance with other sections of 10 CFR 50.

There have been no changes or errors identified for the SAFE/REFLOOD model described in NEDE 20566-P-A, *Analytical Model for Loss-of-Coolant Analysis in Accordance with 10 CFR 50 Appendix K*.

There have been no changes or errors identified for the SAFER/GESTR model described in NEDE 23785-1-P-A, *The GESTR-LOCA and SAFER Models for Evaluation of Loss-of-Coolant Accidents*, and NEDE 30996-P-A, *SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-Jet Pump Plants*.

95-12-18-0305 2 pp

In March 1995, a domestic utility requested that GENE review a concern regarding the RPV bottom head drain (BHD) impact on the LOCA analysis. The concern was that because the bottom head drain line is directly connected to the reactor recirculation loops, that a recirculation line break LOCA would also break the BHD, and the vessel would depressurize to the drywell faster than assumed in current models. Also, upon such an event occurring, some water required to keep the core covered to the 2/3 core height would exit the core due to either gravity or core pressure via the interconnected recirculation and bottom head RWCU suction lines.

A GENE evaluation concluded that while no analysis had been performed to precisely evaluate the PCT impact of the recirculation line break LOCA including the BHD, it is believed that the impact is less than 10°F based on engineering judgment and extrapolation of previous LOCA analyses. Since an event is considered by the NRC to be significant if the PCT is increased more than 50°F (10CFR50.46 (a)(3)(i)), this amount of increase can be considered insignificant and well within the margins of the safety analysis.

The impact of the BHD exiting flow on maintaining RPV level inside the shroud is similarly insignificant. It was determined that a slightly higher minimum makeup flow will be required, however, the increased makeup is well within the margins of available ECCS systems. The minimum makeup flow corresponds to that necessary to makeup for decay heat and the drain rate from the BHD.

By copy of this letter, Licensees utilizing the GE ECCS methodology in their plant licensing are informed of the status of changes in the evaluation methodology. Since no re-analysis or technical specification modifications are required, this submittal is believed to satisfy 10 CFR 50.46 (a) (3) (ii) for evaluation model changes without further reporting on the part of individual utilities.

If you have any questions, please call me or J. L. Embley at (910) 675-5774.

Sincerely,

Original signed by R. J. Reda, 12/15/95

R. J. Reda, Manager
Fuels and Facilities Licensing
(910) 675-5889, MC J26

cc: W. J. Sependa
J. L. Embley



GE Nuclear Energy

General Electric Company
P. O. Box 780, Wilmington, NC 28402

June 28, 1996

RJR-96-071
MFN-088-96

Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: R. C. Jones, Jr., Chief
Reactor Systems Branch

Subject: Reporting of Changes and Errors in ECCS Evaluation Models

Reference: Letter, J. F. Klapproth to the Document Control Desk (R. C. Jones, Jr.), *Reporting of Changes and Errors in ECCS Evaluation Models*, dated June 24, 1995 (MFN-087-95), and revised by Letter, R. J. Reda to the Document Control Desk (R. C. Jones, Jr.), *Reporting of Changes and Errors in ECCS Evaluation Models*, February 20, 1996 (MFN-020-96).

The purpose of this letter is to report, in accordance with 10 CFR 50.46 (a) (3) (ii), the impact of changes and errors in the methodology used by GE to demonstrate compliance with the Emergency Core Cooling System (ECCS) requirements of 10 CFR 50.46. This report covers the period from the last report (Reference) to the present. It is noted that Peak Cladding Temperature (PCT) variations resulting from plant specific system or fuel changes are not addressed in this letter. These should be treated, as appropriate, on a plant specific basis in accordance with other sections of 10 CFR 50.

There have been no changes or errors identified for the SAFE/REFLOOD model described in NEDE 20566-P-A, *Analytical Model for Loss-of-Coolant Analysis in Accordance with 10 CFR 50 Appendix K*.

There have been no changes or errors identified for the SAFER/GESTR model described in NEDE 23785-1-P-A, *The GESTR-LOCA and SAFER Models for Evaluation of Loss-of-Coolant Accidents*, and NEDE 30996-P-A, *SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-Jet Pump Plants*.

During the reporting period an error was discovered in some applications of the GE LOCA evaluation model SAFER/GESTR. It was determined that in some analyses cases an algorithm used to compute the number of fuel rods in a BWR lattice was incorrectly specified. As a result, SAFER input prepared in accordance with the automation process may have had incorrect data. The only impact was on the SAFER analyses for fuel designs containing large water rods where the input generation was automated. This finding does not impact plant safety.

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This incorrect value for the number of active fuel rods resulted from a specification error in an automated SAFER/GESTR basedeck generation procedure. As a result of this specification error, the SAFER/GESTR basedecks for those fuel types containing large water rods (GE9/10/11/12/13) contained both an incorrect number of fuel rods and inappropriate values for the bundle flow areas and hydraulic diameters. Calculations performed to assess the significance of this error indicate that the impact on the calculated cladding temperature is less than 30°F.

Until recently, the limiting fuel types had not been associated with the large water rod designs and the base decks generated with the automated procedure were correct. The inconsistency was discovered as part of a normal GE quality assurance review of the SAFER/GESTR analysis for a specific plant with a large water rod limiting bundle. Actions have been taken to correct the problem and to ensure that the correct variable is used in all future applications. It should be noted that the PCT impact was small compared to the available margin to specified limits demonstrated by the SAFER/GESTR results and no impact on technical specification limits was found.

All utilities using these evaluation models have been notified of this error.

If you have any questions, please call me or J. L. Embley at (910) 675-5774.

Sincerely,

R. J. Reda, Manager
Fuels and Facility Licensing
(910) 675-5608

cc: W. J. Sependa
J. L. Embley