

WOLF CREEK

NUCLEAR OPERATING CORPORATION

Richard A. Muench
Vice President Engineering

March 21, 1997

ET 97-0025

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Subject: Docket No. 50-482: 10 CFR 50.46 Annual Report of
ECCS Model Changes

Gentlemen:

This letter describes changes to the Emergency Core Cooling System (ECCS) Evaluation Models and the estimated effect on the limiting ECCS analysis for Wolf Creek Generating Station (WCGS) for 1996 in accordance with the criteria and reporting requirements of 10 CFR 50.46(a)(3)(i) and (ii), as clarified in Section 5.1 of WCAP-13451, "Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting." The changes in calculated Peak Cladding Temperatures (PCT) caused by the changes to Westinghouse ECCS Evaluation Models are reportable per 10 CFR 50.46 guidelines.

Attachment I describes the impact of the ECCS Evaluation Model changes. Attachment II contains the calculated Large Break LOCA and Small Break LOCA PCT margin allocations resulting from the permanent changes to the evaluation models. Since the PCT values determined in the Small Break and Large Break LOCA analyses of record, which, combined with all the PCT margin allocations, remain well below the 2200 °F regulatory limit, no reanalysis will be performed.

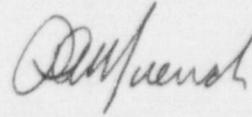
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If you have any questions concerning this matter, please call me at (316) 364-8831, extensor. 4034, or Mr. Richard D. Flannigan at extension 4500.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'R. Muench', written in a cursive style.

Richard A. Muench

RAM/jad

Attachments

cc: E. W. Merschoff (NRC), w/a
W. D. Johnson (NRC), w/a
J. F. Ringwald (NRC), w/a
J. C. Stone (NRC), w/a

ATTACHMENT I

CHANGES TO THE WESTINGHOUSE
EMERGENCY CORE COOLING SYSTEM EVALUATION MODELS

**Changes To The Westinghouse
Emergency Core Cooling System Evaluation Models**

Wolf Creek Nuclear Operating Corporation (WCNOC) has reviewed the annual 10 CFR 50.46 summary report of Emergency Core Cooling System (ECCS) Evaluation Model changes that were implemented by Westinghouse during 1996. The report includes information concerning changes to and errors discovered in the evaluation models. The review concludes that the cumulative effect of changes to, or errors in, the evaluation models on the limiting transient Peak Cladding Temperature (PCT), is not significant. Therefore, reporting of the ECCS Evaluation Model changes may be submitted on an annual basis according to the reporting requirements set forth in 10 CFR 50.46(a)(3)(ii).

Attachment II provides an update of PCT margin utilization for Wolf Creek Generating Station (WCGS). The PCT margin utilization demonstrates that compliance with the requirements of 10 CFR 50.46 is maintained considering the combined effects of the ECCS Evaluation Model changes with the plant design changes performed under 10 CFR 50.59.

SBLOCTA FUEL ROD INITIALIZATION

Background

An error was discovered in the SBLOCTA code related to adjustments which are made as part of the fuel rod initialization process, which is used to obtain agreement between the SBLOCTA model and the fuel data supplied from the fuel thermal-hydraulic design calculations at full power, steady-state conditions. Specifically, an adjustment to the power, which is made to compensate for adjustments to the assumed pellet diameter, was incorrect. Additionally, updates were made to the fuel rod clad creep and strain model to correct logic errors that could occur in certain transient conditions. These model revisions also had a small affect on the fuel rod initialization process, and can produce small effects during the transient. Due to the small magnitude of effects, and the interaction between the two items, they are being evaluated as a single, closely related effect.

This change is considered to be a Non-Discretionary Change as described in WCAP-13451.

Affected Evaluation Model

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

Estimated Effects

Previous representative plant calculations performed with the corrected model demonstrated that these revisions resulted in a predicted peak clad temperature increase on the order of +10°F. The reanalysis with the latest revision of the SBLOCTA code resulted in a reduction of the PCT penalty for this item from 10°F to 2°F.

TRANSLATION OF FLUID CONDITIONS FROM SATAN TO LOCTA

Background

An error was discovered in the coding related to the translation of fluid conditions between the SATAN blowdown hydraulics code and the LOCTA code used for subchannel analysis of the fuel rods. In performing axial interpolations to translate the SATAN fluid conditions onto the mesh nodalization used by the LOCTA code, the length of the lower core channel fluid connection to the lower plenum node was incorrectly calculated.

This change is considered to be a Non-Discretionary Change as described in WCAP-13451.

Affected Evaluation Models

1981 Westinghouse Large Break LOCA Evaluation Model
1981 Westinghouse Large Break LOCA Evaluation Model with BART
1981 Westinghouse Large Break LOCA Evaluation Model with BASH

Estimated Effects

Representative plant calculations with the corrected model demonstrated that this correction resulted in approximately a $\pm 15^{\circ}\text{F}$ effect on the BASH large break LOCA evaluation model. Evaluations based on these studies conclude that the effect on the BART and 1981 evaluation models was a 5°F benefit. Therefore, the following estimated effects are assigned:

BASH EM	15°F penalty
BART and 1981 EM	5°F benefit

ATTACHMENT II

ECCS EVALUATION MODEL
PEAK CLAD TEMPERATURE (PCT)
MARGIN ASSESSMENTS

*** SMALL BREAK PEAK CLAD TEMPERATURE (PCT) MARGIN UTILIZATION ***

Evaluation Model:	1985 EM with NOTRUMP
Fuel:	17X17 V5H w/IFM, non-IFBA 275 psig
Peaking Factor:	FQ=2.50, F _{dH} =1.65
SG Tube Plugging:	10%
Power Level:	3565 MW _{th}
Limiting transient:	3-inch Break

A. ANALYSIS OF RECORD (Rerating 8/92)

Peak Cladding Temperature (PCT): 1510°F

B. PRIOR PERMANENT ECCS MODEL ASSESSMENTS Δ PCT = 29°F

C. 10 CFR 50.59 SAFETY EVALUATIONS

1. Loose Parts	Δ PCT = 45°F
2. Cycle 10 Fuel Assembly Design Changes	Δ PCT = 1°F (1)
3. Reduced Feedwater Inlet Temperature	Δ PCT = 10°F

TOTAL 10 CFR 50.59 SMALL BREAK ASSESSMENTS Δ PCT = 56°F

D. 1996 10 CFR 50.46 MODEL ASSESSMENTS
(Permanent Assessment of PCT Margin)

1. SBLOCTA Fuel Rod Initialization Error Δ PCT = 2°F

E. TEMPORARY ECCS MODEL ISSUES

1. None Δ PCT = 0°F

F. OTHER MARGIN ALLOCATIONS

1. Cold Leg Streaming Temperature Gradient Δ PCT = 7°F

LICENSING BASIS PCT + MARGIN ALLOCATIONS PCT = 1604°F

Notes:

- (1) A detailed evaluation of the impacts of fuel design changes on the small break LOCA analysis was provided in WCNO's license amendment application to revise WCGS Technical Specification Section 5.3.1, Fuel Assemblies, to allow the use of an alternate zirconium-based fuel cladding material, ZIRLO (Letter ET 97-0020 dated March 18, 1997).

*** LARGE BREAK LOCA PEAK CLAD TEMPERATURE (PCT) MARGIN UTILIZATION ***

Evaluation Model:	1981 EM with BASH
Fuel:	17X17 V5H w/IFM, non-IFBA 275 psig
Peaking Factor:	FQ=2.50, F _{dh} =1.65
SG Tube Plugging:	10%
Power Level:	3565 MW _{th}
Limiting transient:	C _D =0.4, Min. SI, Reduced Tav _g

A. ANALYSIS OF RECORD (Rerating 8/92)

Peak Cladding Temperature (PCT): 1916°F

B. PRIOR PERMANENT ECCS MODEL ASSESSMENTS Δ PCT = -15°F

C. 10 CFR 50.59 SAFETY EVALUATIONS

1. Loose Parts	Δ PCT = 20°F
2. Containment Purge Evaluation	Δ PCT = 0°F
3. Cycle 10 Fuel Assembly Design Changes	Δ PCT = 95°F (3)

TOTAL 10 CFR 50.59 LARGE BREAK ASSESSMENTS Δ PCT = 115°F

D. 1996 10 CFR 50.46 MODEL ASSESSMENTS
(Permanent Assessment of PCT Margin)

1. Translation of Fluid Conditions
from SATAN to LOCTA Δ PCT = 15°F

E. TEMPORARY ECCS MODEL ISSUES Δ PCT = 0°F

F. OTHER MARGIN ALLOCATIONS

1. Transition Core (STD to V5H)	Δ PCT = 50°F ⁽²⁾
2. Cold Leg Streaming Temperature Gradient	Δ PCT = 0°F ⁽¹⁾

LICENSING BASIS PCT + MARGIN ALLOCATIONS PCT= 2081°F

Notes:

- (1) A PCT benefit of < 2.5°F was assessed, however, a benefit of 0°F will be tracked for reporting purposes.
- (2) Transition core penalty applies on a cycle-specific basis for reloads utilizing both V5H (with IFMs) and STD fuel until a full core of V5H is achieved.
- (3) A 95°F PCT margin was allocated to Fuel Assembly Design Changes which will be implemented in Cycle 10. A detailed evaluation of the impacts of fuel design changes on the large break LOCA analysis was provided in WCNO's license amendment application to revise WCGS Technical Specification Section 5.3.1, Fuel Assemblies, to allow the use of an alternate zirconium-based fuel cladding material, ZIRLO (Letter ET 97-0020 dated March 18, 1997).