

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9403180298 DOC. DATE: 94/03/14 NOTARIZED: NO DOCKET #
 FACIL: 50-305 Kewaunee Nuclear Power Plant, Wisconsin Public Service 05000305
 AUTH. NAME AUTHOR AFFILIATION
 SCHROCK, C.A. Wisconsin Public Service Corp.
 RECIP. NAME RECIPIENT AFFILIATION
 Document Control Branch (Document Control Desk)

SUBJECT: Describes three model assessments & effects on limiting transients, per Westinghouse 940221 notification that three model refinements have been assessed against WFLASH computer code. SBLOCA PCT margin utilization sheets encl.

DISTRIBUTION CODE: A001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 7
 TITLE: OR Submittal: General Distribution

NOTES:

	RECIPIENT		COPIES			RECIPIENT		COPIES		
	ID CODE/NAME		LTR	ENCL		ID CODE/NAME		LTR	ENCL	
	PD3-3 LA		1	1		PD3-3 PD		1	1	
	LAUFER, R		2	2						
INTERNAL:	ACRS		6	6		NRR/DE/EELB		1	1	
	NRR/DORS/OTSB		1	1		NRR/DRCH/HICB		1	1	
	NRR/DRPW		1	1		NRR/DSSA/SPLB		1	1	
	NRR/DSSA/SRXB		1	1		NUDOCS-ABSTRACT		1	1	
	OC/LFDCB		1	0		OGC/HDS1		1	0	
	<u>REG FILE</u> 01		1	1						
EXTERNAL:	NRC PDR		1	1		NSIC		1	1	

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTR 22 ENCL 20

R
I
D
S
/
A
D
D
S
/
A
D
D
S



WISCONSIN PUBLIC SERVICE CORPORATION

600 North Adams • P.O. Box 19002 • Green Bay, WI 54307-9002

March 14, 1994

10 CFR 50.46

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

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Emergency Core Cooling System Analysis

On February 21, 1994, Wisconsin Public Service Corporation (WPSC) was notified by the Westinghouse Electric Corporation that three model refinements have been assessed against the WFLASH computer code. The WFLASH code was used to perform the Analysis of Record (AOR) for the small break loss of coolant accident (SBLOCA) at the Kewaunee plant. These assessments are being reported in accordance with 10 CFR 50.46(a)(3)(i) because the sum of the absolute magnitudes of the respective temperature changes is greater than 50°F. The SBLOCA Peak Clad Temperature Margin Utilization Sheets for the four inch and six inch SBLOCA are enclosed in Attachment 1.

The three model assessments and their effects on the limiting transients are described below:

- 1) Burst and Blockage/Time in Life - Fuel rod burst during the course of a small break LOCA analysis was found to potentially result in a significant temperature excursion above the clad temperature transient for a non-burst case. Since the methodology for SBLOCA analyses had been to perform the analyses at a near beginning of life (BOL) condition, where rod internal pressures are relatively low, most analyses did not result in the occurrence of a rod burst, and therefore may not have reflected the most limiting time in life Peak Cladding Temperature (PCT). In order to evaluate the effects of this phenomenon, Westinghouse developed an analytical model which allows the prediction of rod burst PCT effects based upon the existing analysis of record. This resulted in a $\Delta PCT = +43^\circ F$ for the four inch break analysis and a $\Delta PCT = +152^\circ F$ for the six inch break analysis.

9403180298 940314
PDR ADDCK 05000305
P PDR



ADD 1

- 2) Average Rod Burst Strain - The rod heat-up code used in Small Break LOCA calculations contains a model to calculate the amount of clad strain that accompanies rod burst. However, the methodology which has historically been used is to not apply this burst strain model to the hot assembly average rod. This was done so as to minimize the rod gap and therefore maximize the heat transferred to the fluid channel, which in turn would maximize the hot rod temperature. However, due to mechanisms governing the zirc-water temperature excursion (which is the subject of the SBLOCA Limiting Time-in-Life penalty for the hot rod), modeling of clad burst strain for the hot assembly average rod can result in a penalty for the hot rod by increasing the channel enthalpy at the time of PCT. Therefore, the methodology has been revised such that burst strain will also be modeled on the hot assembly average rod. This resulted in a $\Delta PCT = +4^{\circ}F$ for the four inch break analysis and a $\Delta PCT = +15^{\circ}F$ for the six inch break analysis, both of which are offset by the fuel rod burst strain limit below.

- 3) Fuel Rod Burst Strain Limit - A revised burst strain limit model which limits strains is being implemented into the rod heat up codes used in the SBLOCA analyses. This model is identical to that previously approved for use in Appendix K analyses of Upper Plenum Injection Plants. This resulted in a $\Delta PCT = -4^{\circ}F$ for the four inch break analysis and a $\Delta PCT = -15^{\circ}F$ for the six inch break analysis.

The acceptance criteria listed in 10 CFR 50.46(b)(1)-(5) continue to be satisfied.

Lastly, WPSC is currently updating the Kewaunee SBLOCA analysis using the Westinghouse NOTRUMP computer code. This is expected to be completed by the end of 1994.

If you have any questions, please contact a member of my staff.

Sincerely,



C.A. Schrock
Manager - Nuclear Engineering

DJK/cjt
Attach.

cc - US NRC Region III
US NRC Senior Resident Inspector

ATTACHMENT 1

Letter from C. A. Schrock (WPSC)

to

Document Control Desk (NRC)

Dated

March 14, 1994

SBLOCA Peak Clad Temperature Margin Utilization Sheets

Small Break Peak Clad Temperature Margin Utilization

Revision Date: 2/10/94

Plant Name: Kewaunee Unit 1
Utility Name: Wisconsin Public Service Corporation

Eval. Model: WFLASH Fuel: 14x14 STD
FQ=2.32 FΔH=1.55 4 inch Break
SGTP=0% (see Note 1)

	Reference*	Clad Temperature	Notes
A. ANALYSIS OF RECORD (9/74)	1	PCT= 1713 °F	
B. PRIOR PERMANENT ECCS MODEL ASSESSMENTS	1	ΔPCT= 77 °F	
C. 10 CFR 50.59 SAFETY EVALUATIONS	Table A	ΔPCT= 67 °F	
D. 1993 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin)			
1. Burst and Blockage/Time in Life		ΔPCT= 43 °F	2
2. Average Rod Burst Strain		ΔPCT= 4 °F	
3. Fuel Rod Burst Strain Limit		ΔPCT= -4 °F	
E. TEMPORARY ECCS MODEL ISSUES**			
1. None		ΔPCT= 0 °F	
F. OTHER MARGIN ALLOCATIONS			
1. None		ΔPCT= 0 °F	
LICENSING BASIS PCT + MARGIN ALLOCATIONS		PCT= 1900 °F	

* References for the Peak Clad Temperature Margin Utilization summary can be found in Table B.

** It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

Notes:

1. The effects of steam generator tube plugging up to 14% are negligible on SBLOCA as shown in the safety evaluation SECL-90-143.
2. An assessment of PCT margin was determined using SPIKE.

Table A – 10 CFR 50.59 Safety Evaluations

Revision Date: 2/10/94

Plant Name: Kewaunee Unit 1
Utility Name: Wisconsin Public Service Corporation

	Reference	Clad Temperature	Notes
I. SMALL BREAK ECCS SAFETY EVALUATIONS			
4 Inch Break:			
A. Auxiliary Feedwater Enthalpy Switchover	1	Δ PCT= 67 °F	
TOTAL 10 CFR 50.59 SMALL BREAK ASSESSMENTS		PCT= 67 °F	
II. LARGE BREAK ECCS SAFETY EVALUATIONS			

Westinghouse does not have cognizance for Kewaunee Unit 1 LBLOCA Analysis

Notes:
None

Table B – References

1. WPS-92-114, Letter from G. Goldberg (W) to S. Putnam (Kewaunee) transmitting the Increased Safety Injection Miniflow Safety Evaluation, April 8, 1992.

Small Break Peak Clad Temperature Margin Utilization

Revision Date: 2/10/94

Plant Name: Kewaunee Unit 1
Utility Name: Wisconsin Public Service Corporation

Eval. Model: WFLASH Fuel: 14x14 STD
FQ=2.32 FΔH=1.55 6 inch Break
SGTP=0% (see Note 1)

	Reference*	Clad Temperature	Notes
A. ANALYSIS OF RECORD (9/74)	1	PCT= 1551 °F	
B. PRIOR PERMANENT ECCS MODEL ASSESSMENTS	1	ΔPCT= 77 °F	
C. 10 CFR 50.59 SAFETY EVALUATIONS	Table A	ΔPCT= 330 °F	
D. 1993 10 CFR 50.46 MODEL ASSESSMENTS (Permanent Assessment of PCT Margin)			
1. Burst and Blockage/Time in Life		ΔPCT= 152 °F	2
2. Average Rod Burst Strain		ΔPCT= 15 °F	
3. Fuel Rod Burst Strain Limit		ΔPCT= -15 °F	
E. TEMPORARY ECCS MODEL ISSUES**			
1. None		ΔPCT= 0 °F	
F. OTHER MARGIN ALLOCATIONS			
1. None		ΔPCT= 0 °F	
LICENSING BASIS PCT + MARGIN ALLOCATIONS		PCT= 2110 °F	

* References for the Peak Clad Temperature Margin Utilization summary can be found in Table B.

** It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

Notes:

1. The effects of steam generator tube plugging up to 14% are negligible on SBLOCA as shown in the safety evaluation SECL-90-143.
2. An assessment of PCT margin was determined using SPIKE.

Table A – 10 CFR 50.59 Safety Evaluations

Revision Date: 2/10/94

Plant Name: Kewaunee Unit 1
Utility Name: Wisconsin Public Service Corporation

	Reference	Clad Temperature	Notes
I. SMALL BREAK ECCS SAFETY EVALUATIONS			
6 Inch Break:			
A. Auxiliary Feedwater Enthalpy Switchover	1	Δ PCT= 73 °F	
B. Safety Injection Spilling Assumption	1	Δ PCT= 257 °F	1
TOTAL 10 CFR 50.59 SMALL BREAK ASSESSMENTS		PCT= 330 °F	

II. LARGE BREAK ECCS SAFETY EVALUATIONS

Westinghouse does not have cognizance for Kewaunee Unit 1 LBLOCA Analysis

Notes:

1. This issue is only applicable to the 6 inch break.

Table B – References

1. WPS-92-114, Letter from G. Goldberg (W) to S. Putnam (Kewaunee) transmitting the Increased Safety Injection Miniflow Safety Evaluation, April 8, 1992.