Wisconsin Electric
POWER COMPANY

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VPNPD-90-363
NRC-90-81

10 CFR 50.73
10 CFR 50.46

August 13, 1990

U. S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

Gentlemen:

DOCKETS 50-266 AND 50-301
LICENSEE EVENT REPORT 90-007-00
ERROR IN ECCS DECAY HEAT MODEL
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

Enclosed is Licensee Event Report 90-007-00 for Point Beach Nuclear Plant, Units 1 and 2. This report is provided in accordance with 10 CFR 50.73 (a)(2)(v), "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to (A) Shutdown the reactor and maintain it in a safe shutdown condition; (B) Remove residual heat; (C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident." It is also reported in accordance with 10 CFR 50.73 (a)(2)(vi), "Events covered in paragraph (a)(2)(v) of this section may include ...discovery of design...inadequacies", as well as in 10 CFR 50.46 (a)(3)(ii), "...any change or error correction that results in a calculated ECCS performance that does not conform to the criteria set forth in paragraph (6) of this section is a reportable event as described in Section 50.55(e), 50.72, and 50.73...."

This report describes an error in the emergency core cooling system (ECCS) decay heat model which indicates a potential for failure to comply with the 2200° F Peak Cladding Temperature (PCT) acceptance limit specified in 10 CFR 50.46 within the constraints of Appendix K.

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If any further information is required, please contact us.

Very truly yours,

C. W. Fay
Vice President
Nuclear Power

Enclosure

Copies to NRC Regional Administrator, Region III
NRC Resident Inspector

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TITLE (4)

ERROR IN ECCS DECAY HEAT MODEL

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 7	1 2	9 0	9 0	0 0 7	0 0	0 8	1 1	9 0	Unit 2	0 5 0 0 0 3 0 1
										0 5 0 0 0

OPERATING MODE (9)	N
POWER LEVEL (10)	1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check one or more of the following)* (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER *(Specify in Abstract below and in Text, NRC Form 366A)*
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
C. W. Fay, Vice President - Nuclear Power	4 1 4 2 2 1 - 2 8 1 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC TURER	REPORTABLE TO NPRDS
X									

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES *(If yes, complete EXPECTED SUBMISSION DATE)*	X NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines)* (16)

On July 12, 1990, our NSSS vendor made a 10 CFR Part 21 notification to the NRC regarding an error in the decay heat model used to perform the Large-Break Loss of Coolant Accident (LBLOCA) analysis for Point Beach Nuclear Plant. The decay heat model is part of the computer code WCOBRA/TRAC used to perform the LBLOCA analyses for Point Beach 1 and 2 and another nuclear power plant. The error indicates a potential for failure to comply with the 2200°F Peak Cladding Temperature (PCT) acceptance limit specified in 10 CFR 50.46 within the constraints of Appendix K.

Pending further reanalysis by the vendor, Point Beach has committed to an administratively reduced Height Dependent Heat Flux Hot Channel Factor ($F_Q(Z)$) limit of 2.40 (below the TS value of 2.50).

This event is reportable in accordance with 10 CFR 50.73(a)(2)(v) and under 10 CFR 50.46.

BACKGROUND AND EVENT DESCRIPTION

During 1988 and 1989, a vendor was contracted by the licensee to perform analyses as necessary to support a shift in fuel type to Westinghouse Vantage 5 fuel arranged in a Low-Low Leakage Loading Pattern (L4P) for Point Beach Units 1 and 2. Changes to the Technical Specifications to allow higher core peaking factors were requested from the NRC in Technical Specification Change Request (TSCR) 127, Increased Allowable Core Power Peaking Factors, dated August 26, 1988, as amended. One of the requested changes was an increase in the allowable Height Dependent Heat Flux Hot Channel Factor $F_Q(Z)$ to a value of 2.50. The NRC approved the amendment request in its letter of May 18, 1989, transmitting Amendment 120 to DPR 50-266, and Amendment 128 to DPR 50-301.

One of the plant specific accidents required to be reanalyzed in support of this effort was the Large-Break Loss of Coolant Accident (LBLOCA) described in the PBNP Final Safety Analysis Report (FSAR) Section 14.3.2. To conduct this analysis, the vendor utilized its thermal-hydraulics computer code WCOBRA/TRAC.

In a letter dated November 30, 1988, we transmitted the vendor's LBLOCA analysis to the NRC. In this submittal we described the methodology used to perform the LBLOCA analysis. The methodology employed followed the approach outlined in SECY-83-472, "Emergency Core Cooling System Analysis Methods", dated November 1983. SECY-83-472 requires that the licensee employ best-estimate models to calculate the peak cladding temperature (PCT) under three conditions: 1) "Nominal" or most probable (50 percent probability level; 2) a more conservative 95 percent probability level (known as a "superbounded" calculation); and 3) with the required, more conservative features of Appendix K applied to the above superbounded calculation. Acceptable results would find all three PCTs less than the 2200°F limit of 10 CFR 50.46, with the "Appendix K" PCT at a value between the superbounded PCT and 2200°F.

The analyses calculated the following PCTs:

Nominal Condition (50% Probability) - 1382°
Superbounded Condition (95% Probability) - 1953°F
Appendix K Calculation - 2023°F

These results are acceptable using the SECY-83-472 approach. As such, the Appendix K calculation has become the licensed basis for the LBLOCA analysis.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

On July 10, 1990, Wisconsin Electric was informed that an error exists in the decay heat model used in the WCOBRA/TRAC computer code in performing the LBLOCA analysis for PBNP. Our NSSS vendor also reported the error in a 10 CFR Part 21 notification telephoned to the NRC on July 12, 1990, and in a written report dated July 16, 1990. The vendor stated that only the Appendix K licensing calculation is affected by the error.

The error is an underestimation of the decay heat power fraction (the fraction of full power due to decay heat) by an amount of 10 to 20% from the decay heat source required by Appendix K to 10 CFR 50. Preliminary calculations with the correct decay heat source indicated that the PCT may exceed 2200°F.

From the onset of this issue it was concluded that there was no safety concern. Both the vendor's Safety Review Committee and the licensee's Safety Review Committee formed this conclusion based on the extreme conservatism built into the Appendix K calculation, especially in view of the more realistic, yet still appropriately conservative, superbounded calculation with its calculated PCT of 1953°F. Nonetheless, until a more conclusive recalculation for the Point Beach plant could be made (the vendor was proceeding with recalculation efforts for the bounding plant), the vendor recommended, and Point Beach implemented, Constant Axial Offset Control (CAOC) to limit F_Q below an estimated new F_Q limit of 2.40.

The vendor informed us through written correspondence dated July 13, 1990, that a recalculation of the PCT for the LBLOCA analysis, assuming a maximum F_Q of 2.40, resulted in a value of 2099°F for the Appendix K value. That calculation incorporated some changes to the WCOBRA/TRAC code regarding fuel rod conduction and strain model to improve the fuel rod energy balance. As a result, Wisconsin Electric adopted a reduced F_Q as described in Technical Specification 15.2.10, from 2.50 to 2.40 as an interim administrative limit for operation of Point Beach Nuclear Plant, Units 1 and 2. As well, based on additional analyses conducted by the vendor, CAOC was deemed as no longer necessary. We informed you of these developments and our operation decisions both orally through our project manager and in writing in a letter dated July 24, 1990.

A meeting was held between the NRC, the vendor and representatives of the affected licenses on August 7, 1990, to discuss the subject in greater detail.

Based on future core loading considerations, it is the intent of the licensee to fully reestablish the TS limit for F_Q of 2.50. This will be accomplished through: 1) A reanalysis and verification of the most recent PCT calculation by the vendor using a slightly higher F_Q value of 2.43 (the calculation is considered final and verified when both the code modifications and the calculation itself are verified). This is expected by August 21, 1990. A description of the model changes and error corrections incorporated into this reanalysis are expected to be submitted by the vendor to the NRC for review and approval in an addendum to WCAP-10924-P by the end of August 1990; and 2) updating the WCOBRA/TRAC code with additional input and model changes to recover the lost F_Q margin. The vendor will pursue these updates, and intends to submit a description and validation of the updates along with the reanalysis results for Point Beach to the NRC for review and approval by October 15, 1990. Following this plan of action, while maintaining an administrative limit of 2.40 for F_Q (or 2.43 if justified), was seen as appropriate by the NRC. The licensee need not submit a Technical Specification Change Request at present.

CAUSE

The cause of the event was cognitive, human error on the part of the contractor conducting the analysis for failing to verify that the decay heat source used in the WCOBRA/TRAC code was the same as that required by Appendix K to 10 CFR 50. Additionally, no other checks were in place or were conducted to identify this error.

REPORTABILITY

This item is reported in accordance with 10 CFR 50.73 (a)(2)(v) which states "The licensee shall report: Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to:

(A) Shutdown the reactor and maintain it in a safe shutdown condition;
(B) Remove residual heat;
(C) Control the release of radioactive material; or
(D) Mitigate the consequences of an accident."

It is also reported in accordance with 10 CFR 50.73 (a)(2)(vi) which states:

"Events covered in paragraph (a)(2)(v) of this section may include...discovery of design...inadequacies..."

It is further reported in accordance with 10 CFR 50.46 (a)(3)(ii) which states:

"...any change or error correction that results in a calculated ECCS performance that does not conform to the criteria set forth in paragraph (6) of this section is a reportable event as described in Section 50.55(e), 50.72, and 50.73..."

NRC FORM 366A (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

CORRECTIVE ACTION AND SAFETY ASSESSMENT

As described in the above BACKGROUND AND EVENT DESCRIPTION

GENERIC IMPLICATIONS

The WCOBRA/TRAC code was used only for LBLOCA analyses conducted for Point Beach and one other plant. The licensee for the other plant, as well as Wisconsin Electric, was informed by the vendor upon discovery of the error and has taken similar actions. We have been in contact with this licensee during the course of this issue, and we participated with them in the August 7, 1990 meeting. There are no other generic implications from this event.