



231 W. Michigan, P.O. Box 2046, Milwaukee, WI 53201-2046

(414) 221-2345

VPNPD-94-129  
NRC-94-087

10CFR50.73

December 2, 1994

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

Gentlemen:

DOCKET 50-301  
LICENSEE EVENT REPORT 94-005-00  
VIOLATION OF TECHNICAL SPECIFICATIONS TABLE 15.3.5-2  
OVERTEMPERATURE  $\Delta T$  MINIMUM DEGREE OF REDUNDANCY NOT ACHIEVED  
POINT BEACH NUCLEAR PLANT, UNIT 2

Enclosed is Licensee Event Report (LER) 94-005-00 for Point Beach Nuclear Plant (PBNP), Unit 2. This report is provided in accordance with 10 CFR 50.73(a)(2)(i)(B), "The licensee shall report...any operation or condition prohibited by the plant's Technical Specifications."

This report describes a violation of Technical Specifications Table 15.3.5-2 requirements for the minimum degree of redundancy of the overtemperature  $\Delta T$  reactor protection circuitry.

Please contact us if any further information is required.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Bob Link'.

Bob Link  
Vice President  
Nuclear Power

DAW/jg

Enclosure

cc: NRC Resident Inspector  
NRC Regional Administrator

9412080131 941202  
PDR ADOCK 05000301  
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## LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH  
THIS INFORMATION COLLECTION REQUEST: 50.0 HRS.  
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO  
THE INFORMATION AND RECORDS MANAGEMENT BRANCH  
(MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION,  
WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK  
REDUCTION PROJECT (3150-0104), OFFICE OF  
MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.FACILITY NAME (1)  
Point Beach Nuclear Plant, Unit 2DOCKET NUMBER (2)  
05000301PAGE (3)  
1 OF 5TITLE (4)  
TS Violation - Overtemperature  $\Delta T$  Minimum Degree of Redundancy Not Achieved

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 NAME	DOCKET NUMBER
11	02	94	94	-- 005 --	00	12	02	94	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)						
POWER LEVEL (10)	28	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
		20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
		20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
		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  
David A. Weaver, Senior Engineer - LicensingTELEPHONE NUMBER (Include Area Code)  
(414) 221-3418

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

## SUPPLEMENTAL REPORT EXPECTED (14)

YES  
(If yes, complete EXPECTED SUBMISSION DATE).

X NO

EXPECTED  
SUBMISSION  
DATE (15)

MONTH DAY YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 2, 1994, while performing flux mapping during Point Beach Nuclear Plant (PBNP) Unit 2 start-up following the Unit 2 Cycle 20 refueling outage, plant personnel noted that the delta flux indication for power range Channel N42 was not consistent with the other three power range channels. The N42 delta flux indication was the opposite of the N41, N43, and N44 delta flux indications. After flux mapping was completed, plant personnel confirmed via rod motion that the signals from the upper and lower N42 detectors were reversed. Technicians switched the N42 signal cables at the input to the electronics to provide the proper indication. Although the N42 flux trips and interlocks remained operable, the overtemperature delta T function for the N42 channel was inoperable due to the inaccurate delta flux input and would have resulted in nonconservative trip setpoints for some conditions of axial flux mismatch. However, these conditions did not exist while the N42 channel overtemperature delta T was inoperable. This placed the overtemperature delta T circuitry in a condition with three operable channels with two channels to actuate to trip the reactor, or a minimum degree of redundancy of 1. This condition violated Technical Specifications Table 15.3.5-2, Item 5, which requires a minimum degree of redundancy of 2 for the overtemperature delta T reactor protection function.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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Point Beach Nuclear Plant, Unit 2		05000301		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
				94	--- 005 ---	00	

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

EVENT DESCRIPTION

Power range nuclear instrument (NI) detector N42 was replaced in PBNP Unit 2 during the Fall 1994 outage. The detector was replaced because it had reached its design life. Post-maintenance testing and return to service testing were conducted to verify proper operation of the replaced detector. The testing consisted of verifying proper cable connections between the field cables and the detector cables and proper response of the detector as reactor power was increased to the power range (e.g.,  $\geq 2\%$ ).

On November 2, 1994, a flux map was performed at approximately 28% power during the Point Beach Nuclear Plant (PBNP) Unit 2 start-up following the Unit 2 Cycle 20 refueling outage. During the flux map, control room personnel noticed that the delta flux indication for power range Channel N42 was not consistent with the corresponding indications for power range Channels N41, N43, and N44. The N42 delta flux indication was the opposite of the N41, N43, and N44 delta flux indications. After flux mapping was completed, control room personnel confirmed, via rod motion, that the signals from the upper and lower (A and B) N42 detectors had been reversed. Temporary Modification (TM) 94-40 was subsequently initiated to swap the A and B detector signal leads in the control room nuclear instrumentation system (NIS) rack to return the instrument to its designed configuration.

Although the N42 flux trips and interlocks remained operable, the over-temperature delta T function for the N42 channel was inoperable due to the inaccurate delta flux input. This situation would have resulted in nonconservative trip setpoints for conditions of delta flux greater than 5 percent. However, these conditions did not exist while the over-temperature delta T function was inoperable. This placed the over-temperature delta T circuitry in a condition with 3 operable channels and 2 channels required to actuate to initiate a reactor trip, or a minimum degree of redundancy of 1. This condition violated Technical Specifications Table 15.3.5-2, Item 5, which requires a minimum degree of redundancy of 2 for the overtemperature delta T reactor protection function.

EQUIPMENT DESCRIPTION

The NI detectors are located in instrument wells within the concrete shield around the reactor vessel. Four independent and redundant power range channels are provided. Each channel has dual uncompensated ion chambers to monitor the neutron flux at each core quadrant. The dual configuration produces 2 separate detector signals. The "A" signal is

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proportional to the power generated in the upper half of the core. The "B" signal is proportional to the power generated in the bottom half of the core. The individual top and bottom current signals are output separately from the total current signal and are used to develop the delta flux used in the calculation of overtemperature delta T setpoints.

Component information for installed N42 NI detector:

IEEE Standard 803A-1983 component identifier - DET  
Manufacturer - W120 (Westinghouse)  
Model Number - WL-24154

CAUSE

Because the condition of the N42 channel was not identified until Unit 2 was brought up in power, the wiring configuration at the detectors inside containment could not be verified. We believe there are three potential causes for the detector signals being reversed:

1. The new detectors are mislabeled, or
2. The signal cables are reversed at the containment penetration, or
3. The independent verification of the detector cable connections was inadequate.

However, a known contributing factor to this event was inadequate post-maintenance and return to service testing. The specified post-maintenance testing and return to service testing which was performed indicated a proper response to neutron flux, but it did not ensure that the detectors responded appropriately to an axial flux difference.

CORRECTIVE ACTIONS

## Immediate:

1. The N42 overtemperature delta T channel was placed in "Trip" in accordance with plant procedures. This restored the required minimum degree of redundancy in accordance with the PBNP Technical Specifications.

## Short Term:

1. The "A" and "B" signal cables were swapped at the NIS rack in the control room in accordance with Temporary Modification (TM) 94-040 to provide the correct delta flux signal and indication.



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

Long Term:

1. Because the N42 detector is located inside containment, the cable connections at the N42 detector cannot be verified with the unit at power. Therefore, final resolution of this condition will be determined prior to the completion of the 1995 Unit 2 refueling outage which is presently scheduled to end on November 7, 1995.
2. Instrument & Contr 1 (I&C) procedures which relate to nuclear instrument detector replacement and Procedure NP 8.1.3, "Post Maintenance Testing," will be reviewed to determine the need for additional or revised guidance on post-maintenance and operability testing. The review of I&C procedures will be completed prior to replacement of any additional neutron flux detectors, but no later than September 29, 1995. The review of procedure NP 8.1.3 will be completed prior to the 1995 Unit 1 refueling outage, which is presently scheduled to commence on March 11, 1995.

REPORTABILITY

This report is provided in accordance with 10 CFR 50.73(a)(2)(i)(B), "The licensee shall report...any operation or condition prohibited by the plant's Technical Specifications." The NRC Resident inspectors were also notified of this event.

SAFETY ASSESSMENT

The overtemperature delta T reactor protection feature is credited as a primary mitigator for the uncontrolled rod withdrawal accident and loss of load accident. For the loss of load accident, the turbine trip would be preemptive; however, no credit is taken for the turbine trip in the loss of load FSAR accident analysis. Reactor protection system trip setpoints other than overtemperature delta T also provide protection, including high pressurizer pressure and low steam generator level. For the uncontrolled rod withdrawal accident, the intermediate reactivity insertion rate is the rate at which overtemperature delta T may provide protection. The high flux trip serves as a back-up to the over-temperature delta T trip. Additional protection is provided by the high pressurizer level, overpower delta T, and high pressure reactor trips. For high reactivity insertion rates, reactor trip is initiated by the high neutron flux trip. For low reactivity insertion rates, the rise in reactor coolant temperature is sufficiently high so that the steam generator safety valve setpoint is reached prior to trip. High and low reactivity insertion rates are the most limiting cases of the uncontrolled rod withdrawal event.

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This plant condition resulted in a reduction of the degree of redundancy required by Technical Specifications for reactor protection instrumentation. Although the N42 overtemperature delta T channel was inoperable during the time that the signal cables were reversed, three channels remained operable. Therefore, the overtemperature delta T trip function remained available, but one of four channels would have functioned at a nonconservative trip setpoint. Because the delta flux trip and interlocks remained fully operable, this condition involved minimal safety significance.

GENERIC IMPLICATIONS

No generic implications have been identified.

SIMILAR OCCURRENCES

No similar events have been identified.