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VPNPD-91- 374

NRC-91-123

October 28, 1991

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

Gentlemen:

DOCKET 50-301  
LICENSEE EVENT REPORT 91-001-00  
FAILURE OF MAIN STEAM ISOLATION VALVES TO CLOSE  
POINT BEACH NUCLEAR PLANT, UNIT 2

Enclosed is Licensee Event Report 91-001-00 for Point Beach Nuclear Plant, Unit 2. This report is provided in accordance with 10 CFR 50.73(a)(2)(v)(D), "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 mitigate the consequences of an accident."

This report describes the failure of both Main Steam Isolation Valves to close at the start of the Unit 2 maintenance and refueling outage when an attempt was made to shut them from the control room. A supplemental report will be filed following final determination of all corrective actions.

If any additional information is required, please contact us.

Very truly yours,

A handwritten signature in cursive script that reads 'James J. Zach'.

James J. Zach  
Vice President  
Nuclear Power

Enclosure

Copies to NRC Regional Administrator, Region III  
NRC Resident Inspector

9111050068 911028  
PDR ADOCK 05000301  
S PDR

A subsidiary of Wisconsin Energy Corporation

Handwritten initials 'JEP' and the number '11' below them.

## LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-500), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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Point Beach Nuclear Plant Unit 2

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TITLE (4)

Failure of Main Steam Isolation Valves to Close

EVENT DATE (5)			LER NUMBER (6)			RE-DATE DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME		DOCKET NUMBER (5)
0	9	2	9	9	1	9	1	0	0	1	0 5 0 0 0
0	9	2	9	9	1	9	1	0	0	1	0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)									
POWER LEVEL (10)	0 0 0	N	20.402(b)	20.406(c)	50.73(a)(2)(i)	73.71(b)					
		20.406(a)(1)(i)	50.38(a)(1)	X	50.73(a)(2)(ii)	73.71(c)					
		20.405(a)(1)(i)	50.38(a)(2)		50.73(a)(2)(iii)	OTHER (Specify in Abstract Section and in Text, NRC Form 306A)					
		20.406(a)(1)(ii)	50.73(a)(2)(i)		50.73(a)(2)(iv)(A)						
		20.406(a)(1)(iv)	50.73(a)(2)(ii)		50.73(a)(2)(iv)(B)						
			20.406(a)(1)(iv)	50.73(a)(2)(iii)		50.73(a)(2)(i)					

LICENSEE CONTACT FOR THIS LER (12)

NAME

TELEPHONE NUMBER

Mr. T. J. Koehler, Manager-Maintenance

AREA CODE

4 1 4 7 5 5 - 2 3 2 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC										
B	S	B	I	S	V	A	5	8	5	Y									

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)

MONTH

DAY

YEAR

X YES (If yes, complete EXPECTED SUBMISSION DATE)

NO

0 1 2 4 9 2

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

## ABSTRACT

At 0930 on September 29, 1991, an attempt to shut the Point Beach Nuclear Plant Unit 2 Main Steam Isolation Valves (MSIVs) was made from the control room. Both MSIVs failed to leave the fully open position. An operator was dispatched to the valves and shut them by applying mechanical force to the valve operators. After the valve operators were freed by mechanical force, the valves shut unassisted. Unit 2 had been shut down and cooled down to approximately 325 degrees F for the beginning of its annual maintenance and refueling outage when this event occurred. An extensive investigation into the cause of the failure to close is being performed. The cause for the valves failure to close has initially been attributed to degradation of the valve operators due to corrosion. Steps are being taken to prevent recurrence of the corrosion and return the operators to service. Modifications to the valves and associated operators and changes to the valve maintenance program are being considered. An independent Nuclear Power Department team investigation was also performed to assess MSIV performance and perceptions of valve performance.

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TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 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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TEXT (if more space is required, use additional NRC Form 305A's) (17)

EVENT DESCRIPTION

On September 29, 1991, Point Beach Nuclear Plant Unit 2 was shut down and a cooldown was in progress in preparation for its annual maintenance and refueling outage. The unit had operated continuously with the MSIVs open since November 18, 1990. Cooling was being provided by the Residual Heat Removal System. At 0930, with steam pressure approximately 80 psig and minimal steam flow in the steam lines, an attempt was made to shut the MSIVs (MS-2017 and MS-2018) from the control room in accordance with the shutdown procedure. Both MSIVs remained in the full open position. An operator was dispatched to shut the valves locally. MS-2017 shut after the operator struck the valve operating arm several times with an eight-pound sledge hammer. MS-2018 shut after the valve operating arm was struck once with the sledge. Both valves were shut by 0941.

This effort to shut the valves was done in accordance with the existing shutdown procedure and not to verify the valves' ability to close in accordance with Technical Specification 15.4.7. Verification of valve operability and satisfaction of the technical specification test requirement are accomplished through an inservice test which is performed prior to unit startup. This test verifies the valves are operable during the ensuing operating cycle.

The operators initiated maintenance work requests (MWR) for each valve to investigate and correct the failure to close. However, the event was not immediately recognized as reportable. Subsequent review of the station and operator logs determined this event required a four-hour report in accordance with 10 CFR 50.72(b)(2)(iii)(D), "Any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident."

The valves were quarantined to insure that disassembly and inspection of the valves to determine the cause(s) of the failure to close could be performed in a planned and controlled manner. Our plans were to hold disassembly until an NRC inspector was present to witness the work. However, some disassembly was inadvertently initiated without the NRC inspector being present.

SYSTEM DESCRIPTION

The MSIVs are Atwood Morrill Model E, thirty-inch swing check valves, drawing 20735H. The valves are held open, out of the steam flow stream, against spring pressure by a piston operator utilizing instrument air. When the valve receives a shut signal, instrument air is bled from the valve operator; spring force on the operator and gravity cause the valve disc to drop into the flow stream, which then assists the valve in closing.

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TEXT (if more space is required, use additional NRC Form 306A's) (17)

The valves can be shut manually from the control room and receive automatic shut signals designed for plant protection from a potential steam line break. The steam line isolation automatic actuation signals provided for each loop are:

1. Coincidence of safety injection and high steam flow (Hi-Hi setpoint, 1/2 trip logic).
2. Coincidence of a safety injection signal, low tavg (2/4 trip logic) and high steam flow (Hi setpoint, 1/2 trip logic).
3. High containment pressure (Hi-Hi setpoint, 2/3 trip logic).

CAUSES AND CORRECTIVE ACTIONS

During the disassembly of the MS-2017 operator air cylinder, corrosion was found on the operator shaft bushing seal. This corrosion was sufficient to hold the operator in the open position against cylinder spring pressure and contributed to the valve remaining full open against the disc stop. The operating shaft bushing is nodular iron and subject to corrosion in a moist environment. A bushing wiper helps prevent moisture from entering the operator internals. Striking the valve operating arm with the sledge hammer broke the cylinder piston rod free allowing the valve to close.

Disassembly of the MS-2018 valve operator revealed general corrosion problems internal to the air cylinder. This air cylinder is of a different design than that on MS-2017. The MS-2018 cylinder design does not employ a seal or wiper between the shaft bushing and shaft. From approximately December 1989 until the Unit 2 1990 refueling outage, steam leakage existed through the MS-2018 valve stem packing. We suspect this leakage resulted in water condensing on the valve operator and flowing into the unpresurized upper portion of the air cylinder. Some of this water then entered the lower portion of the cylinder during outage conditions when the MSIV is shut and air pressure removed from the cylinder, resulting in the internal corrosion. During the fall 1990 refueling outage, the valve was repacked and the packing adjusted to eliminate the steam leakage. Water leakage into the operating cylinder was not investigated at that time.

The following corrective actions have been, or will be, taken prior to startup from the refueling outage to insure valve operability:

1. Investigation into the valve failure to address immediate operability concerns will be completed.

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2. The valve packing material and arrangement will be modified in an attempt to stop the leakage and decrease the packing friction. This will include the use of graphite spacers on both sides of the packing box and the use of composite packing rings on each side of grafoil packing rings. This modification is consistent with the valve manufacturer's recommendations and has been implemented at other utilities.

In addition, we plan on taking the following actions to address this issue over the long term:

1. We will disassemble the valve operators during future refueling shutdowns for inspection and correction of potential problems. The actual inspection interval will be determined using the results of these inspections.
2. A number of valve operator modifications suggested by the valve manufacturer are under investigation. These include modification of the present operator and valve packing arrangements.
3. Modified testing is being investigated to test the valves under hot, low flow conditions. The test conditions will be chosen to better predict the valves' ability to close in order to fulfill their designed safety function.

These modifications and changes will also be implemented where appropriate for the Unit 1 MSIVs.

Steps were also taken to insure the operability of the Unit 1 valves. On the morning of October 5, 1991, the unit was removed from service. With the unit operating at two to five percent power, the MSIVs were cycled shut, one at a time, from the control room. Both valves operated satisfactorily.

We also inspected and refurbished the Unit 1 valve operators during a scheduled shutdown on October 26, 1991. The MS-2017 operator internals were slightly corroded and a small amount of water was found on top of the operator piston. The side of the piston on which instrument air acts was dry. The MS-2018 operator internals were damp and slightly corroded. The operator dashpots which had been noted to have been removed were found in place. However, the dashpot internals had been modified such that the dashpots have no effect on valve operation. Following refurbishment, the valves were tested and shut satisfactorily.

Upon completion of the investigations and determination of the corrective actions to be taken to address long-term concerns, a supplemental LER will be submitted. The supplemental LER will include the corrective actions we plan to take as a result of our incident investigation, a discussion of

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modifications we plan to take to address operability concerns along with our schedule for implementation and a more complete discussion of what was found on the Unit 1 valve operators. We expect to submit this supplemental LER by January 24, 1992.

In response to this event not being recognized by the operating crew as a reportable occurrence, increased emphasis will be provided in training on reportability considerations. This training will include operators, Duty Technical Advisors, Duty Shift Superintendents, and Duty and Call Superintendents. The specifics of this training will be developed from the results of the incident investigation. Details on the training to be performed and the schedule for completion will be reported in the supplemental LER.

SAFETY SIGNIFICANCE

The safety significance of both MSIVs failing to close when called upon was evaluated in 1987 in response to an event in which it was discovered that control power was tagged out to the valves for a short period of time during power operation. This evaluation is detailed in LER 50-301/87-003-00 dated September 17, 1987. This assessment evaluated the effect of the unavailability of the MSIVs on the FSAR transient analyses. The transients of concern are the main steam line break and steam generator tube rupture. This evaluation, which pertains to this event also, concludes that the PBNP FSAR analyses bound this event. Therefore, the event did not pose a health and safety hazard to the general public or plant personnel.

REPORTABILITY

This event is being reported in accordance with the requirements of 10CFR50.73(a)(2)(v)(D), "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 mitigate the consequences of an accident."

A four-hour report was made in accordance with 10CFR50.72 upon recognition of the event. Because this event was not immediately recognized as reportable, this notification was made at 1624 on Monday, September 30, 1991, instead of prior to 1330 on September 29, 1991. The NRC resident inspector was also informed.

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GENERIC IMPLICATIONS

This event revealed potential inadequacies in the MSIV operator design and maintenance. Potential inadequacies include operator size, materials, operating conditions, and preventive maintenance. These issues do not appear to affect operation in the short term based on recent operating history. Investigations and determination of corrective actions to address long-term concerns will continue and corrective action will be taken.

ENERGY INDUSTRY IDENTIFICATION

MS-2017

MS-2018

System	SB	SB
Component	ISV	ISV
Manufacturer	A585	A585

SIMILAR OCCURRENCES

<u>LER/SOE</u>	<u>UNIT</u>	<u>TITLE</u>
74-024-00	2	'B' Main Steam Stop Failure To Close At No Flow
75-005-00	2	'B' Main Steam Stop Valve Failure To Close At No Flow Conditions
75-05	2	'B' Main Steam Stop Valve Failure To Close At Zero Flow Conditions
75-06	2	Failure Of 'B' Main Steam Stop Valve To Close Tightly Within 5 Seconds
77-03	2	Failure Of 'B' Main Steam Stop Valve To Close Tightly Within 5 Seconds
78-02	2	Failure Of Main Steam Stop Valves To Close
79-001-00	2	Failure Of Main Steam Isolation Valves To Close
80-008-00	2	Failure Of 'B' Main Steam Isolation Valve To Close
85-005-00	2	Reactor Trip Due To Loss Of Load
86-004-00	2	Failure Of Main Steam Isolation Valve To Close On Demand
86-004-01	2	Failure Of Unit 2 Main Steam Isolation Valve To Close On Demand

In addition to the above occurrences, Unit 1 MS-2017 failed to shut during performance of inservice test IT-280 in 1987. The lower portion of the valve operating air cylinder was found to be full of rust. The air cylinder was rebuilt and live load packing was installed on the valve. The valve was then stroke tested satisfactorily.