

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)  
McGuire Nuclear Station - Unit 2

DOCKET NUMBER (2)

0 5 0 0 0 3 7 0 1 OF 3

TITLE (4)

Upper Head Injection Train Inoperable Due to Pressure Surge

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)						
1	1	1	3	8	4	8	4	0	2	8	0	5	0	0	0		
1	1	1	3	8	4	8	4	0	2	8	0	5	0	0	0		

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 8: (Check one or more of the following) (11)

OPERATING MODE (9)	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
1	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
POWER LEVEL (10)	20.405(a)(1)(ii)	50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 365A)
1	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
0	20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
0	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME  
Scott Gewehr - Licensing

TELEPHONE NUMBER

AREA CODE

7 0 4 3 7 3 - 7 5 8 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input checked="" type="checkbox"/>	<input type="checkbox"/>		0	1	14 8 5

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

On November 13, 1984 an Upper Head Injection (UHI) [FIIS:BG] Hydraulic System Alarm was received in the Control Room for Train "B" while "Train A" instruments were being calibrated. As technicians valved train "A" into service, a pressure surge in the crossover line between the trains caused two UHI isolation valves to partially close. During attempts to reopen the valves, one failed completely closed and was declared inoperable. Unit 2 was at 100 power at the time. Cause of the event is considered to be a design deficiency, because the crossover connection between the trains allows pressure surges in one train to be transmitted to the other

A contributing cause is also considered to be a component malfunction, because a check valve did not operate properly.

Corrective action consists of a revision to the UHI accumulator level calibration procedure to disable UHI isolation valves in the open position prior to any maintenance or calibration activity. While this will not prevent pressure surges between trains, it will block the isolation valves in the open position to ensure a flow path for UHI.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104  
EXPIRES: 8/31/85

FACILITY NAME (1)  McGuire Nuclear Station - UNIT 2	DOCKET NUMBER (2)  0 5 0 0 0 3 7 0 8 4 -	LER NUMBER (6)			PAGE (3)		
		YEAR 0 8 4	SEQUENTIAL NUMBER 0 2 8	REVISION NUMBER 8 4		OF	2

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

INTRODUCTION: At 0012, on November 13, 1984, Unit 2 control room operators received a UHI hydraulic trouble alarm on train "B" while Instrument and Electrical (IAE) personnel were calibrating the train "A" level transmitters. As the IAE technicians valved the train "A" instruments back in service, the pressure surge on the instrument impulse line was transmitted to the train "B" instruments through a pressure equalizing crossover line inside the tank. UHI isolation valves 2NI-242B and 2NI-244B partially closed on this false signal but were not declared inoperable because they were still partially open.

While Operations personnel were attempting to restore the valves to the full open position, 2NI-244B failed completely closed and was declared inoperable at 0130.

Unit 2 was in Mode 1 at 100% power.

This incident is attributed to a Design Deficiency because the train "A" to train "B" crossover connection inside the tank causes pressure surges in one train to be felt on the other train during instrument maintenance. A Component Failure/Malfunction, also contributed to this incident when 2NI-244B did not respond to the open control circuitry because pilot operated check valves did not function properly.

EVALUATION: Special attention has been directed toward the UHI level transmitter system since the incidents that occurred on November 1, 1984. These incidents are explained in Licensee Event Report 369/84-30, and involved 1) the unit 1 transmitters being incorrectly installed, 2) the setpoints for valve closure were miscalculated and 3) gassing in instrument lines.

As a follow-up to an NRC review of the above incidents, IAE personnel initiated work requests on November 12, 1984 to verify that the outputs of the Unit 1 and Unit 2 UHI level transmitters had not drifted since their previous calibrations.

IAE technicians were in the process of completing this verification on two level instruments using UHI accumulator tank level loop calibration procedure. These Train "A" instruments are taken out of service when the instrument root valves are closed. The technicians opened a root valve to pressurize the instruments and impulse lines. This was done in preparation to fill and vent the reference leg with water at system pressure. The sudden surge of pressure in the impulse lines caused a corresponding pressure drop in the Train "B" LP instrument lines through the crossover line between Trains A and B inside the tank. This pressure drop caused the two train "B" transmitters and control circuitry to momentarily initiate a valve closure signal to 2NI-242B and 2NI-244B.

The train "B" transmitters were initially at static system pressure (approximately 1230 psig) with zero differential pressure before the pressure spike. A pressure drop of approximately 1.6 psi on the LP line would be sufficient to cause the isolation valves to close.

A water box arrangement was installed by Westinghouse to dampen the effects of waves in the tank during a UHI tank blowdown. The crossover line was apparently installed to insure that both instrument trains received the same pressure signals to actuate the isolation valves at the same time.

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							8 4	0 2 8	8	4 0 3	OF	3

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

During normal operation of the UHI tank level controls or during a UHI blowdown, the instruments would respond correctly. The arrangement is only deficient from the maintenance aspect as the instruments are valved in and out of service or vented after calibration. The crossover line offers a flow path between trains in parallel with the flow path through the water box assembly. Theoretically, "A" train should have been water solid prior to pressurization. Since water is virtually non-compressible, little water movement would be expected as the root valve was opened. In fact, small pockets of compressible gas probably did exist in the "A" train instruments and/or lines. As these pockets of gas were compressed, water through the lines and instruments, creating a pressure dip at the crossover line.

The tubing length and size also add to the problem. The tubing size inside the tank is 3/8 inch diameter and approximately 7.5 feet in length to the water box. The tubing size outside the tank is 1/2 inch diameter and train "A" is approximately 50 feet in length and train "B" is approximately 75 feet in length. This excessive tubing length outside the tank is a substantial volume to be pressurized when the instruments are valved in service.

The problems encountered while Operations personnel were trying to open 2NI-244B have not been completely resolved. These valves are designed to go completely closed or remain open. It is believed that two pilot-operated check valves did not function correctly after the momentary pressure surge that caused the valves to partially close.

The two spring-loaded pilot-operated check valves are connected by a pilot line which has a vent valve installed between the two check valves. In order to close 2NI-244B, the pilot line is vented, which allows hydraulic fluid to flow through one of the check valves into the top of the hydraulic cylinder which operates valve 2NI-244B. The fluid which is expelled from the other end of that cylinder goes through the other check valve and back to the fluid reservoir. Apparently, this second check valve failed to close once 2NI-244B closed. As a result, fluid which should have gone back into the bottom of the hydraulic cylinder to reopen the valve (2NI-244B) escaped through the check valve.

CORRECTIVE ACTION: IAE procedure UHI Accumulator Tank Level Loop Calibration Procedure was rewritten to disable all four isolation valves in the open position prior to any maintenance or calibration activity. This action did not correct the problem with the opposite train instruments receiving pressure surges when the instruments are valved in, but does block the UHI isolation valves in the open position. Further action to determine the cause and correction for the malfunction of this check valve should be available by January 14, 1985.

SAFETY ANALYSIS: One UHI discharge line was isolated and inoperable with 2NI-244B in the closed position. Two isolation valves remained open providing a flow path for UHI had the system been required to operate during a design event. Preoperational testing of the UHI system demonstrated that this one operable flow path was sufficient to insure safe reactor operation. The health and safety of the public were not affected.

**DUKE POWER COMPANY**

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HAL B. TUCKER  
VICE PRESIDENT  
NUCLEAR PRODUCTION

December 13, 1984

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

Subject: McGuire Nuclear Station, Unit 2  
Docket No. 50-370  
LER 370/84-28

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 370/84-28 concerning the inoperability of the Upper Head Injection System, which is submitted in accordance with §50.73 (a)(2)(vii). This event was considered to be of no significance with respect to the health and safety of the public.

One aspect of this event remains unresolved, regarding the malfunction of a pilot-operated check valve. This issue should be resolved, and a supplemental report submitted by January 14, 1985.

Very truly yours,

*H. B. Tucker*  
Hal B. Tucker

SAG/mjf

Attachment

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