

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 1	DOCKET NUMBER (2)	PAGE (3)
	0 5 0 0 0 3 6 9	1 OF 0 6

TITLE (4) TRAIN B OF THE COMPONENT COOLING SYSTEM WAS INOPERABLE DUE TO A NUCLEAR SERVICE WATER SYSTEM VALVE BEING IN A NONCONSERVATIVE POSITION - LOOSE TRAVEL STOPS

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 3	0 9	8 8	8 8	0 0 3	0 0	0 4	0 8	8 8			0 5 0 0 0
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OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50. (Check one or more of the following) (11)										
	20.402(b)			20.406(e)			50.73(a)(2)(iv)			73.71(b)	
	20.406(a)(1)(i)			50.36(e)(1)			50.73(a)(2)(v)			73.71(c)	
	20.406(a)(1)(ii)			50.36(e)(2)			50.73(a)(2)(vii)			OTHER (Specify in Abstract below and in Text, NRC Form 366A)	
	20.406(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(viii)(A)				
	20.406(a)(1)(iv)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(B)				
20.406(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(ix)					

LICENSEE CONTACT FOR THIS LER (12)										TELEPHONE NUMBER			
NAME Steven E. Le Roy, Licensing										AREA CODE			
										7 0 4 3 7 3 1 6 2 1 3 3			

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

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

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

On 03/09/88 at 1330, Performance personnel were inspecting the progress of some valve work and discovered the Component Cooling (KC) Heat Exchanger (HX) 1B Control, valve 1RN-190B, with the travel stops loose and in a nonconservative position. Performance immediately notified the Control Room Senior Reactor Operator (SRO) that valve 1RN-190B would not allow the proper amount of Nuclear Service Water (NSW) system flow through the 1B KC HX. The SRO declared KC Train 1B inoperable at 1335 on 03/09/88. Performance reset the travel stops to the position that was determined during the most recent RN system flow balance on January 29, 1988. Performance tightened the hex nuts for the travel stop adjustment to ensure the hex nuts would stay in position. At 1420 on 03/09/88 the SRO returned KC Train 1B to operable status. A cause of Unknown has been assigned to this event because this investigation could not determine when or how the hex nuts had come loose from the secured position. Loctite thread sealant will be applied to the threads of the hex nuts for the travel stop adjustments on valve 1RN-190B and an evaluation will be performed regarding the need for Loctite thread sealant on valves 2RN-190B, and 1 and 2RN-89A. Appropriate Maintenance personnel will be required to read a memo warning personnel never to use travel stop adjustments to secure a valve in the closed position.

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McGuire Nuclear Station - Unit 1	050100	369	88	003	00	02 OF 06

TEXT (If more space is required, use additional NRC Form 366A (1/17))

INTRODUCTION:

On March 9, 1988 at 1300, Performance personnel were in the Auxiliary Building inspecting the progress of some valve work. At 1330, Performance personnel discovered the Component Cooling (KC) [EIIS:CC] Heat Exchanger (HX) 1B Control, valve 1RN-190B, with the travel stops loose and in a nonconservative position. Performance personnel immediately notified the Control Room Senior Reactor Operator (SRO) that valve 1RN-190B would not allow the proper amount of Nuclear Service Water (RN) system [EIIS:BI] flow through the 1B KC HX. The SRO declared Train B of the Unit 1 KC system inoperable at 1336 on March 9, 1988. Performance personnel reset the travel stops to the position that was determined during the most recent RN system flow balance on January 29, 1988. Performance personnel tightened the hex nuts for the travel stop adjustment to ensure that the hex nuts would stay in position. At 1420 on March 9, 1988, the SRO returned Train B of the Unit 1 KC system to operable status.

Unit 1 was in Mode 1, Power Operation, at 100% power, at the time this event was discovered.

A cause of Unknown has been assigned to this event because this investigation could not determine when or how the hex nuts had come loose from their secured position.

EVALUATION:Background

The RN system provides assured cooling water for various Auxiliary and Reactor Building HXs during all phases of plant operation. Each unit has two redundant essential headers serving equipment necessary for safe plant shutdown and a non-essential header serving equipment not required for safe shutdown. In conjunction with Lake Norman and the Standby Nuclear Service Water Pond, the RN system is designed to assure cooling for normal plant operation and also provide cooling for safe shutdown normally or as a result of a postulated Loss Of Coolant Accident (LOCA). The KC HXs are the largest thermal load on the RN system for all phases of plant operation. RN system flow through the KC HXs for LOCA conditions must be a minimum of 6000 gpm and is normally set at 6300 gpm for conservatism. This flow is measured quarterly and documented by the RN Train 1B Flow Balance periodic test.

Valve 1RN-190B is a throttle valve [EIIS:FCV] that controls the amount of RN system flow through the 1B KC HX and has a travel stop that limits the maximum amount of flow through the KC HX. The travel stop is set by adjusting a pair of hex nuts on each of two threaded rods adjacent and parallel to the actuator [EIIS:84] stem on opposite sides. There is a stop bar attached to the actuator stem with holes through which the threaded rods pass as the actuator stem moves. The stop bar will contact the hex nuts and stop the actuator stem travel. The two hex nuts on each threaded rod tighten against each other to prevent movement of

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U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

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TEXT (If more space is required, use additional NRC Form 368A (2/1/77))

the travel stop adjustment. Valve 1RN-190B is a Fisher Controls 20 inch butterfly valve with an air operated, fail open actuator. The actuator serial number is BF248583, and the model number is 7610.

The KC system is designed to remove residual and decay heat from the Reactor Coolant system [EIIS:AB] through the Residual Heat Removal (ND) system [EIIS:BP] HXs during plant shutdown and under accident conditions.

Description of Event

On January 27, 1988, Mechanical Maintenance (MNT) personnel secured valve 1RN-190B in the closed position by moving the hex nuts for the travel stop adjustment to a position that would prevent the valve from opening. Operations personnel were isolating the RN system to the 1B KC HX so that MNT could repair a leak on the HX. Valve 1RN-190B was being used as an isolation valve for the RN system. The leak could not be repaired, and the work was rescheduled to be done during the 1988 Unit 1 refueling outage. On January 28, 1988, Operations personnel restored RN system flow to the 1B KC HX, and MNT personnel returned the hex nuts for the travel stop adjustment to their previous position.

On January 29, 1988, Performance personnel began the quarterly RN Train 1B Flow Balance periodic test. During the performance of this test, it was determined that there was too much RN system flow through the 1B KC HX. Performance personnel adjusted the hex nuts for the travel stop from approximately 4 inches of actuator stem travel to approximately 3 and 3/8 inches of actuator stem travel for valve 1RN-190B and then tightened the two hex nuts on each threaded rod against each other to lock the travel stop adjustment in position. At approximately 3 and 3/8 inches of actuator stem travel, approximately 6300 gpm of RN system flow was available through the 1B KC HX which met the design requirement for the KC system. The flow balance test was successfully completed on February 1, 1988.

On March 9, 1988, at approximately 1300, Performance personnel were inspecting the RN system because some work was scheduled to be done that day on valve 1RN-190B. They discovered the hex nuts for the travel stop adjustment on valve 1RN-190B loose and located at approximately 2 and 7/8 inches of actuator stem travel. This position would allow approximately 1500 gpm less RN system flow to the 1B KC HX than the 6000 gpm required. Performance personnel immediately notified the Control Room SRO. At 1336, the Control Room SRO declared Train B of the KC system inoperable. Performance personnel referred to the most recent RN Train 1B Flow Balance periodic test that was conducted on January 29, 1988 to determine the proper setting of the hex nuts for the travel stop adjustment for valve 1RN-190B. Performance personnel set the hex nuts for approximately 3 and 3/8 inches of actuator stem travel and tightened the two hex nuts on each threaded rod against each other to lock the travel stop adjustment in position. After notification from Performance personnel that they had returned the hex nuts for the travel stop adjustment to an acceptable position for valve 1RN-190B, the Control Room SRO returned Train B of the Unit 1 KC system to operable status.

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

Conclusion

This event has been assigned a cause of Unknown because this investigation could not determine when or how the hex nuts had come loose from their secured position. However, it is presumed that once they became loose, vibration in the piping and at the valve moved the nuts along the threaded rod to the position at which they were found on March 9, 1988. A thorough investigation of work request records failed to produce any work requests documenting work performed on the Unit 1 RN or KC systems from February 1, 1988 to March 9, 1988 that would have affected valve 1RN-190B. Also, an investigation of Operations Red Tag logs failed to produce any record of valve 1RN-190B having been tagged or secured in the open or closed position during this same period of time. If MNT personnel had used the hex nuts to secure the valve in the closed position, as they did on January 27, 1988, an Operations Red Tag would have been issued to document this event, as it was on January 27, 1988.

Another possibility is that sometime between February 1, 1988 and March 9, 1988, flow induced vibration in the RN system piping and at valve 1RN-190B caused the hex nuts to become loose and vibrate to the configuration in which they were found on March 9, 1988. When Performance personnel adjusted the hex nuts on January 29, 1988, they tightened the hex nuts to secure them in position. The Performance personnel who performed the work believe they tightened the hex nuts securely; however, they may not have tightened them securely enough to prevent the vibration from loosening them. During this investigation it was noted by Performance personnel that vibration had loosened the hex nuts on KC HX 1A Control, valve 1RN-89A, [E11S:FCV] at least two times within the past 4 years. The hex nuts on only one of the two threaded rods came loose but the travel stop adjustment was not compromised. These events were not documented, and the details were inconclusive. No corrective actions were taken except to secure the hex nuts back to their proper position.

The hex nuts for the travel stops for valve 1RN-190B were returned to a configuration that allowed the amount of flow (approximately 6300 gpm) recommended by the RN Train 1B Flow Balance to the 1B KC HX. The hex nuts were secured in this position by tightening the two hex nuts on each threaded rod against each other.

A review of past McGuire Reports revealed numerous past reportable events attributed to Unknown causes. These events and their corrective actions were not related to valve failures caused by vibration or inappropriate actions by MNT personnel, and the past corrective actions for these events could not have prevented this event from occurring.

This event is not Nuclear Plant Reliability Data System (NPRDS) reportable.

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TEXT (If more space is required, use additional NRC Form 386A's) (17)

CORRECTIVE ACTIONS:

- Immediate:
- 1) Performance personnel set the hex nuts for the travel stops for valve 1RN-190B at the correct position as determined by the most recent 1B RN system flow balance.
 - 2) Operations personnel returned Train B of the Unit 1 KC system to operable status.

Subsequent: Performance personnel placed plastic signs on valves 1 and 2RN-89A and 1 and 2RN-190B that read "DO NOT MOVE TRAVEL STOPS EXCEPT WHEN MAKING FLOW BALANCE ADJUSTMENTS - LOCK SECURELY AFTER POSITIONING TRAVEL STOPS".

- Planned:
- 1) McGuire MNT and Construction and Maintenance Department personnel will be required to read a memorandum that warns personnel never to use the travel stop adjustments to secure a valve in the closed position. This will be documented by the MNT Employee Training and Qualification System.
 - 2) Performance personnel will put Loctite thread sealant on the threads of the hex nuts for the travel stop adjustments for valve 1RN-190B.
 - 3) Performance personnel will evaluate the need to put Loctite thread sealant on the threads of the hex nuts for the travel stop adjustments for valves 2RN-190B, 1RN-89A and 2RN-89A.

SAFETY ANALYSIS:

The KC system is designed to remove residual and decay heat from the Reactor Coolant system through the ND system HXs. The RN system removes the heat from the KC system through the KC HXs. The limiting design criteria for the KC HXs is to limit peak Reactor Building pressure to less than 15 psig following a large pipe break LOCA. The RN system flow through the tube side of the KC HXs and the amount of fouling in the tubes of the KC HXs are the two factors that affect this design criteria most significantly. This event reduced the potential maximum amount of RN system flow through the 1B KC HX from approximately 6300 gpm to approximately 5000 gpm. 1B KC HX fouling at the time of this event was approximately 5.5 psid across the RN system side of the HX. This pressure differential represents a reasonably clean HX since the pressure measured on November 28, 1987, immediately after the most recent mechanical cleaning, was approximately 5.0 psid. The acceptance criteria to meet the design of the system is 8.8 psid.

It is most likely that with a reasonably clean KC HX, the reduced RN system flow through the HX would not have had much of an effect on heat transfer.

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U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

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

Fouling of the HX causes more severe loss in heat transfer capability. The accident analysis for a LOCA considers that RN system temperature is 78 degrees-F. During the time that the potential maximum amount of RN system flow through the KC HXs was reduced, the RN system temperature was less than 70 degrees-F. This would allow for heat transfer capacity better than predicted by the accident analysis.

The Containment Spray (NS) system [EIIIS:BE] assists the ND system in removing heat from the Reactor Building after a LOCA. The NS system HXs are cooled by the RN system. With reduced RN system flow through the KC HXs, there would be increased flow through the NS HXs and allow for improved heat transfer and heat removal capabilities of the NS system to limit peak Reactor Building pressure following a LOCA.

During this event, the heat removal capabilities of the KC system were compromised; however, there still should have been enough heat removal capability to limit the peak Reactor Building pressure to less than 15 psig following a LOCA. The heat removal capability of the KC system was not challenged by a LOCA or any similar occurrence during the time of this event.

There were no personnel injuries, personnel overexposures, or releases of radioactive material as a result of this event.

This event is considered to be of no significance with respect to the health and safety of the public.

DUKE POWER COMPANY

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HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

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April 8, 1988

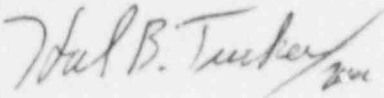
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station, Unit 1
Docket No. 50-369
Licensee Event Report 369/88-03

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/88-03 concerning Train B of the Component Cooling system being discovered inoperable on March 9, 1988. This report is being submitted in accordance with 10CFR 50.73(a)(2)(i)(B). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,



Hal B. Tucker

SEL/256/jgc

Attachment

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