NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

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

TITLE (4) Design Basis Nuclear Service Water Flow To The Control Area Chilled Water System Cannot Be Justified Between December 8, 1987 and February 24, 1989 As Required By Technical Spec.

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 2	2 4	8 9	8 9	— 0 0 2	— 0 0	0 4	1 4	8 9	McGuire Unit 2	0 5 0 0 0 3 7 0
										0 5 0 0 0

OPERATING MODE (9): 1

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)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	X 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)
Alan Sipe, Chairman, McGuire Safety Review Group	7 0 4 8 7 5 - 4 1 8 3

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 fifteen single-space typewritten lines) (16)

On February 23, 1989, Performance personnel began performing a Nuclear Service Water system flow balance test. During the flow balance test, Performance personnel discovered that Nuclear Service Water system flow to the Control Area Chilled Water System Train A Chiller had been recorded as being approximately 180 to 190 gallons per minute higher than actual flow. This error could have prevented the availability of the required design basis Nuclear Service Water system flow to the Control Area Chilled Water system Train A Condenser. This discrepancy may have existed since December 8, 1987. Units 1 and 2 were in Mode 1, Power Operation at 100% power, at the time the discrepancy was discovered. This event is assigned a cause of Management Deficiency because Performance personnel failed to adhere to Station Directives concerning test equipment. This event will be covered with all Performance personnel.

IE22

U.S. GPO: 1984-0-454-481/18759

EVALUATION:

Background

There are two independent trains of the Control Area Ventilation (VC) system [EIIS:VI] and Chilled Water (YC) System [EIIS:KM] which provide heating, ventilation, and air conditioning in normal and emergency conditions for the Control Room [EIIS:NA], Cable Room, Battery Room, Switchgear Rooms, and Electrical Penetration Rooms. Each train of the VC/YC system has a chiller unit which consists of a condenser [EIIS:COND], compressor [EIIS:CMP], and evaporator [EIIS:EVP]. The two trains of the VC/YC system are shared by Unit 1 and Unit 2. The Nuclear Service Water (RN) system [EIIS:BI] provides assured cooling water from Lake Norman [EIIS:BS] to various safety related components. These components include the VC/YC system. Each component that is cooled by the RN system requires a minimum amount of flow as specified by the McGuire Final Safety Analysis Report (FSAR), to be available for the component to be properly cooled. This minimum amount of flow is monitored periodically by Performance personnel using procedures PT/1 and 2/A/4403/07, RN Train 1A and 2A Flow Balance. The FSAR lists a design basis accident flow requirement of 775 GPM to the VC system condensers.

Technical Specification (TS) 3.7.6 requires that two independent trains of the VC/YC system be operable in all modes. With one train of the VC/YC system inoperable in Modes 1, 2 (Startup), 3 (Hot Standby), or 4 (Hot Shutdown), TS 3.7.6 requires the inoperable train to be restored to operable status within 7 days or Units 1 and 2 must be in Mode 3 within the next 6 hours and Mode 5 (Cold Shutdown) within the following 30 hours.

Station Directive (SD) 2.3.1, Performance Measuring and Test Equipment, states that equipment that has had no calibration performed shall be classified as miscellaneous test equipment and shall not be used to verify acceptance criteria, or verify calibration of safety related equipment, or to perform adjustments to station components.

Description of Event

On February 22, 1989, Performance (PRF) personnel began performing an RN system flow balance using procedures PT/1 and 2/A/4407, RN Train 1A and 2A Flow Balance. The RN system flow balance was required because Nuclear Station Modification (NSM) MG-1-1893 included installation of Flow Element [EIIS:FE] ORNFE6100 into the RN system. While performing the flow balance to the VC/YC system condenser, PRF personnel noted a flow rate of 710 GPM as indicated by process Flow Gauge [EIIS:FI] OMRNFG6110. This was less than the required target flow rate of 814 GPM. 814 GPM is used to allow a 5% margin for error of measuring equipment. Ultrasonics instrument No. MCPRF26272 indicated a flow rate of 858 GPM. PRF personnel then adjusted the travel stop for valve [EIIS:FCV] 1RN89A, RN System Flow To The VC/YC Train A Condenser. The flow rate was then observed to be 810 GPM as indicated by process instrument OMRNFG6110, 824 GPM as indicated by test gauge MCPRF26221, and 1014 GPM as indicated by ultrasonic instrument No. MCPRF26272. The travel stops for other RN system valves [EIIS:V] were adjusted to allow more flow to the VC/YC system train A condenser and a third and final set of readings were performed. The

results were 805 GPM as indicated by process instrument OMRNFG6110, 833 GPM as indicated by test gauge No. MCPRF26221, and 1014 GPM as indicated by ultrasonic instrument No. MCPRF26272. Test gauge No. MCPRF26221 data was used in the RN Train 1A Flow Balance procedure to record flowrate to the VC/YC system Train A condenser. On February 24, 1989 after reviewing the data for the RN system flow balance PRF personnel realized that because the ultrasonic instrumentation had been used since 1986 to determine RN system flow rates to the VC/YC system Train A condenser, it was possible design basis flow rates of 775 GPM to the condenser could not have been met after December 8, 1987. On that date, the flow through valve 1RN-445, Control Room Air Conditioning Train A Control, was reduced. Before December 8, 1987, RN system flow to the VC/YC system was above 775 GPM as required. The flow through valve 1RN-445 was reduced to allow more RN system flow to other components. Instrument indications at that time indicated that flow through 1RN-445 could be reduced.

Conclusion

NSM MG-1-1893 was initiated in October 1986 to move Flow Element ORNFE6110 to the upstream side of the VC/YC system Train A Chiller. The flow element had been located on the downstream side of the Train A Chiller and in close proximity to valve 1RN-89A. Because of the throttling effect of valve 1RN-89A, large fluctuations in pressure made obtaining accurate flow measurements difficult. This fluctuation resulted in unreliable process Flow Gauge OMRNPG6110 readings. For the same reasons, test gauge readings at the same location also proved to be unreliable. Because of the fluctuations in pressure, the ultrasonic method of determining flow was the only known method available to obtain RN system flow to the VC/YC system until NSM MG-1-1893 was completed. At that time a decision was made by PRF Management personnel to use the ultrasonic method to measure RN system flow to the VC/YC system Train A condenser. PRF personnel performed a test of another flow element with a flow gauge and ultrasonic measuring device no. MCPRF26272 to correlate the flow rate between the instruments before it was first used in March 1986. The results determined that the ultrasonic measurements were within 1% to 3% of that of the flow gauge. The process flow gauge has an accuracy of 1 percent full scale and the test gauge has an accuracy of 0.5 percent full scale. This correlation plus the 5 percent flow margin convinced PRF personnel to use the ultrasonic measuring device as an accurate method of determining RN system flow to the VC/YC system Train A Condenser.

PRF personnel used Ultrasonic instrument No. MCPRF26272 to measure RN flow to the VC/YC system Train A condenser from March 24, 1986 until Flow Element ORNFE6110 was moved. The ultrasonic flow measuring device used for measuring the flow is manufactured by Dynasonics, Incorporated Model No. UFT-603. The instrument was calibrated by Dynasonics, Inc. at the factory. There was no approved method to calibrate ultrasonic measuring device MCPRF26272 at the station. PRF personnel used the ultrasonic instrument to measure RN system flow to the Train A VC/YC system chiller from March 24, 1986 to February 24, 1989.

PRF personnel completed the RN system Train A flow balance on February 24, 1989 using calibrated process flow gauges and test equipment.

This event is assigned a Cause of Management Deficiency because PRF Management personnel failed to adhere to SD 2.3.1, PRF Measuring and Test Equipment. PRF Management Personnel made the decision to use the ultrasonic measuring device to determine RN system flow to the VC/YC Train A condenser. SD 2.3.1 states that test equipment used to determine acceptance criteria must be calibrated. In October 1985, and January 1986, the NRC personnel performed an inspection of the RN system. The NRC determined that the RN system had not been balanced since 1982. Station Management personnel committed to NRC personnel to begin RN flow balancing and to test other RN components. An RN system task force was implemented in 1986 to address the problems with the RN system that were affecting station operability. Among those problems were heat exchanger fouling that affected heat transfer and the problem with obtaining accurate RN system flow measurements at Flow Element ORNFE6110. Two NSMs were initiated to move the flow elements to locations where conventional flow measuring devices would accurately measure RN flow to the Train A and B VC/YC system chillers. The NSM was completed for the flow gauge of the Train B VC/YC system Chiller in March 1987. NSM MG-1-1893 was initiated to move Flow Element ORNFE6110 and required additional work from Design Engineering personnel. The additional Design Engineering work was necessary because the location for the new flow element was in a vertical run of RN system piping. The decision to use the ultrasonic measuring device was made by PRF Management personnel with the understanding that ultrasonic instrument No. MCPRF26272 would be used to measure RN system flow to the VC/YC system Train A Chiller temporarily, and the completion of NSM MG-1-1893 would allow the use of conventional flow measurement devices. NSM MG-1-1893 was completed in February 1989.

The ultrasonic measuring equipment was used to determine RN system flow to the VC/YC system Train A condenser from March 24, 1986 to February 24, 1989. The responsibility of the RN system flow balance was turned over to another PRF Staff engineer in October, 1986 because the PRF personnel previously assigned the RN system flow balance responsibility transferred out of PRF. The flow balance was performed approximately 10 times using ultrasonic measuring device No. MCPRF26272 before this event was discovered. PRF personnel were aware the instrument was not on a calibration schedule but were not aware that this was in violation of SD 2.3.1, PRF Measuring and Test Equipment. The ultrasonic measuring device was calibrated at the factory and PRF personnel have no means to calibrate it. This fact, plus the initial urgency to perform the flow balance led PRF personnel to inadvertently believe that recalibration data did not apply to this instrument. This mind set was carried over through every subsequent flow balance using the ultrasonic flow device and was never corrected. PRF personnel will ship ultrasonic measuring device MCPRF26272 to Dynasonic, Incorporated to determine as found data and to calibrate it.

A review of McGuire Licensee Event Reports (LERs) for the past 12 months revealed numerous events of a TS violation with a cause of Management Deficiency. However, none were because of not following procedures or Station Directives. Therefore, this event is not considered recurring.

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

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

CORRECTIVE ACTIONS:

Immediate: None

Subsequent: 1) PRF personnel used Test Gauge MCPRF26221 to determine RN system flow to the VC/YC system Train A condenser.

2) PRF personnel completed procedure PT/1/A/4403/07, RN Train 1A Flow Balance, on February 24, 1989.

Planned: 1) PRF Management personnel will review this event with all PRF personnel.

SAFETY ANALYSIS:

The VC/YC system is designed to maintain a habitable environment in the Control Room for normal and post accident conditions. During the time between December 8, 1987 and February 24, 1989, it is possible that the VC/YC Train A condenser could have had up to 180 GPM less than the 775 GPM design basis flow. This could have caused the temperature in the Control Room to increase to levels that would impair the operation of the electronic equipment. However, during the time between December 8, 1987 and February 24, 1989, no Control Room high temperature alarms (alert at 85 degrees-F and alarm at 90 degrees-F) were recorded. At no time during this period did Control Room personnel implement procedure AP/0/A/5500/039, Control Room Hi Temperature. Control Room personnel could not recall noticing any problems with Control Room temperature while operating on Train A of the VC/YC system during this time.

During accident conditions the heat loads for the VC/YC system are essentially the same as in normal operating conditions. The greatest demand placed on the VC/YC system is during the summer months when the RN system water temperature is at the highest annual temperature. Control Room personnel could not recall having any abnormally high temperatures in the Control Room during the previous summer months. If there had been an accident condition during the time the RN system flow balance was inaccurate it can be assumed that if VC/YC system Train A had been in service the cooling requirements for the Control Room should have been met. VC/YC system Train B chiller was receiving the required RN system flow of greater than 775 GPM during this entire time period. Control Room personnel would have implemented the Control Room Hi Temperature procedure, if the temperature had increased to high levels in the Control Room and this would have helped mitigate the consequences of any high temperature condition until the VC/YC system was restored.

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

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DUKE POWER

April 14, 1989

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 369/89-02

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 369/89-02 concerning Nuclear Service Water System flow to the Control Area Chilled Water system. 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,

J W Hampton for
Hal B. Tucker

ARS/bcb

Attachment

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