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DUKE POWER

August 4, 1989

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

Subject: McGuire Nuclear Station, Unit 2
Docket No. 50-370
Licensee Event Report 370/89-05

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 370/89-05 concerning Pressurizer PORV 2NC-72B not capable of actuating in the low pressure mode of control. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

T.L. McConnell

ROS/U2LER/

Attachment

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MC-815-04
(20)

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 3 7 0	PAGE (3) 1 OF 0 16	
TITLE (4) Pressurizer PORV 2NC-32B Would Not Have Actuated In The Low Pressure Mode Of Control Because Of An Inappropriate Action And A Contributing Management Deficiency												
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 N/A			DOCKET NUMBER(9) 0 5 0 0 0
0	7	0	7	8	8	9	0	0	5	0	0	0 5 0 0 0
OPERATING MODE (10) THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)												
3		20.402(b)		20.406(c)		50.73(e)(2)(iv)				73.71(b)		
0 0 0		20.405(e)(1)(ii)		50.36(c)(1)		50.73(e)(2)(v)				73.71(c)		
		20.405(e)(1)(iii)		50.36(c)(2)		50.73(e)(2)(vi)				OTHER (Specify in Abstract below and in Text NRC Form 366A)		
		20.405(e)(1)(iv)		X 50.73(e)(2)(ii)		50.73(e)(2)(viii)(A)						
		20.405(e)(1)(v)		50.73(e)(2)(iii)		50.73(e)(2)(viii)(B)						
		20.406(e)(1)(vi)		50.73(e)(2)(ix)		50.73(e)(2)(x)						
LICENSEE CONTACT FOR THIS LER (12)												
NAME Alan Sipe, Chairman, McGuire Safety Review Group										TELEPHONE NUMBER 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 NRPDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS		
X	A	B	F U X	9 9 9	Y							

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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YES (If yes, complete EXPECTED SUBMISSION DATE)

NO

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

During performance of procedure PT/2/A/4150/14, Pressurizer PORV Cold Overpressure Functional Test, on July 5, 1989, Instrumentation and Electrical personnel discovered that two wires in the circuit for valve 2NC-32B, Pressurizer Power Operated Relief Valve, had been reversed. Instrumentation and Electrical personnel corrected the reversed wires and successfully completed the periodic test and functional verification. Unit 2 was in Mode 3, Hot Standby, in preparation for a Refueling Outage when the reversed wires were found. This event is assigned a cause of Inappropriate Action because of inattention to detail by Maintenance Engineering Services personnel. The Maintenance Engineering Services personnel reversed the wire numbers during documentation of a change in 1988. This event is also assigned a contributory cause of Management Deficiency because of a breakdown in the Functional Verification Program.

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EXPIRES 8/31/88

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

EVALUATION:

Background

The Reactor Coolant (NC) system [EIIS:AB] is protected from exceeding pressure and temperature limits as specified in Technical Specifications (TS) figures 3.4-2 and 3.4-3. This required protection is accomplished by Power Operated Relief Valves (PORVs) [EIIS:RV] NC-34A, NC-32B and NC-36, located on the Pressurizer [EIIS:PZR]. When the NC system temperature is below 300 degrees F, the Low Temperature Overpressurization Protection (LTOP) setpoint for PORV NC-32B and NC-34A is enabled by manual key-lock switches. This key-lock is activated by Operations personnel when the NC system pressure has decreased to 325 PSIG, as required by procedure. TS 3/4.9.3 requires both PORVs to be operable in Mode 4, Hot Shutdown, with Cold Leg temperature </= 300 degrees - F, Mode 5, Cold Shutdown, and Mode 6, Refueling, with the Reactor Vessel [EIIS:RPV] Head in place.

Pressurizer PORVs NC-34A and NC-32B are designed to automatically open on high pressure signals generated by wide range pressure transmitters [EIIS:PT] on the NC system Hot Legs. TS 3/4.9.3 requires the Pressurizer PORVs to open prior to NC system pressure reaching 400 PSIG.

The purpose of procedure PT/2/A/4150/14, Pressurizer PORV Cold Overpressure Protection Channel Functional Test, is to verify operability of the PORV control circuitry, excluding cycling the valves.

Description of Event

On June 21, 1988, Instrumentation and Electrical (IAE) personnel began performing a functional test on PORVs 2NC-32B and 2NC-34A in accordance with Work Request (WR) 086007, and procedure PT/2/A/4150/14, Pressurizer PORV Cold Overpressure Protection Channel Functional Test. During the performance of the functional test, the IAE personnel discovered a wiring problem that had occurred during Nuclear Station Modification (NSM) MG-2-0595. A portion of NSM MG-2-0595 consisted of extensive wiring changes in the Process Control System [EIIS:JF] (7300) cabinets. After discussions with Maintenance Engineering Services (MES) Staff personnel, it was determined that 2 wires were incorrectly connected into 7300 relay card [EIIS:30] (NAI), location C2-836. The wires in 7300 Cabinet 2, Frame 8 from point 001-20 and point 001-21 were connected to point 036-08 and point 036-09 respectively. The wires should have been placed on point 036-16 and point 036-17, respectively. These wires were originally placed in accordance with Westinghouse Electric Corporation wiring add-delete sheets for NSM MG-2-0595. IAE personnel placed the wires to the correct points and completed the functional test satisfactorily. Project Services personnel then initiated Variation Notice MEVN-0722 to provide an accurate (as built) set of engineering instructions which would validate the current wiring in the Process Control System. MES Person A initiated the add-delete sheet change and forwarded it to Project Services personnel. During preparation of the add-delete sheet, MES Person A reversed the numbers on the add-delete sheet for Cabinet 2, Frame 8. The wire from point 001-20 was changed to be connected to point 036-17 and the wire from point 001-21 was shown on the revised add-delete sheet to be connected to point 036-16. The connections were

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wrong on the add-delete sheet change Variation Notice MEVN-0722. MEVN-0722 was approved by Project Services and Design Engineering personnel on June 30, 1988. On July 7, 1988, while clearing some alarms [EIIS:ALM] in 7300 Cabinet 2, IAE personnel discovered Signal Comparator (NAL) card C2-534, serial number 941221, damaged, and replaced it with another NAL card serial number 5727. NAL card C2-534 is a logic card for the circuitry for PORV 2NC-32B LTOP activation. At this same time, IAE personnel performed an add-delete wiring check and incorporated the current add-delete sheets for NSM MG-2-0595 which included the change documented on MEVN-0722. The IAE personnel do not remember specifically changing the wiring but stated it is very likely that the wiring was changed to reflect what was documented on the add-delete sheets at this time. NSM MG-2-0595, WR 95431 was completed on July 27, 1988. WR 95431 documented the wiring changes for the Process Control System portion of NSM MG-2-0595.

On July 5, 1989, Unit 2 was in Mode 3, Hot Standby, in preparation for a Refueling Outage, and IAE personnel began performing procedure PT/2/A/4150/14, Pressurizer PORV Cold Overpressure Protection Channel Functional Test, for PORVs 2NC-34A and 2NC-32B. The test was documented on WR 87025. During the functional test, IAE personnel discovered that the wires in 7300 Cabinet 2, Frame 8 from point 036-16 and point 036-17 were reversed. In that configuration, PORV 2NC-32B would not have activated in the low pressure mode. In addition, IAE personnel found a blown fuse [EIIS:FU] in the circuitry for valve 2NC-34A. It is possible that the fuse was blown during the 1988 Refueling Outage after the functional test had been completed. If that did happen, valve 2NC-34A would have been inoperable when required to be operable from June 23, 1988 until July 23, 1988. IAE personnel reversed the wires to the correct position, replaced the blown fuse, and satisfactorily completed procedure PT/2/A/4150/14, Pressurizer PORV Cold Overpressure Protection Functional Test on July 5, 1989.

Conclusion

This event is assigned a cause of Inappropriate Action because of a lack of attention to detail by MES Person A. After determining the correct wiring configuration for the LTOP circuit for PORV 2NC-32B, MES Person A initiated a revision to the add-delete sheet documented in MEVN-0722. MES Person A stated that he determined the correct configuration for the wiring but when he changed the add-delete sheet he reversed the wire numbers as documented on MEVN-0722. One mitigating circumstance that led to this inappropriate action is that to determine the correct wiring configuration, drawing MCM-2399.03-0110, and a String List must be referenced. The String List is a point to point wiring list that shows all interconnections for a particular component or system. Drawing MCM 2399.03-0110 shows the wires in the order that MES Person A documented on MEVN-0722. MES Person A stated he does not remember whether or not he made the error on the wiring because of the confusion with the drawing but stated that it was possible. All MES electrical personnel and IAE personnel are familiar with String Lists that show interconnections and use them to determine correct wiring configurations. Catawba Nuclear Station (CNS) drawings do not have associated string lists. All interconnections that are shown on String Lists at McGuire are incorporated in the drawings for CNS. MES Person A stated that if the drawings for McGuire had the String List information included, he probably would not have listed the wires

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incorrectly on the add-delete sheet included in MEVN-0722. M&S personnel will initiate a Station Problem Report requesting that Design Engineering personnel upgrade the McGuire drawings to include the information contained in the String Lists.

This incident is also assigned a contributory cause of Management Deficiency because of a breakdown in the Functional Verification Program. At the time this incident occurred, Maintenance Management Procedure (MMP) 1.3 did not clearly define the minimum functional verification requirements for a particular component. NSM work request 95431 identified twenty six functional verifications for post modification testing. In addition, a statement was added to the work request which said "additional testing may be required at the discretion of IAE technical staff". This was the only reference in the work request package addressing additional testing.

As a result of an INPO inadequate functional verification finding against McGuire Nuclear Station in April of 1987, Maintenance personnel began development of MMP 1.6 to replace MMP 1.3. MMP 1.6 was approved in May, 1988 and was fully implemented on October 1, 1988. MMP 1.6 provides specific guidance to Planning personnel for determining functional verification requirements and includes a form for documentation. The documentation form is attached to the work request package by the planner prior to sending the package to the craft supervisor.

The exact time the fuse in the circuitry for valve 2NC-34A was blown and the cause of the blown fuse could not be determined during this investigation. The fuse was a Bussman Cartridge 1NQ. There was no other work performed on valve 2NC-34A which would have affected the circuit containing the blown fuse after the functional test was successfully completed on June 23, 1988.

A review of the LER database for the twelve months prior to the event date (July 7, 1988) revealed five incidents involving Technical Specification violations resulting from Inappropriate Actions because of a lack of attention to detail but none of the event particulars were similar. The incidents are documented in LERs 369/87-15, 369/87-21, 369/87-27, 369/87-36 and 370/87-20. The corrective actions were specific to each incident and would not have prevented this event from occurring. A review of the McGuire LERs for the 12 months (July 1988 - July 1989) prior to discovery of the event revealed four incidents involving Technical Specification violations caused by Inappropriate Actions because of lack of attention to detail but none of these event particulars were similar. This event is not recurring. The incidents are documented in LERs 369/89-01, 369/89-05, 369/89-06 and 369/89-11.

LER 370/88-10 involved a wire placed on the wrong terminal block. One of the corrective actions addressed a review of NSM packages to determine if adequate functional verification was performed. The scope of the review included post modification functional testing for switch bypass modifications and other similar modifications. Therefore, the scope of the review did not include NSM MG-2-0595. The isolated nature of this event precludes conducting a generic review of other NSMs.

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This event is considered to be a recurring problem because of a breakdown in the Functional Verification Program. LERs 369/88-25, 369/88-26, 370/88-10, and 370/88-13 describe events involving a breakdown in the Functional Verification Program because the minimum functional verification requirements for a particular component were not defined. The corrective action addressing changing the MMP for functional verification for LERs 369/88-25, 369/88-26 and 370/88-10 had not been implemented at the time this event occurred. If this corrective action had been implemented, this event should have been prevented from occurring. The corrective actions for LER 370/88-13 were specific to the event and would not have prevented this event from occurring.

This event is reportable to the Nuclear Plant Reliability Data System (NPRDS) because of the effect the blown fuse can have on the operability of valve 2NC-34A.

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

CORRECTIVE ACTIONS:

- Immediate:
- 1) IAE personnel relocated the wires to the correct position for valve 2NC-32B.
 - 2) IAE personnel replaced the blown fuse for valve 2NC-34A.

Subsequent: None

- Planned:
- 1) MES personnel will write a Station Problem Report requesting Design Engineering personnel to incorporate the information contained on the String Lists into all electrical drawings.
 - 2) This incident will be reviewed with appropriate IAE, MES, and Planning personnel to reemphasize the importance of Functional Verification after a component or system has been compromised.

SAFETY ANALYSIS:

The wiring discrepancy associated with valve 2NC-32B originated during the 1988 Refueling Outage and was discovered during Mode 3 testing of the 1989 Refueling Outage. Either the miswiring of 2NC-32B or the blown fuse associated with PORV 2NC-34A created the condition of noncompliance. The period of noncompliance is taken to be the later portion of the 1988 Refueling Outage following modification work performed on July 7, 1988 in which the wiring discrepancy was created. Upon reaching Mode 3 during the return to service of the unit following the outage, the requirements of Technical Specification 3/4.4.9.3 no longer applied. This is a conservative position because of the uncertainty of the occurrence of the blown fuse, but is necessary because of the potential inoperability of the "Cold Overpressure Prevention System".

Presently, cold overpressure prevention in Modes 4, 5, and 6 is accomplished either by the low pressure mode select feature of two of the three pressurizer PORVs while

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the NC system remains pressurized, or by an open vent area of at least 4.5 square inches when the NC system is in a depressurized condition. The consequence of not having a means of cold overpressure prevention is that pressure/temperature limits established according to 10CFR50 Appendix G could be exceeded in the event of a cold overpressure transient. Exceeding these limits by a significant amount could result in brittle cracking of the Reactor Vessel.

An alternative means of cold overpressure control exists in the form of a relief valve on the suction side of the Residual Heat Removal [EIIS:BP] (ND) Pumps [EIIS:P]. Relief valve 2ND-3 is situated on the common ND Pump suction line from 'C' hot leg. The valve relieves at 450 psig through a 4 inch line, having comparable flow capacity to that of a charging and safety injection pump. The relief valve is available for pressure transient control anytime the ND Pump hot leg suction valves [EIIS:ISV], 2ND-1B and 2ND-2A, are opened to place the ND system in service for cold shutdown and refueling. These valves are operated by Operator action according to procedure when NC system pressure is approximately 350 psig. System design is such that in the open position, the valves are subject to auto closure interlocks. Presently, the auto closure is administratively disabled once the Pressurizer steam bubble is quenched (according to the shutdown procedure) by racking out and safety tagging the motor breaker for valve actuator. This practice ensures, until the time that the interlocks are deleted (NSMs MG-12238 and MG-22238), that residual heat removal capability is not inadvertently or spuriously lost. Because an administrative measure was in place to ensure that ND Pump suction would not be lost, relief valve 2ND-3 would have remained available and provided adequate capacity for cold overpressure protection.

The health and safety of the public were not affected by this incident.