



DUKE POWER

June 14, 1991

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 370/91-02

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 370/91-02 concerning the Unit 2 Turbine Drive Auxiliary Feedwater pump being inoperable because of a mispositioned sliding link. 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

ADJ/cbl

Attachment

xc: Mr. S. D. Ebnetter
Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
Atlanta, GA 30323

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, GA 30339

Mr. Tim Reed
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Mr. P. K. Van Doorn
NRC Resident Inspector
McGuire Nuclear Station

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 9			
TITLE (4) The Unit 2 Turbine Driven Auxiliary Feedwater Pump Was Inoperable Because Of A Mispositioned Sliding Link Due To A Possible Inappropriate Action																							
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					
0 5		1 5		9 1		9 1		- 0 0 2		- 0 0		0 6		1 4		9 1		DOCKET NUMBER (5) 0 5 0 0 0 0					
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5 (Check one or more of the following) (11)																							
OPERATING MODE (9)		1		20.402(b)		20.405(a)		50.73(a)(2)(vi)		73.71(b)													
POWER LEVEL (10)		1 0 0		20.405(a)(1)(iii)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)													
				20.405(a)(1)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text NRC Form 366A)													
				20.405(a)(1)(v)		X 50.73(a)(2)(i)		50.73(a)(2)(viii)(A)															
				20.405(a)(1)(vi)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)															
				20.405(a)(1)(vii)		50.73(a)(2)(iii)		50.73(a)(2)(ix)															
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 NRRDS		CAUSE		SYSTEM		COMPONENT		MANUFACTURER		REPORTABLE TO NRRDS					
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH		DAY		YEAR							
YES (If yes, complete EXPECTED SUBMISSION DATE)										X NO													

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

On May 15, 1991, while preparing to perform preventive maintenance on Unit 2 Turbine Driven Auxiliary Feedwater Pump suction pressure switch 2MCAPS5390, Instrument And Electrical personnel discovered sliding link C-8 in cabinet 2AFP2B was open. This open link would have prevented valve 2CA-116B (Turbine Driven Auxiliary Feedwater Pump Supply From Train B Nuclear Service Water), from opening if a low suction pressure signal had been received. This rendered the pump inoperable and left the Standby Shutdown Facility (SSF) in a degraded condition. The link was subsequently restored to the closed position by Instrument And Electrical personnel and valve 2CA-116B was stroked by Operations Control Room personnel. Sliding links for Units 1 and 2 Auxiliary Feedwater suction pressure switches were subsequently inspected per work requests 601113 and 601114 with no further problems noted. The event is assigned a cause of Possible Inappropriate Action because no definite cause could be determined. Unit 2 was in Mode 1 (Power Operation), operating between 95 and 100 percent power during the time period from April 22, 1991 through May 15, 1991. This event will be reviewed with Instrument And Electrical personnel and Quality Assurance personnel as applicable.

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

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EXPIRES: 8/31/88

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attached to 16.9.7 describing required actions whenever one or more SSS components become inoperable, which states:

Note: THE SRO SHOULD ENSURE THAT SECURITY IS NOTIFIED 10 MINUTES PRIOR TO DECLARING SSS COMPONENTS INOPERABLE (EXAMPLE: TDCA PUMP) OR ASAP IF SSS COMPONENTS ARE DISCOVERED OR RENDERED INOPERABLE SO THAT COMPENSATORY MEASURES CAN BE IN EFFECT WITHIN 10 MINUTES OF THE TIME OF INOPERABILITY. OTHERWISE, A 1 HOUR NOTIFICATION TO NRC IS REQUIRED BY SECURITY.

Description of Event

On April 22, 1991, at 1611, Operations (OPS) Control Room personnel were informed by Instrument And Electrical (IAE) personnel that several CA system pressure switches might be inoperable due to a possible error in calibration. The pressure switches involved were 2MCAPS5380, 5381, and 5390, which auto open valves 2CA-162C (Auxiliary Feedwater Pump Suction Header Nuclear Service Water Supply Isolation), 2RN-162B (2B Supply To Auxiliary Feedwater Pump Isolation), and 2CA-116B, (Crossover Between Auxiliary Feedwater Pump Nuclear Service Water Supply Isolation). This problem was documented on Problem Investigation Report (PIR) 2-M91-0077. An emergency work request 601014, was originated to check the calibration of these pressure switches.

At 2021, IAE personnel who were assigned to complete work request 601014 requested permission to begin work from OPS Control Room personnel. Permission was granted and the work request was logged in the Technical Specification Action Item Logbook (TSAIL) as item 16259. This problem with CA pressure switches rendered the Unit 2 TDCA pump and the Standby Shutdown Facility (SSF) inoperable. At the time (2021) that the Unit 2 TDCA pump and the SSF were declared inoperable, the Unit 2, Train A CA system was already inoperable due to preventive maintenance (PM) work on the Unit 2, Train A, Emergency Diesel Generator (D/G) [E1IS:EK]. With two CA pumps inoperable, Unit 2 was forced to begin a shutdown per Technical Specification (TS) 3.7.1.2. Load reduction began at 2255.

After receiving clearance to begin work on work request 601014, the IAE personnel proceeded to the Unit 2 CA Pump Room. The check of the CA pressure switches 2MCAPS5381 and 5390 required opening several sliding links in electrical cabinet 2AFP2B prior to the actual pressure switch calibration check. The links involved were links C-46 and C-48 for 2MCAPS5381 and link C-8 for 2MCAPS5390. Opening these links prevents the inadvertent cycling of the associated valves during the cycling of the respective pressure switches. Prior to beginning any work, IAE personnel independently verified (IVed) that they were entering the right cabinet. IAE Technician A identified cabinet 2AFP2B and documented his identification on Enclosure 11.2, Troubleshooting and Independent Verification Checklist, of procedure IP/0/A/3090/02, Instrument And Electrical Troubleshooting. IAE Technician B then IVed that they were at the correct cabinet, and then signed off his IV.

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Upon entering the cabinet, IAE Technician A proceeded to identify link C-46. Access to these links requires leaning inside the cabinet, identifying the correct link, opening the link, and then exiting the cabinet. IAE Technician A identified link C-46, rechecked himself, and opened the link. He then exited the cabinet and documented opening the link. IAE Technician B then proceeded to IV the opening of link C-46. He leaned into the cabinet, identified the link, rechecked himself, and exited the cabinet. He then documented that link C-46 had been properly opened. The self-checking methods being used consisted of counting the links off, first from the top of the terminal block, and then from the bottom, to assure the correct link was identified. IAE Technicians A and B then proceeded to identify and IV link C-48 in the same manner. Pressure switch 2MCAPS5381 could now be safely worked on.

At the time the IAE personnel received clearance to begin work on these switches, they had planned to check one switch at a time. However, after further discussion between the IAE personnel and the OPS Control Room personnel, it was decided to check pressure switches 2MCAPS5381 and 5390 at the same time. This would allow the TDCA pump to be restored to an operable status more promptly, and could easily be accomplished since the one additional link which would need to be opened, C-8, was in the same cabinet as links C-46 and C-48. Link C-8 was identified, opened, and Ived as previously described for links C-46 and C-48.

After the links were opened, pressure switches 2MCAPS5381 and 5390 were checked. Switch operation was verified by reading the switch actuation with a volt/ohm meter. Once the calibration checks were completed, IAE Technicians A and B proceeded to restore links C-46, C-48, and C-8 to the closed position. IAE Technician A restored each individual link to the closed position, then rechecked each link restoration. All three links were restored during a single entry into the cabinet. He then exited the cabinet and documented the restorations. IAE Technician B Ived the restoration of each of the three links, also making only one entry into the cabinet. IAE Technician B then documented the IV of the link restoration. The work on these switches was completed by approximately 2200.

At approximately 2300, Quality Assurance (QA) personnel arrived to inspect the restoration of links C-46, C-48, and C-8. IAE Technician A then reviewed the work performed with QA Inspector A. QA Inspector A then inspected each link. He then documented his inspection on the same Enclosure 11.2 of procedure IP/0/A/3090/02, used to document the link openings and restorations.

Work on the other pressure switch, 2MCAPS5380, required opening link G-91 in cabinet SSFCP, located in the SSF. Once again, the cabinet was first identified and Ived, then the desired link was located, opened, and Ived. After the pressure switch calibration check was completed, the link was restored and the restoration was Ived. All work on work request 601014 was completed and the TDCA pump was declared operable at 2332. This cleared the TS 3.7.1.2 Action Statement for two inoperable CA pumps and the load

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reduction was terminated. Unit 2, A Train, CA system remained inoperable until April 23, 1991, at 1500 due to the PM work on the Unit 2 Emergency D/G.

On May 15, 1991, IAE Shift personnel were preparing to perform a PM of pressure switch 2MCAPS5390 per work request 026370. Clearance to begin work had been granted by OPS Control Room personnel at 0910, under TSAIL item number 16959. At 1335, IAE Shift personnel, while preparing to open link C-8 in cabinet 2AFP2B, discovered that link C-8 was already open. IAE Shift personnel notified OPS Control Room personnel, and after discussion with OPS Management personnel it was decided to close the link. IAE shift personnel closed the link and OPS Control Room personnel then stroked valve 2CA-116B to assure valve operation had been restored. This was completed by 1430.

Conclusion

This event is assigned a cause of Possible Inappropriate Action because no definite cause could be determined. No other documented activities involving cabinet 2AFP2B and links C-46, C-48, or C-8 could be determined to have been performed between April 22, 1991, at 2332 and May 15, 1991, at 1330. IAE and QA personnel involved in the work on April 22, 1991, stated they acted in accordance with appropriate approved procedures. The IAE personnel assigned to perform work request 601014 were part of a day shift crew and were held over for this work.

At the time they restored the link and IVD the link restoration, they had been on the job for approximately fourteen hours. However, prior to exceeding sixteen hours, they were evaluated by an IAE supervisor and a Shift Manager, and were assessed as fit to continue to work. The individuals also stated April 22 was their first day on duty, they had not been working excessive hours prior to the event, and did not experience any fatigue while completing the work. There was concern that night due to two CA pumps on Unit 2 being inoperable, but they did not feel any pressure to rush or take short cuts to finish the work. While this work activity appears to be a likely cause of link C-8 being open, it was noted during the investigation that cabinet 2AFP2B was not locked closed on the day the open link was discovered. Previous interviews with IAE Technician A indicate that this cabinet was left with the door locked closed when the work was completed on April 22, 1991. Although no other documented work activities on this equipment could be identified for the time interval in question, the possibility does exist that other entries to the cabinet may have occurred. The locking mechanism to this cabinet is standard to Nelson electrical cabinets. A large number of these locks are keyed alike and keys have not been controlled.

After sliding link C-8 was found in the open position, the link was returned to the closed position. OPS personnel stroked the valve to confirm it would operate. Sliding links for pressure switches 1 and 2MCAPS5002, 5012, 5042, 5044, 5350, 5360, 5370, 5380, 5381, and 5390 were subsequently inspected on work requests 601114 and 601113.

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This event will be reviewed with all QA Electrical Inspection personnel. The event will also be covered in training for all IAE personnel.

A review of the Operating Experience Program (OEP) data base for the previous 24 months revealed one additional example where Possible Inappropriate Actions were attributed to IAE personnel. Non-reportable Problem Investigation Report (PIR) 2-M90-361 documented an incident in which an Intermediate Range Detector (N-35) did not receive compensation voltage adjustment following a detector change out during an outage due to a Possible Inappropriate Action. This problem is considered to be recurring. Additionally, a search for other examples of equipment mispositioning revealed no other examples where the CA system was inoperable due to a mispositioned component. However, a number of examples were noted involving mispositioned valves or rolled leads in electrical circuits. Therefore, equipment mispositioning is considered to be a recurring problem.

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

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

CORRECTIVE ACTIONS:

- Immediate:
- 1) IAE Shift personnel closed sliding link C-8 in cabinet 2AFP2B.
 - 2) Operations personnel stroked valve 2CA-116B.
- Subsequent:
- 1) Sliding links for pressure switches 2MCADS5002, 5012, 5042, 5044, 5350, 5370, 5380, 5381, and 5390 were inspected per work request 601113.
 - 2) Sliding links for pressure switches 1MCAPS5002, 5012, 5042, 5044, 5350, 5360, 5370, 5380, 5381, and 5390 were inspected per work request 601114.
- Planned:
- 1) QA Management personnel will review this event with all QA Electrical Inspection personnel.
 - 2) This event will be covered in training for IAE personnel.
 - 3) IAE Management will coordinate with other station groups and evaluate the need to control access to safety related electrical cabinets.

SAFETY ANALYSIS:

This event resulted in the technical inoperability of the Unit 2 TDCA pump between the dates of April 22, 1991, at 2332, and May 15, 1991, at 1430. During this period, there were also several other instances when either the

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Train 2A Motor driven CA (MDCA) pump or the Train 2B MDCA pump were inoperable.

At the time link C-8 was possibly left open, the Train 2A MDCA pump was inoperable due to in-progress PM activities on the Train 2A Emergency D/G. This work continued until April 23, 1991, at 1500. This resulted in a period of 15 hours and 28 minutes in which both the Unit 2 TDCA pump and the Train 2A CA system were inoperable at the same time.

On May 9, 1991, between 0910 and 0930, the Train 2B CA system was inoperable while Performance personnel conducted testing under procedure PT/2/A/4200/28B, Train B Slave Relay Test On The Train 2B Emergency D/G. This resulted in a 20 minute interval in which the Unit 2 TDCA pump and the Train 2B CA system were inoperable at the same time.

Also, on May 9, 1991, the Train B CA system was inoperable between 1400 and 1620 while Performance personnel conducted testing under procedure PT/2/A/4252/18B, Motor Driven CA Pump 2A Discharge Pressure Verification, and Maintenance personnel took oil samples. This resulted in a 2 hour and 20 minute interval in which the Unit 2 TD CA pump and the Train B CA system were inoperable at the same time.

Finally, on May 13, 1991, between 1031 and 1040, the Train A MDCA pump was inoperable while Performance personnel conducted testing under procedure PT/2/A/4200/28A, Train A Slave Relay Test. This resulted in a 9 minute interval in which the Unit 2 TDCA Pump and the Train 2A CA system were inoperable at the same time.

In summary, during the period in which the Unit 2 TDCA pump was inoperable, there were intervals of time totaling 18 hours and 17 minutes in which one of the motor driven CA pumps was also inoperable.

The McGuire Final Safety Analysis Report (FSAR), Section 15, assumes that the TDCA pump fails during a Loss of Normal Feedwater Flow or a Feedwater System Pipe Break. It is also assumed that both motor driven CA pumps are operable. During this event, this assumption would not have been met. For the previously stated 18 hours and 17 minutes, only one motor driven CA pump would have been available. However, FSAR Subsection 10.4.7.2.2 states water must be supplied to a minimum of two steam generators to maintain safe shutdown conditions. This requirement was fulfilled at all times during the event, since one CA pump was always operable. At all other times during the event, at least two CA pumps were available to provide flow to the steam generator.

In addition, except for the time when the Unit 2, Train A Emergency D/G was inoperable, causing Train 2A RN system to be inoperable, the Train 2A RN system suction supply to the Unit 2 TDCA pump was available. Also, the RN system supply from the SSF to the Unit 2 TDCA pump was available during the entire event. Therefore, although the Unit 2 TDCA pump was technically inoperable, a source of RN system suction supply was continually available to

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the pump and the pump could have provided CA system flow had the need occurred.

During the entire event, the Main Feedwater (CF) system was operable and capable of providing adequate feedwater flow at the required pressure and temperature to the steam generators.

During this event, no demands were placed on the CA system to provide flow to the steam generators.

During the time the TDCA pump was inoperable, the SSF was degraded. During normal operating conditions when the SSF is not degraded, the equipment in this area is non-vital. When the SSF is degraded, the equipment in this area becomes vital because the equipment is necessary to safely shutdown the plant.

Two levels of security protection are required for areas containing vital equipment: One level of physical protection and access control for the protected area; and, a second level of physical protection and access control for areas containing vital equipment within the protected area. This second level of security protection is provided to prevent personnel inside the protected area from accessing area containing vital equipment for which they have not been authorized access. Personnel are allowed access to areas containing vital equipment on an as needed basis. By limiting the number of personnel accessing vital equipment, the probability of insider sabotage is reduced. During the time period from April 22, 1991 through May 15, 1991, two levels of protection for the SSF were not provided. However, physical protection and access control to the protected area was maintained. Additionally, there were no challenges made to gain access to the protected area. During the event, there were no ESF actuations or challenges to safety systems that required the use of the SSF to shut down the plant. The plant operated without incident during the time the required security compensatory measure was not fulfilled.

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

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FIGURE 1 - CA SUCTION

