



DUKE POWER

March 21, 1991

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

Subject: McGuire Nuclear Station Unit 1
Pocket No. 50-369
Licensee Event Report 369/91-04

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/91-04 concerning a Unit 1 Reactor Trip. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv). 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
T.L. McConnell

DVE/ADJ/cbl

Attachment

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JE 2/11

LICENSEE EVENT REPORT (LER)

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

TITLE (4): A Unit 1 Reactor Trip Occurred Due To The Manual Opening Of A Reactor Trip Breaker Because Of A Management Deficiency And 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			DOCKET NUMBER(S)
0	2	1991	1991	004	00	0	3	1991				0 5 0 0 0
												0 5 0 0 0

OPERATING MODE (9): 1
POWER LEVEL (10): 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 50. (Check one or more of the following) (11)

20.402(b)	20.405(a)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(ii)	50.36(a)(1)		50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(iv)	50.36(a)(2)		50.73(a)(2)(ix)	OTHER (Specify in Abstract below and in Text, NRC Form 306A)
20.405(a)(1)(vi)	50.73(a)(2)(ii)		50.73(a)(2)(viii)(A)	
20.405(a)(1)(vii)	50.73(a)(2)(iii)		50.73(a)(2)(viii)(B)	
20.405(a)(1)(ix)	50.73(a)(2)(iv)		50.73(a)(2)(ix)	
20.405(a)(1)(xi)	50.73(a)(2)(viii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME: Alan Sipe, Chairman, McGuire Safety Review Group
TELEPHONE NUMBER: 704 875-4183

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14): YES (If yes, complete EXPECTED SUBMISSION DATE) NO
EXPECTED SUBMISSION DATE (15):

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

On February 19, 1991, at 2142, Unit 1 experienced a Reactor/Turbine Trip. Unit 1 was in Mode 1 (Power Operation), at 100 percent power prior to this event. Prior to the Reactor Trip, Operations (OPS) management personnel were attempting to close the door on Reactor Trip Breaker (RTB) cubicle 1B. When the cubicle door was pushed closed, RTB 1B opened, tripping the Reactor. The Control Rods dropped into the Reactor core, thereby, generating a "NIS Hi Flux Rate Power Range Reactor Trip" trip signal. The only Safety System Actuation was the manual start of the Motor Driven Auxiliary Feedwater Pumps at 2143:58. OPS personnel implemented the Reactor Trip Or Safety Injection procedure and then entered the Reactor Trip procedure. OPS personnel returned Unit 1 to Mode 1 on February 21, 1991, at 1815. This event has been assigned causes of a Management Deficiency and a Possible Inappropriate Action.

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McGuire Nuclear Station, Unit 1	0500036991	—	004	—	00	2 OF 9

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

EVALUATION:

Background

There are four identical Reactor Trip Breakers [EIIS:72] for each units Rod Control System [EIIS:JD]. The four breakers are arranged in a series-parallel network, which allows one main breaker and the opposite train bypass breaker to be deactivated and isolated for periodic testing or preventive maintenance.

The RTBs connect the power from the Motor Generator (MG) Sets [EIIS:MG] to the Reactor Control Rod Drive mechanisms (CRDM) [EIIS:DRIV]. When either of the two operable breakers, which are aligned in series, opens, the power is interrupted to the CRDMs. At this point power is lost to the gripper coils, the Control Rods fall by gravity into the core, and the Reactor is tripped (i.e. shutdown). The RTBs may either be tripped automatically, manually from the Control Room [EIIS:NA], or manually at the breaker.

Each of the four breakers are housed in individual breaker cubicles. A hinged door [EIIS:DR] covers the front of each cubicle. Mounted on the door is a manual trip plate and the door handle/latch mechanism. The manual trip plate is used for performing a local manual trip of the RTB. The door handle/latch secures the cubicle door closed. Operation of the handle from the latched to unlatched position is 90 degrees.

Description of Event

On February 18, 1991, at 1011, IAE personnel completed the normally scheduled periodic test (PT) of the Unit 1 Solid State Protection System (SSPS), Train B. Upon completion of testing, IAE personnel stated that the doors on the RTB cubicles were left closed. Later in the day, after the evening shift turnover at 1930, an OPS nonlicensed Operator (NLO) discovered the door to RTB 1B partially opened, approximately 3 to 4 inches. He attempted to close and latch the door. The door would close, but would not latch. He noted that the door handle was not properly oriented (see page 9 of 9) in its normal position, and would rotate a full 360 degrees. The door was pushed closed and left in that condition. The NLO then reported the condition to OPS Supervisor A.

The following night, January 19, 1991, the NLO checked the condition of the breaker cubicle door to RTB 1B and found the condition to be the same as the night before, closed, but not latched. He discussed this item with OPS Supervisor A again.

At approximately 2130 on February 19, 1991, OPS Supervisor A entered the Unit 1 MG Set room to investigate the problem with the cubicle door for RTB 1B.

OPS Supervisor A discovered the door slightly open, with the door handle misoriented at approximately 45 degrees above the unlatched position (see page 9 of 9). He opened the door and examined the inside of the cubicle for

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TEXT (If more space is required, use additional NRC Form 306A's) (17)

any potential interferences which could obstruct closing the door. No interferences were evident. He then tried to close the door but the door would not fully close, lacking approximately 3/4 inch from fully closed. The door handle appeared to be binding, and the position of the latch would not allow the door to close.

OPS Supervisor A then applied force on the door handle. The door closed, but the door latch would not engage properly, and the door would reopen. OPS Supervisor A attempted to close the door again. This time, he applied force on the door handle with his right hand and force on the bottom right corner of the door with his left hand. He adjusted the handle/latch position with his right hand and the cubicle door suddenly closed. At this time, OPS Supervisor A heard RTB 1B trip open. The time of opening for RTB 1B was 2142:23.377. At this point, OPS Supervisor A performed no other actions on the breaker cubicle door.

When RTB 1B opened, power was interrupted to the CRDMs and the Control Rods fell into the core. The Unit 1 Events Recorder recorded a Nuclear Instrumentation System (NIS) Hi Flux Rate Power Range Reactor Trip. The Reactor Trip resulted in a Turbine Trip.

OPS Control Room personnel implemented emergency procedure EP/1/A/5000/01, Reactor Trip Or Safety Injection, and then procedure EP/1/A/5000/1.3, Reactor Trip. At 2143:58, OPS Control Room personnel manually started Motor Driven Auxiliary Feedwater (CA) [EIIS:BA] pumps 1A and 1B due to decreasing Steam Generator (S/G) [EIIS:SG] levels.

At 2200, Unit 1 was stabilized with Reactor Coolant (NC) [EIIS:AB] system average temperature at 557 degrees Fahrenheit and Pressurizer (PZR) [EIIS:PZR] pressure at 2250 psig.

Unit 1 was returned to Mode 1 at 1815 on February 21, 1991.

Conclusion

A cause of Management Deficiency was assigned due to the degraded material condition of the RTB cubicle door handle/latch mechanism. During their investigation into the tripping of RTB 1B, Maintenance Engineering Services (MES) and IAE personnel noted that the door handle could be rotated a full 360 degrees. This was due to a worn/broken plastic bushing in the door handle mechanism.

The door handles on all four Unit 1 RTBs were repaired by replacing the broken plastic bushings with steel flat washers. Subsequent investigation by MES and IAE personnel revealed that bushings in the door handles for the SSPS cabinets and 7300 process cabinets are also cracked. MES personnel are consulting with Westinghouse to determine the correct replacement part number for these bushings. When new bushings are available, the degraded bushings will be replaced. Work request 600781 was originated to inspect the Unit 2 Reactor Trip switchgear door handles.

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TEXT (If more space is required, use additional NRC Form 366A 2/117)

An investigation of the tripping of RTB 1B was conducted by Transmission Department, MES, and IAE personnel, and documented on Work Request 144440. The investigation consisted of the following items:

- 1) Wiring for the breakers undervoltage function were examined, which verified that connections were tight and no open circuits existed.
- 2) The physical appearance of the Undervoltage (UV) [EIIS:27] and Shunt trip [EIIS:94] relays were examined. No damage was evident and the relays looked the same as those for RTB 1A.
- 3) The RTB 1B trip was discussed with OPS Supervisor A and attempts were made which successfully duplicated the event.
- 4) RTB 1B was closed and opened several times to determine the amount of travel required in the manual trip mechanism to open the breaker, and this was compared to the other three Unit 1 RTBs. The results were: RTB 1B = 7/16 inch, RTB 1A = 9/16 inch, Bypass Breaker 1A = 1/2 inch and Bypass Breaker 1B = 1/2 inch. The travel for RTB 1B was relatively consistent with the other three breakers.
- 5) Attempts were made to open RTB 1B by rapidly closing the door or jarring the breaker. The breaker did not open.
- 6) RTB 1B was removed from its cubicle and Transmission department personnel conducted preventive maintenance (PM) of the breaker using Maintenance procedure MP/0/A/2001/06, DS-416 Air Circuit Breaker Inspection And Maintenance.
- 7) RTB 1B was returned to its cubicle and IAE personnel conducted response time testing of the breaker using procedures PT/0/A/4601/08B, SSPS Train B Periodic Test With NC System Pressure > 1955 PSIG and IP/0/A/3010/07, Troubleshooting The Solid State Protection System (SSPS). Breaker response time must be less than 0.15 seconds. Results of the response time test were 0.106 seconds. This compared favorably with the time recorded for RTB 1B during SSPS testing on February 18, 1991, which was 0.105 seconds.

No problems were identified with RTB 1B.

A cause of Possible Inappropriate Action was also assigned.

Only one method could be demonstrated to duplicate the opening of RTB 1B. IAE, MES, and Transmission Department personnel observed the hand placements used by OPS Supervisor A at the time RTB 1B opened. They determined that the left hand of OPS Supervisor A was probably depressing the manual trip plate on the door when the door was suddenly closed. Using this scenario they were able to trip RTB 1B several times. When questioned about the placement of his left hand at the time of the event, OPS Supervisor A stated that he was not certain whether or not his finger was on the trip pushbutton.

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TEXT (if more space is required, use additional NRC Form 306A's) (17)

The only Safety System actuation was a manual start of both Motor Driven CA Pumps at 2143:58. This was due to decreasing S/G levels. All systems responded as expected except valve 1CF-26. Valve 1CF-26 D Steam Generator (S/G) Main Feedwater (CF) Containment Isolation could not be closed from the Control Room pushbutton.

Unit 1 returned to Mode 1 on February 21, 1991, at 1815. Prior to returning to Mode 1, valve 1CF-26, was repaired per work request 144298. In addition, McGuire Exempt Variation Notice (MEVN) 2667 was completed on the actuator for valve 1CF-127, C S/G CF to CA Nozzle Isolation, per work request 144411 and the valve was returned to service.

A search of the Operating Experience Problem (OEP) data base for the previous twenty-four months revealed no other examples where a Reactor Trip was caused by a Possible Inappropriate Action by OPS personnel or by a Management Deficiency. This event is not 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: OPS personnel implemented emergency procedure EP/1/A/5000/01, Reactor Trip Or Safety Injection, and subprocedure EP/1/A/5000/1.3, Reactor Trip.

- Subsequent:
- 1) MES and IAE personnel visually inspected wiring for the undervoltage wiring for RTB 1B for loose connections or open circuits.
 - 2) MES and IAE personnel visually examined the UV and Shunt trip coils for RTB 1B.
 - 3) Transmission department personnel conducted a PM of RTB 1B using procedure MP/0/A/2001/06, DS-416 Circuit Breaker Inspection and Maintenance, under work request 144440.
 - 4) IAE personnel conducted response time testing of RTB 1B using procedure PT/0/A/4601/08B, SSPS Train B Periodic Test With NC System Pressure >1955 PSIG, under work request 144440.
 - 5) MES and OPS personnel simulated the actions at the time RTB 1B opened and were able to duplicate the problem.
 - 6) IAE personnel repaired the door handles on all 4 Unit 1 Reactor Trip Breaker cubicles.
 - 7) The event was discussed with the personnel involved.

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

- 8) MES and IAE personnel determined that cracked door handle bushings also exist in the SSPS and 7300 process cabinets.
- Planned:
- 1) IAE and MES personnel will inspect the door handles on the Unit 2 Reactor Trip Breaker Cubicles per work request 600781.
 - 2) Degraded door mechanism bushings will be replaced when replacement parts become available.
 - 3) IAE Management will evaluate methods for increasing the level of awareness of IAE personnel in the area of identification, repair practices, and standards regarding the Material Condition of door closures.
 - 4) OPS Management will evaluate methods for increasing the level of awareness of OPS personnel in the area of identification, repair practices, and standards regarding the Material Condition of door closures.
 - 5) Transmissions Department Management will evaluate methods for increasing the level of awareness of Transmission Department personnel in the area of identification, repair practices, and standards regarding the Material Condition of door closures.

SAFETY ANALYSIS:

The Reactor Trip was caused by an inadvertent, local manual opening of RTB 1B. When the breaker opened, power to the CRDMs was lost and the Control Rods fell into the core. Although the breaker actuation was accidental, the plant responded as expected after such an occurrence.

The Reactor Protection System sensed a high negative flux rate due to the Control Rods entering the core and initiated an automatic NIS Hi Flux Rate Power Range Reactor Trip signal. This signal caused RTB 1A to open. The Turbine was also automatically tripped.

All plant systems responded as expected with the exception of valve 1CF-26, which could not be closed from the Control Room. At the time of the event, valve 1CF-127 was red tagged and gagged closed due to an inprogress wiring modification. Operation of the motor driven CA pumps was manually initiated, and S/G B and D levels were maintained using the CA system.

Lifting of the PZR Code Safety Valves [EII:RV], PZR Power Operated Relief Valves (PORVs), Main Steam [EII:SB] Line Code Safety Valves, and the S/G PORVs was not required. The steam dumps to the condenser [EII:COND] opened as required. Operation of the Atmospheric Steam Dump valves was not required.

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

All Primary and Secondary system parameters were at or approaching no-load conditions approximately 30 minutes after the Reactor Trip. Operation of the Emergency Core Cooling and the Emergency Power systems was not required.

The health and safety of the public were not affected as a result of this event.

ADDITIONAL INFORMATION

Sequence of Events:

- PR - Personnel Recollection
- PTR - Post Trip Review Report
- SSL - Unit 1 Shift Supervisor's Logbook
- WR - Work Request
- TSAIL - Unit 1 Technical Specification Action Item Log

Date	Time	Event
2/18/91	1011	IAE personnel completed SSPS Train B PT. RTB 1B cubicle door was left closed. (PR,TSAIL)
	----	An OPS NLO discovered RTB 1B cubicle door open. The problem was reported to OPS Supervisor A. (PR)
2/19/91	----	OPS NLO noticed that the cubicle door problem on RTB 1B was unchanged. OPS Supervisor A was contacted. (PR)
	~2130	OPS Supervisor A investigated the problem with the RTB 1B door. (PR)
	~2142:23	OPS Supervisor A forced the door to RTB 1B closed and heard the breaker open. (PR)
	----	RTB 1B opened. (PTR)
	----	NIS Hi Flux Power Range Reactor Trip signal was initiated. (PTR)
	----	RTB 1A opened. (PTR)
	~2143	OPS Control Room personnel implemented procedure EP/1/A/5000/01 and procedure EP/1/A/5000/1.3. (SSL)
	----	Valve 1CF-26 would not close from the Control Room. (PTR)

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

2143:58 OPS Control Room personnel manually started motor driven CA pumps 1A and 1B. (PTR)

~2243 Primary and Secondary system parameters at or approaching no-load condition. (PTR)

2/20/91 ---- Repairs on valve ICF-26 were completed. (WR)

2/21/91 ---- Valve ICF-127 returned to service. (WR)

1815 Unit 1 returned to Mode 1. (SSL)

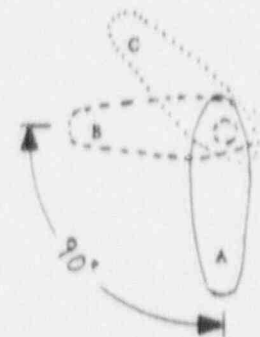
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TEXT IF more space is required, use additional NRC Form 350A's (17)

Reactor Trip Breaker Cubicle Door

1 RTB
 REACTOR
 TRIP
 BREAKER B



TRIP

- A- CLOSED POSITION
- B- OPEN POSITION
- C- AS FOUND POSITION