

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) **McGuire Nuclear Station, Unit 2** DOCKET NUMBER (2) **05003170** PAGE (3) **1 OF 06**

TITLE (4) **Manual Reactor Trip when Main Feedwater Control Valve Failed Closed when Solenoid Valve for the Air Supply was Accidentally Damaged**

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	7	31	8	8	008	00	08	30	8	8	N/A	050000
												050000

OPERATING MODE (9) **1** THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

POWER LEVEL (10) <b>100</b>	<input type="checkbox"/> 20.402(b)	<input checked="" type="checkbox"/> 20.405(e)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.38(a)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)
	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 50.38(a)(2)	<input type="checkbox"/> 50.73(a)(2)(vi)	<input type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(vii)(A)	
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(vii)(B)	
	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME **Steven E. LeRoy, Licensing** TELEPHONE NUMBER **704373-6233**

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)  NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

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

On 7/31/88 at 1917, valve 2CF-32AB, 2A Steam Generator Main Feedwater Regulating Valve, failed in the closed position. Preventive Maintenance Inc. (PMI) personnel were removing a fan from above valve 2CF-32AB actuator when the fan was set on the electrical cable attached to valve 2CFSV0320, Feedwater Flow (CF) to Steam Generator (S/G) 2A Solenoid, and broke a wire in the cable. Valve 2CFSV0320 deenergize which failed the air supply to the actuator for valve 2CF-32AB, causing the valve to fail closed. With CF flow isolated to S/G 2A, the water level began to rapidly decrease. At 1918, Operations manually tripped the Unit 2 Reactor to prevent a automatic trip. Auxiliary Feedwater (CA) Motor Driven Pumps 2A and 2B auto-started at 1918 in response to the S/G 2A Low Low level signal. Operations stabilized Unit 2 at approximately 1948. Instrumentation and electrically repaired the broken wire on valve 2CFSV0320 and returned valve 2CF-32AB to service at approximately 2330. Operations returned Unit 2 to power operation at approximately 1015 on 08/1/88. This event is assigned a cause of Personnel Error because while removing a fan from above the valve 2CF-32AB actuator, PMI Mechanic A lost his footing and accidentally set the fan on the electrical cable to valve 2CFSV0320 causing a loss of power to valve 2CFSV0320 and a resultant loss of air supply to valve 2CF-32AB.

8809260220 880830  
PDR ADDOCK 05000370  
S PNU

IE22  
11

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station, Unit 2	DOCKET NUMBER (2)  0   5   0   0   0   3   7   0   8   8   -   0   0   8   -   0   0   0   2	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENCE NUMBER	REVISION NUMBER		

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

INTRODUCTION:

On July 31, 1988 at 1917, valve 2CF-32AB, 2A Steam Generator Main Feedwater Regulating Valve [EIIS:FCV], failed in the closed position. Preventive Maintenance Inc. (PMI) personnel were removing a fan from above valve 2CF-32AB actuator [EIIS:84] when the fan was set on the electrical cable attached to valve 2CFSV0320, Feedwater Flow to Steam Generator 2A Solenoid [EIIS:SOL], and broke a wire in the cable. Valve 2CFSV0320 deenergized which failed the air supply to the actuator for valve 2CF-32AB, causing the valve to fail to the closed position. With Main Feedwater [EIIS:SJ] flow isolated to Steam Generator [EIIS:SG] 2A, the water level began to rapidly decrease. At 1918, Operations personnel manually tripped the Unit 2 Reactor [EIIS:RCT] to prevent an impending automatic trip from a Steam Generator 2A Low Low Level condition. Auxiliary Feedwater Motor [EIIS:MO] Driven Pumps [EIIS:P] 2A and 2B automatically started at 1918 in response to the Steam Generator 2A Low Low Level signal. Operations personnel stabilized Unit 2 at approximately 1948. Operations personnel notified the NRC at approximately 2030 of the Reactor Trip and Auxiliary Feedwater [EIIS:BA] start. Instrumentation and Electrical personnel repaired the broken wire on valve 2CFSV0320 and returned valve 2CF-32AB to service at approximately 2330. Operations personnel returned Unit 2 to power operation at approximately 1015 on August 1, 1988.

Unit 2 was in Mode 1, Power Operation, at 100% power at the time of this event.

This event is assigned a cause Personnel Error because while removing a fan from above the valve 2CF-32AB actuator, PMI Mechanic A lost his footing and accidentally set the fan on the electrical cable to valve 2CFSV0320. The weight of the fan broke a wire at the connection point. This caused a loss of power to valve 2CFSV0320 and a resultant loss of air supply to valve 2CF-32AB.

EVALUATION:

Background

The Main Feedwater system provides feedwater flow to the four Steam Generators for all unit operating conditions. Individual Unit 2 Steam Generator feedwater flow is controlled by air operated control valves 2CF-17, 20, 23, and 2CF-32 [EIIS:V] for Steam Generators 2D, 2C, 2B, and 2A, respectively. Each control valve has two solenoid valves in series in the control air supply line. The two solenoid valves are powered from either Train A or Train B Direct Current (DC) power. During normal operating conditions, both solenoid valves will be energized which will allow control air to flow to the pneumatic valve controller. On loss of power to either solenoid valve, the solenoid valve will isolate and vent the controller air supply, and the control valve will fail closed. The Solid State Protection System [EIIS:JC] will automatically deenergize the solenoid valves on a Safety Injection signal, High High Steam Generator Level signal, Reactor Trip coincident with Low T signal, High High Doghouse water level signal, or a manual initiation of a Feedwater Isolation signal from the Control Room.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station, Unit 2	DOCKET NUMBER (2)  0 5 0 0 0 3 7 0	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 8	- 0 0 8	- 0 0	0 0 3	OF	0 6

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

PMI is a company contracted by McGuire Mechanical Maintenance to perform on-line leak sealant work on valves, flanges, and piping. The work is done by injecting a leak sealant material into the area of the leak on the valve, flange, or piping. Some leak repairs require a clamp or other restrictive device be placed around the leak to prevent the sealant from leaking or blowing out. The work is normally performed with the plant and/or system at full operating temperature and pressure.

Description of Event

Valve 2CF-20AB, 2C Steam Generator Main Feedwater Regulating Valve, developed a body to bonnet leak when Unit 2 was increasing power on July 29, 1988 after a refueling outage. PMI personnel began work on July 31, 1988 at approximately 0800 to inject leak sealant to stop this leak. A large portable fan (approximately 70 pounds) was placed on top of the valve 2CF-32AB actuator and tied to a nearby pipe hanger to blow steam away from valve 2CF-20AB so PMI personnel could see and work around the leak. PMI personnel placed a clamp around the body to bonnet flange of valve 2CF-20AB and then injected leak sealant which successfully stopped the leak. At approximately 1900, PMI personnel began clearing the work area of equipment and material. PMI Mechanic A was standing on a scaffold next to valve 2CF-32AB at approximately the same height as the valve body. He untied the fan and picked it up from the top of the valve 2CF-32AB actuator and while lowering it to the scaffold lost his footing and set the fan onto an electrical cable at the connection point to solenoid valve 2CFSV0320. The weight of the fan broke one of the wires in the cable where it connects to the solenoid valve, and the solenoid valve deenergized, which failed the air supply to the actuator for valve 2CF-32AB.

At 1917:56, valve 2CF-32AB failed closed. Operations Control Room personnel noticed that Steam Generator 2A level was decreasing rapidly, and valve 2CF-32AB demand indication was at 100%. Steam Generator 2A level was rapidly approaching the Low Low Level Reactor Trip setpoint. At 1918:49, Operations Control Room personnel manually opened the Reactor Trip breakers to trip the Reactor. The Turbine Generator automatically tripped immediately after the Reactor Trip. Also at 1918:49, the Auxiliary Feedwater system Motor Driven Pumps started automatically as a result of the Steam Generator 2A Low Low level signal.

Operations personnel implemented procedure AP/2/A/5500/01, Unit 2 Reactor Trip recovery, and stabilized Unit 2 by approximately 1948 on July 31, 1988. The Auxiliary Feedwater system Motor Driven Pumps were secured by Operations personnel at approximately 2100. Operations personnel implemented procedure RP/0/A/5700/10, NRC Immediate Notification Requirements, at approximately 2030 to notify the NRC of the Reactor Trip and automatic start of the Auxiliary Feedwater system Motor Driven Pumps, which is an Engineered Safety Features [EISS:JE] Actuation.

Instrumentation and Electrical personnel repaired the broken wire on valve 2CFSV0320 at approximately 2330 on July 31, 1988. Valve 2CF-32AB was then returned to service. Unit 2 returned to Mode 1 on August 1, 1988 at 1015.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station, Unit 2	DOCKET NUMBER (2)  0 5   0   0   0   3   7   0	LER NUMBER (6)			PAGE (3)	
		YEAR 8   8	SEQUENTIAL NUMBER —   0   0   8	REVISION NUMBER —   0   0	0   4	OF 0   6

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

Conclusion

This event is assigned a cause of Personnel Error because while removing a fan from above the valve 2CF-32AB actuator, PMI Mechanic A lost his footing and accidentally set the fan on the electrical cable to valve 2CFSV0320 and broke a wire at the connection point. This caused a loss of power to valve 2CFSV0320 which isolated the air supply to the actuator for valve 2CF-32AB and caused the valve to fail closed.

The working conditions around these valves were clean and well lit. scaffolding was adequate, and room was available to work comfortably. The only factor which may have contributed to this accident was that PMI Mechanic A had worked approximately 12 hours in a high temperature area, and this may have reduced his attention to detail.

There were no anomalies noted during this Reactor Trip. All primary and secondary system parameters responded as expected during this transient. Operations personnel responded in a timely and efficient manner to stabilize the unit. Approximately 30 minutes after the Reactor Trip, Pressurizer [EIIS:PZR] level and pressure, Steam Generator level and pressure, and Reactor Coolant system [EIIS:AB] temperature had all achieved stable no-load conditions. The Auxiliary Feedwater system Motor Driven Pumps started automatically and responded properly to provide feedwater to the Steam Generators. Operations personnel secured the Auxiliary Feedwater system Motor Driven Pumps at approximately 2100.

After valve 2CF-32AB was returned to service, a valve stroke timing test was performed by Performance personnel. The procedure used to document the valve stroke timing test requires that the unit be in Mode 5 (Cold Shutdown) or Mode 6 (Refueling). In the past, a temporary procedure change had been implemented to allow for this procedure to be used in Mode 3 (Hot Standby). Performance personnel did not obtain the necessary procedure change for the test of valve 2CF-32AB. This was a violation of the procedure. The valve stroke timing test was performed successfully, and the results were valid except that the documentation was not properly completed. Performance personnel involved were counseled about improper use of procedures. The valve stroke timing test procedures will be changed by Performance personnel to allow for use in Mode 3, Hot Standby, and this should prevent recurrence of this problem.

A review of McGuire Licensee Event Reports (LER) did not reveal any Reactor Trips, Near Miss Reactor Trips, or Engineered Safety Features actuations within the past three years that were attributed to a Personnel Error because the action taken was accidental. Therefore, this event is not considered to be recurring.

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

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station, Unit 2	DOCKET NUMBER (2)  0 5   0   0   0   3   7   0	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		8   8	-   0   0   8	-   0   0	0   5	OF 0   6

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

CORRECTIVE ACTIONS:

- Immediate: Operations personnel implemented the Reactor Trip recovery procedure.
- Subsequent:
- 1) This event was reviewed with PMI personnel involved, and the need was stressed to be extremely careful when working around sensitive plant equipment.
  - 2) Instrumentation and Electrical personnel repaired the broken wire at valve 2CFSV0320.
  - 3) Mechanical Maintenance personnel changed procedure MP/O/A/7650/77, On-line Leak Repair Initial Injection, to include a prerequisite that any special tools or rigging required for the job be used in accordance with standard maintenance practices.
  - 4) An INFORM bulletin has been sent to all McGuire Station Nuclear Production and Construction and Maintenance Department-North personnel detailing the events of the Reactor Trip, stressing the need to be careful around sensitive plant equipment.
- Planned:
- 1) An Employee Training Qualification System memorandum will be required reading for all McGuire Mechanical Maintenance personnel. This memorandum will detail the events of the Reactor Trip and stress the need to be careful around sensitive plant equipment.
  - 2) Performance personnel will review and change as necessary all valve stroke timing procedures to allow for more flexible use by eliminating the need for temporary procedure changes to perform valve stroke timing in Mode 3.

SAFETY ANALYSIS:

The Reactor Trip was initiated manually by Operations personnel, and the Turbine Generator Trip was automatic as a result of the Reactor Trip. This Reactor Trip is bound by the "Loss of Normal Feedwater Flow" event of the McGuire Final Safety Analysis Report (FSAR), Chapter 15, Section 15.2.7. The event described in the FSAR is more limiting because it assumes a complete loss of main feedwater. The Auxiliary Feedwater system is assumed to provide decay heat removal capability following an automatic Reactor Trip from Low Low

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station, Unit 2	DOCKET NUMBER (2)  0   5   0   0   0   3   7   0   8   8	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		8   8	--   0   10   8	--   0   0	0   6	OF   0   6

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

Steam Generator water level. The manual Reactor Trip on July 31, 1988 was initiated before the Reactor Protection System would have performed an automatic Reactor Trip. The Main Feedwater system was available after the Reactor Trip and Steam Generator water level did not go as low as predicted in the FSAR. Therefore, the transient was less severe than that analyzed in the FSAR. The Auxiliary Feedwater system started automatically as designed and provided necessary additional feedwater flow to all four Steam Generators to assist in returning Steam Generator water level to normal.

All primary and secondary system parameters necessary to ensure a safe shutdown were at or approaching no-load conditions 30 minutes after the trip. The Steam Generator Power Operated Relief valves [EIIS:RV] and Safety Relief valves [EIIS:RV] did not open and were not challenged. The Reactor Coolant system Power Operated Relief valves and Safety Relief valves did not open and were not challenged. This Reactor Trip presented no hazard to the integrity of the Reactor Coolant system or Main Steam system [EIIS:SB].

There were no personnel injuries, radiation 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  
P.O. Box 33158  
Charlotte, N.C. 28242

Hal B. Tucker  
Vice President  
Nuclear Production  
(704)373-4531



DUKE POWER

August 30, 1988

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 370/88-08

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), Licensee Event Report 370/88-08 concerning manual reactor trip initiated when a main feedwater valve failed closed. This report is being submitted in accordance with 10CFR 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,

A handwritten signature in cursive script that reads "Hal B. Tucker".

Hal B. Tucker

SEL/321/mmf

Attachment

xc: Dr. J. Nelson Grace  
Regional 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

M&M Nuclear Consultants  
1221 Avenue of the Americas  
New York, NY 10020

American Nuclear Insurers  
c/o Dottie Sherman, ANI Library  
The Exchange, Suite 245  
270 Farmington Avenue  
Farmington, CT 06032

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

Mr. W.T. Orders  
NRC Resident Inspector  
McGuire Nuclear Station

IE22  
11

Document Control Desk  
August 30, 1988  
Page 2

bxc: P.M. Abraham  
B.W. Eline  
C.M. Bodsford  
D.R. Bradshaw  
R.M. Dulin  
H.E. Edwards  
R.C. Futrell  
R.M. Glover (CNS)  
C.W. Graves  
G.W. Hallman  
C.L. Harlin (ONS)  
A.D. Harrington (PSD)  
A.R. Hollins  
M.D. McIntosh  
J.J. Maher  
B.L. Peele  
R.P. Ruth (MNS)  
R.O. Sharpe (MNS)  
A.R. Sipe (MNS)  
J.E. Thomas  
V.B. Turner  
R.L. Weber  
QA Tech. Services Manager (EC 12/58)  
QA Tech. Services NRC Coordinator (EC 12/55)  
S.S. Kilborn (W)  
N.A. Rutherford  
R.L. Gill  
S.A. Gewehr  
P.B. Nardoci  
MC-815-04  
(30)

SEL/321/mmf