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 4

TITLE (4)

Reactor Trip Due to Rod Control System Not Lowering Power Enough

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)
1 1	1 9	8 5	8 5	0 3 6	0 0	1 2	1 9	8 5		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 1 0 0	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)	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
Jerry Day, Licensing	AREA CODE 7 0 4 3 7 3 - 7 0 3 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)		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 November 19, 1985 at 1547, the reactor tripped due to a turbine trip from 53% power. The turbine trip was initiated when the second main feedwater pump turbine (FWPT) tripped.

FWPT 1A tripped at 1541 on overspeed caused by a failed fuse in its control feedback circuit. An automatic turbine/reactor runback was initiated, reducing turbine load and driving control rods in to reduce reactor power. It was later determined that reactor power was not reduced enough.

As the result of increasing steam generator (S/G) levels and a lowered program level setpoint for the S/Gs (due to the reduction in reactor power), the main feedwater control valves closed. FWPT 1B tripped at 1547 on high discharge pressure.

Unit 1 was in Mode 1 at 100% power when FWPT 1A tripped and at 53% power when the turbine/reactor trips occurred. All systems responded properly to the trip.

The type of fuse that failed will be replaced and the FWPT and S/G level controls will be adjusted.

IE22
1/1

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
McGuire Nuclear Station - Unit 1	0 5 0 0 0 3 6 9	8 5	— 0 3 6	— 0 0	0 2 OF 0 4

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

On November 19, 1985, at 1547, the Unit 1 reactor tripped due to a turbine trip from 53% power. The turbine trip was initiated when both main feedwater [EIIS:SJ] pump turbines (FWPT) tripped.

FWPT 1A tripped at 1541 on overspeed caused by a failed fuse in its control feedback circuit [EIIS:JK]. An automatic turbine/reactor runback was initiated, reducing turbine load to approximately 700 Megawatts electric (MWe) and driving control rods in to reduce reactor power. It was later determined that reactor power was not reduced enough.

As the result of increasing steam generator (S/G) levels and a lowered program level [EIIS:JB] setpoint for the S/Gs (due to the reduction in reactor power), the main feedwater control valves closed. FWPT 1B tripped at 1547 on high discharge pressure.

Unit 1 was in Mode 1 at 100% power when FWPT 1A tripped and at 53% power when the turbine/reactor trips occurred.

It is unknown why the rod control system [EIIS:AA] did not lower the reactor power enough to eliminate the temperature difference between the turbine and the reactor.

A contributory factor to this event is that Control Room personnel were unaware that the new FWPT controls were going to operate differently during a transient than the old FWPT controls. Also, another contributory factor to this event is the failure of the fuse in FWPT 1A control circuitry.

Background

Each unit at McGuire Nuclear Station has two main FWPTs used to supply water to the S/Gs. The FWPTs are controlled by an electronic/pneumatic/hydraulic system manufactured by the Lovejoy Control Corporation. This control system is a retrofit which was installed in early 1985 on both units.

The rod control system receives a signal from the 7300 control system based on turbine impulse pressure, reactor average temperature, and nuclear power. The rod control system receives this signal in the form of a speed demand and direction (in or out), and drives the control rods at variable speed based on the amount of temperature error and mismatch between turbine load rate and nuclear power rate.

Description Of Event

On November 19, 1985, FWPT 1A tripped on overspeed resulting from a failed fuse. As a result, the turbine and reactor automatically ran back. The turbine load was reduced to 700 MWe. Due to reasons unknown, the reactor controls did not drive the control rods in far enough. This kept reactor power high, which in turn kept the steam dumps to the condenser open. Steam demand was kept high; therefore, feedwater demand was high. This was the first runback either unit at McGuire has experienced since the new Lovejoy Control System was installed on the FWPTs.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
McGuire Nuclear Station - Unit 1	0 5 0 0 0 3 6 9	8 5	— 0 3 6	— 0 0	0 3 OF 0 4

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

Personnel took manual control of the DEH (digital electro-hydraulic) turbine control system [EIIS:JJ] and lowered turbine load to approximately 430 MWe. This was done in accordance with the procedure "Load Rejection" which requires a load reduction after a turbine runback. This load reduction was based on the old FWPT control system. No changes in the procedure concerning the load reduction were made when the new FWPT control system was installed.

Turbine load was again cut to approximately 230 MWe in an effort to reduce the speed on FWPT 1B. By lowering the turbine load to 230 MWe, the S/G programmed level setpoint was automatically lowered. Since the S/G levels were already recovering, the Main Feedwater (CF) control valves started closing. FWPT 1B could not slow down quick enough and tripped on high discharge pressure. Before the FWPT tripped, personnel took manual control of the FWPT and tried to reduce its speed. They had control of the FWPT for only a few seconds before it tripped.

On the initial runback, the turbine correctly ran back to an impulse pressure of 414 psig. This impulse pressure corresponded to an output of 700 MWe. The Lovejoy control system was capable of keeping the high pressure steam valve, which supplies steam to the feedwater pump turbines, fully open. The old FWPT control system was not able to keep this valve fully open. Since this valve was fully open, FWPT 1B could have supplied enough feedwater to the S/Gs at 700 MWe. Some personnel felt that S/G level could have started to recover earlier if load had not been cut from 700 MWe to 430 MWe.

The failed fuse in FWPT 1A control circuitry was a 2 ampere, dual element, indicating type fuse produced by the Bussmann Division of McGraw Edison (Part No. FNA-2). The failure of the fuse was due to the element coming loose from the solder joint inside the fuse. The solder joint was not broken but instead, the element wire pulled out of the joint. This type of failure suggests a cold, insufficient solder joint.

A review of past incidents indicated no previous incidents due to control rods not driving in far enough during a runback. Therefore, this is considered an isolated event.

The review also indicated several incidents involving blown or failed Bussmann fuses including a reactor trip on Unit 1 on November 11, 1981. The cause of the trip was due to a failed fuse in a solenoid valve which controls a nuclear service water valve. Therefore, events involving problems with Bussmann fuses are considered to be recurring.

CORRECTIVE ACTIONS:

Immediate: Personnel took manual control of the DEH turbine control system and lowered turbine load.

Personnel unsuccessfully attempted to reduce the speed of FWPT 1B.

Subsequent: All Bussmann fuses were replaced in the Unit 1 FWPT control system to non-indicating type fuses.

Planned: All Bussmann fuses will be replaced in the Unit 2 FWPT control system at the next available time.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
McGuire Nuclear Station - Unit 1	0 5 0 0 0 3 6 9	8 5	— 0 3 6	— 0 0	0 4 OF 0 4

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

A program will be developed to replace all Bussmann indicating type fuses throughout the plant as they require replacement.

A computer program will be developed to simulate a transient to checkout the 7300 control system output to the rod control system to try to determine why the rod control system did not function properly.

A step load reduction test will be performed at the next planned outage (or forced outage if possible) to fine tune the FWPTs and S/G level controls.

Past transient data will be reviewed and compared with the transient on November 19th, to evaluate the need to remove from the load rejection procedure the requirement to reduce turbine load by 120 MWe after a turbine runback due to a loss of a FWPT. If determined necessary, such a change will be made.

A Station Problem Report will be written to add a power mis-match signal for Control Room indication. This signal along with a $T_{ref} - T_{avg}$ temperature error will aid personnel in determining whether or not to go to manual on rod control during a transient.

SAFETY ANALYSIS:

All reactor safety systems responded as expected. No steam code safety relief valves were opened. The FWPT control system responded correctly to all the events.

TRANSIENT ASSESSMENT:

Reactor power decreased from 100% to approximately 53% during the pre-trip load reductions. Pressurizer pressure peaked at 2321, during the initial runback, below the nominal PORV setpoint (2335 psig). Pressure decreased as power was reduced and was approximately 2200 psig at the trip. Tave and pressurizer level behaved similarly, peaking at 591.2 degrees-F and 65%, respectively during the initial load rejection, then decreasing as expected. Steam pressure increased as the turbine ran back and was approximately 1080 psig at the reactor trip; pressure remained below the S/G PORV setpoint. S/G level decreased with the initial runback, began to recover, before dropping after the trip. Minimum S/G level was 35.7%.

Auxiliary feedwater provided cooling; heat was rejected to the condenser. Adequate core cooling was maintained at all times. Emergency core cooling systems and emergency power were not actuated or required during this event.

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

DUKE POWER COMPANY
P.O. BOX 33189
CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

TELEPHONE
(704) 373-4531

December 19, 1985

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

Subject: McGuire Nuclear Station, Unit 1
Docket No. 50-369
LER 369/85-36

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/85-36 concerning a reactor trip due to the rod control system not lowering power enough following a turbine runback. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

Hal B. Tucker

JBD/jgm

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

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

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

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

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 Comm.
Office of Nuclear Reactor Reg.
Washington, D.C. 20555

IE22
1/1