

Duke Power Company
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

(704)875-4000



DUKE POWER

October 17, 1990

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

Subject: McGuire Nuclear Station Unit 1
Docket No. 50-369
Licensee Event Report 369/90-25-01

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/90-25-01 concerning a forced shutdown due to an Unidentified Reactor Coolant leak. This report is being revised and submitted in accordance with 10 CFR 50.73(a)(2)(i)(a). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony L. McConnell

T.L. McConnell

DVE/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

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

American Nuclear Insurers
c/o Dottie Sherman, ANI Library
The Exchange, Suit 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. P.K. Van Doorn
NRC Resident Inspector
McGuire Nuclear Station

9010310070 900926
PDR ADOCK 05000369
S PDC

104
IE22
11

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 1 DOCKET NUMBER (2) 050003691 OF 16

TITLE (4) Unit 1 Shutdown Because Of Unidentified Reactor Coolant System Leakage Greater Than Technical Specification Limits Caused By Equipment Failure

Table with columns: EVENT DATE (8), LER NUMBER (6), REPORT DATE (7), OTHER FACILITIES INVOLVED (8). Includes sub-columns for month, day, year, sequential number, revision number, and facility names. Values: 082790, 90-025-01, 092690, N/A.

Table with columns: OPERATING MODE (9), POWER LEVEL (10), and regulatory codes (20.402(b) through 60.73(a)(2)(iii)). Includes checkboxes for compliance with 10 CFR 50.402(b).

LICENSEE CONTACT FOR THIS LER (12) NAME Alan Sipe, Chairman, McGuire Safety Review Group TELEPHONE NUMBER 704 875-4183

Table for component failures: COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13). Columns: CAUSE, SYSTEM, COMPONENT, MANUFACTURER, REPORTABLE TO NPDs.

SUPPLEMENTAL REPORT EXPECTED (14) YES (11) NO (12) X NO EXPECTED SUBMISSION DATE (15)

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single spaced typewritten lines) (16) On August 27, 1990, at 0554 hours, Unit 1 began reducing load to comply with the Unidentified Leakage Technical Specification. Leakage calculations indicated that unidentified leakage was greater than 1 gallon per minute. An Unusual Event was declared at this time. Unit 1 entered Mode 3 (Hot Standby), at 1013 hours. Entries were made into containment and Pressurizer PORV Header Hi Point Vent valve, 1NC-252, was found to have a packing leak of approximately 8 ounces per hour. The packing was adjusted and the leak stopped. In addition, Pressurizer Relief Isolation valve, 1NC-33, was found to have a packing leak and the valve stem leakoff line was separated from the main piping. The leakoff line was replaced and valve 1NC-33 was backseated to stop its leakage. The packing on valve 1NC-33 was torqued to its maximum allowed value. The power to the associated Pressurizer Power Operated Relief Valve solenoid was deenergized because valve 1NC-33 is technically inoperable while backseated. Valve 1NC-33 will be repacked during the next appropriate outage. This event is assigned a cause of Equipment Failure. Unit 1 was in Mode 1 (Power Operation) at 100 percent power at the time the leakage was discovered.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
McGuire Nuclear Station, Unit 1	0500036990	0	25	01	2	OF 6

TEXT (If more space is required, use additional NRC Form 300A's) (17)

EVALUATION:

Background

The Reactor Coolant (NC) system [EIIS:AB] transports heat from the reactor [EIIS:RCT] to the steam generators [EIIS:SG], where heat is transferred to the Feedwater [EIIS:SJ] and Main Steam systems [EIIS:SB]. During all phases of normal operation, NC system pressure is maintained at or near 2235 pounds per square inch gauge (PSIG), while the Pressurizer [EIIS:PZR] liquid level is controlled by the charging flow control in the Chemical and Volume Control system [EIIS:CB].

Technical Specification (TS) 3.4.6.2b, in part, states that NC system leakage shall be limited to 1 gallon per minute (gpm) unidentified leakage. With NC system unidentified leakage greater than 1 gpm, reduce the leakage rate to within limits within 4 hours or be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours.

TS 3.4.4, in part, states that all power operated relief valves (PORVs) [EIIS:RV] and their associated block valves [EIIS:ISV] shall be operable in Mode 1 (Power Operation), Mode 2 (Startup), and Mode 3 (Hot Standby). With one block valve inoperable, the block valve must be restored to operable status, or closed and deenergized, or the associated PORV must be closed and power removed from its associated solenoid [EIIS:SOL] valve.

An Unusual Event is declared when there is an activity that has occurred or is in progress that has the potential to degrade the level of safety in a nuclear plant. Releases of radioactive material requiring offsite response or monitoring are not expected unless further degradation of safety systems occur.

Description of Event

On August 26, 1990, at 2240 hours, Operations (OPS) personnel were performing procedure PT/1/A/4150/01B, Reactor Coolant System Leakage Calculation. This procedure is required to be performed at least once per 72 hours by TS surveillance requirement 4.4.6.2.1d. Unit 1 was in Mode 1 (Power Operation) at 100 percent power.

The leakage calculation indicated that unidentified leakage was approximately 2.6 gpm. OPS personnel began checking for other indications of an NC system leak. OPS personnel stated that the frequency of makeup of water to the Volume Control Tank [EIIS:TK] did not indicate excessive leakage. The rate of level increase in the Containment Floor and Equipment Sump and the Ventilation Unit Condensate Drain Tank also did not indicate an NC system leak. Containment particulate activity, as indicated by radiation monitor [EIIS:MON] 1EMF-38L, had shown a moderate increase over the past 24 hours.

The Unit 1 OPS Manager was informed of the leakage calculation results. Station Directive 2.8.2, Operability Determination, directs the OPS personnel

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
McGuire Nuclear Station, Unit 1	050003699	0	25	01	3	OF 6

TEXT (if more space is required, use additional NRC Form 388A's) (17)

to ensure the validity of the leakage calculation by performing a second calculation. The second NC leakage calculation was initiated on the Operator Aid Computer (OAC) [EIIS:CPU] and a manual calculation was performed by the Reactor Operators. The results of these calculations also indicated that NC system unidentified leakage was greater than the TS allowable limit. The OPS Senior Reactor Operator declared the NC system inoperable per TSs at 0024 hours on August 27, 1990.

OPS personnel implemented procedure AP/1/A/5500/10, NC System Leakage Within The Capacity of Both Charging Pumps. This procedure gives guidance on searching for the source of a leak.

Attempts to locate the leak were unsuccessful. OPS personnel commenced a load reduction and implemented procedure RP/0/A/5700/01, Notification of Unusual Event, at 0554 hours on August 27, 1990. Appropriate personnel and regulatory agencies were notified as required by this procedure.

OPS and Radiation Protection (RP) personnel entered lower containment at 1000 hours in an attempt to find the source of the leak. Valve 1NC-252, Pressurizer PORV Header Hi Point Vent, was found to have a packing leak of approximately 8 ounces per hour. Unit 1 entered Mode 3 at 1013 hours. OPS personnel made entries into lower containment at 1120 and again at 1510 in attempts to find the source of the leak.

At 1825, Insulation personnel were sent to the Pressurizer to remove the insulation on the pressurizer manway. While in the Pressurizer area, the Insulators discovered a valve stem leakoff line blowing to atmosphere. The Insulators identified this leak to an OPS person who had entered the pressurizer area to assist the Insulators in finding the manway. The valve stem leakoff line was determined to be from valve 1NC-33, Pressurizer PORV Isolation. The leakoff line had separated at a compression fitting where it was connected with other valve stem leakoff lines which were piped to the NC Drain Tank. Valve 1NC-33 was backseated (the valve is fully open which by design prevents leakage) and the leak stopped.

Work Request (WR) 142863 had been issued to adjust the packing on valve 1NC-252 when the leak was discovered. WR 142864 was issued to adjust the packing on valve 1NC-33 and to replace the valve stem leakoff tubing. Valve 1NC-252 packing was adjusted satisfactorily. The valve stem leakoff line for valve 1NC-33 was replaced. Valve 1NC-33 was left in its backseat position after the packing was overtightened to prevent further leakage. With valve 1NC-33 backseated, it is inoperable. WR 142869 was written to de-energize the solenoid valve for 1NC-34, Pressurizer PORV, to comply with TS 3.4.4.

Leakage calculations were satisfactorily performed on August 27, 1990, at 2035 and again at 2348 hours. Both of these calculations indicated that NC system leakage was within TS limits.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) McGuire Nuclear Station, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 6 9 9 0	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		0	25	0	1	4 OF 16

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

OPS personnel declared the NC system operable and secured from the Unusual Event at 0030 hours on August 28, 1990. Unit Startup was commenced, and the unit entered Mode 1 at 0530 hours on August 28, 1990.

Conclusion

This event is assigned a root cause of Equipment Failure. Valve stem leakage through the packing of valve 1NC-33 is normally piped to the NC Drain Tank. This leakage is accounted for as identified leakage in the NC system leakage calculations. The valve stem leakoff line separated at the point where the leakoff line connected to other valve stem leakoffs. This allowed the leakage to go to containment atmosphere. The leakoff line had separated at a compression fitting. The exact cause of the separation could not be determined.

Valve stem leakage through the valve packing occurs through normal usage of the valves. Valve 1NC-252 was found to have a small leak of approximately 8 ounces per hour. This leakage stopped when the packing was adjusted by Maintenance personnel. Valve 1NC-33 had valve stem leakage through the packing. This leakage stopped when the valve was backseated. The packing was torqued to the maximum allowed value of 200 in. lbs. per procedure MP/0/A/7600/54, Borg Warner Gate Valve Pressure Seal Bonnet, Air or Motor operated, Corrective Maintenance. Adequate assurance that the packing would not leak without replacing the packing was not available. OPS and Maintenance personnel decided to leave valve 1NC-33 in its backseat position until an appropriate outage occurs. The valve will be repacked at that time. To comply with TSs, the power supply to the solenoid valve for valve 1NC-34 was deenergized after verifying the valve was closed.

WR 95004 documents that the valve stem-gate assembly was replaced on valve 1NC-33 in November of 1988. This WR documents that a new valve stem leakoff line was installed on November 27, 1988. The valve packing was also replaced during performance of this WR. No problems were noted. WR 75334 documents that the valve and the packing for valve 1NC-252 were installed in March 1990. Again, no problems were noted.

A review of the Operating Experience Program data base for the past twenty four months prior to this event revealed no events involving TS shutdowns because of Equipment Failure. LER 370/90-07 describes a TS required shutdown of Unit 2 caused by a vent valve leaking past its seat. This event had a different root cause and different circumstances. Therefore, this event is not considered recurring.

The packing leak and subsequent temporary repair to valve 1NC-33 is Nuclear Plant Reliability Data System (NPRDS) reportable. Valve 1NC-33 is a 3 inch gate valve manufactured by Borg Warner Corporation. The valve stem leakoff line for valve 1NC-33 and the packing leak on valve 1NC-252 are not NPRDS reportable.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		09	025	01	5	OF 6

McGuire Nuclear Station, Unit 1

0500036990-025-01 5 OF 6

TEXT (If more space is required, use additional NRC Form 388A's) (17)

There were no personnel injuries, radiation overexposures or uncontrolled releases of radioactive materials to the environment as a result of this event.

CORRECTIVE ACTIONS:

Immediate: OPS personnel implemented procedure AP/1/A/5500/10, NC System Leakage Within The Capacity Of Both Charging Pumps.

- Subsequent:
- 1) OPS personnel commenced a load reduction to comply with TS 3.4.6.2.
 - 2) Maintenance personnel adjusted the packing on valve 1NC-252 in accordance with WR 142863.
 - 3) Valve 1NC-33 was backseated by OPS personnel and the packing was tightened by Maintenance personnel in accordance with WR 142864.
 - 4) The valve stem leakoff line was replaced by Maintenance personnel on valve 1NC-33 in accordance with WR 142864.
 - 5) Power was removed from the solenoid valve for Pressurizer PORV 1NC-34 by OPS personnel.
 - 6) RP shift personnel began monitoring various radiation monitors including EMFs 38, 39, and 40, containment particulate, gas, and Iodine, and are trending the readings from these monitors.

- Planned:
- 1) Valve 1NC-33 will be repacked at the next appropriate outage.
 - 2) An investigation by Maintenance personnel will be conducted to determine the cause of the packing failure on valve 1NC-33, and corrective measures taken as required.
 - 3) RP personnel will change procedure HP/0/B/1003/08, Determination of Radiation Monitor Setpoints, to require the notification of the Shift Manager and the RP Manager anytime an EMF setpoint is increased more than once in any seven day time period.

SAFETY ANALYSIS:

The NC system leakage was detected by the OAC. TS surveillance requires that a leakage calculation be performed at least once per 72 hours. OPS personnel perform this calculation on the OAC to satisfy this requirement. In the event the OAC is unavailable, the procedure for leakage calculations directs the OPS personnel on performing a manual calculation. Other methods of detecting leakage include monitoring the containment atmosphere gaseous and particulate activity and monitoring the containment sump inventory. These methods ensure that a leak greater than TS limits does not go unnoticed.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) McGuire Nuclear Station, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 6 9 9 0	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6	OF	6
		0	025	01			

TEXT (If more space is required, use additional NRC Form 388A's) (17)

Leakage rates of this small amount are well within the capability of a single Centrifugal Charging pump. A makeup flow rate from one Centrifugal Charging pump is typically adequate to sustain Pressurizer level at 2250 PSIA for a break through a 0.375 inch diameter hole. The leakage through the packing on INC-252 and INC-33 was much less.

Should other leaks occur and exceed the makeup capacity of a single charging pump, depressurization of the NC system would cause fluid to flow into the loops from the Pressurizer resulting in a pressure and level decrease in the Pressurizer. A Reactor Trip occurs when the low Pressurizer pressure trip setpoint is reached. Letdown from the NC system to the Chemical and Volume Control system would automatically be secured when the Pressurizer level decreased to 17 percent level.

Should the leakage rate continue to exceed makeup rate, Pressurizer pressure would continue to decrease until a Safety Injection signal was generated. This would automatically start additional pumps to ensure sufficient flooding of the core to prevent excessive clad temperatures.

Valve INC-33 does not play a mitigating role during an accident scenario. Operation with this valve backseated, until it is repacked, does not present an unreviewed safety question.

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