Duke Power Company
McGuire Nuclear Generation Department
12700 Hagers Ferry Road (MG01VP)
Huntersville, NC 28078-8985

T. C. McMeekin
Vice President
(704)875-4800
(704)875-4809 Fax

DUKE POWER

June 2, 1994

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

Subject: McGuire Nuclear Station Unit 1 and 2
Docket No. 50-369
Licensee Event Report 369/94-01, Revision 1
Problem Investigation Process No.: 0-M93-1253

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Revision 1 of Licensee Event Report 369/94-01. This revision is being submitted in accordance with 10 CFR 50.73 (a) (2) (i). It clarifies the intent of the planned corrective actions, and is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

T.C. McMeekin

RJD/bcb

Attachment

xc: Mr. S.D. Ebneter
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. Victor Nerses
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Mr. George Maxwell
NRC Resident Inspector
McGuire Nuclear Station

IE22
1/1

bxc: B.L. Walsh (EC11C)
P.R. Herran (MG01VP)
R.C. Norcutt (MG01WC)
K.L. Crane (MG01RC)
B.F. Caldwell (MG01VP)
R.N. Casler (EC05N)
S.G. Benesole (ONS)
G.H. Savage (EC06E)
G.B. Swindlehurst (EC11-0842)
M.S. Tuckman (EC07H)
R.F. Cole (EC05N)
D.B. Cook (EC13A)
G.A. Copp (EC05O)
Tim Becker (PB02L)
J.I. Glenn (MG02ME)
P.M. Abraham (EC08I)
Zach Taylor (CNS)
L.V. Wilkie (CN03SR)
D.P. Kimball (ON05SR)
NSRB Support Staff (EC 12-A)

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME(1)	DOCKET NUMBER(2)	PAGE(3)
McGuire Nuclear Station, Unit 1	05000 369	1 OF 6

TITLE(4) Technical Specification Violations Due To A Non-conservative Calculation Caused By Failure To Consider System/Component Interaction.

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)
									Unit 2	05000 370
01	06	94	94	01	1	02	05	94		05000

OPERATING MODE(9)	1	THIS REPORT IS SUBMITTED PURSUANT TO REQUIREMENTS OF 10CFR (Check one or more of the following)(11)					
POWER LEVEL(10)	100%	20.402(b)	20.405(c)	50.73(a)(2)(iv)		73.71(b)	
		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)	X 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	
	AREA CODE	
Rickey J. Deese, Manager, McGuire Safety Review Group	704	875-4065

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 December 7, 1993, Systems Engineering (SES) personnel were investigating a problem involving valve 2NI-54A, Cold Leg Accumulator 2A Discharge Check Valve. The investigation revealed the potential stem leakoff from the valve was flowing in a direct path to the Reactor Coolant (NC) system Drain Tank (NCDT). This potential leakage path was included as input to the NCDT and; therefore, considered as identified NC system leakage. The addition of any leakage from this path would result in the figures for the unidentified NC system leakage calculation being non-conservative. Further analyses revealed that both Units probably have exceeded the 1 gpm limit for unidentified NC system leakage as specified by Technical Specification (TS) 3.4.6.2, when considering the effect of this leakage path. Because plant personnel were not aware the TS limits had been exceeded at those times, no actions had been taken to reduce the leakage rate to within limits or shutdown as required by the TS. This event is assigned a cause of Failure To Consider System/Component Interaction. Both units were in Mode 1 (Power Operation) at 100 percent power at the time of the event discovery. Corrective actions include determining the best way to permanently remove non-NC system related inputs from the NC system Leakage Calculation, and including appropriate information in the Design Basis Document for the NC system Leakage Calculation.

EVALUATION:

Background

The Reactor Coolant (NC) system [EIIS:AB] transports heated water from the reactor [EIIS:RCT] to the steam generators (SGs) [EIIS:SG], where heat is transferred to the Feedwater [EIIS:SJ] and Main Steam systems [EIIS:SB]. In addition, the system includes a pressurizer (PZR) [EIIS:PZR], a PZR relief tank (PRT) [EIIS:TK], volume control tank (VCT), NC system drain tank (NCDT), interconnecting piping, valves [EIIS:V], pumps [EIIS:P], and instrumentation necessary for operational control. The NC system is also serviced by a number of auxiliary systems, including the Chemical and Volume Control (NV) system [EIIS:CB], Residual Heat Removal (ND) system [EIIS:BP], and Nuclear Sampling (NM) system [EIIS:KN]. These auxiliary systems are interconnected with the NC system piping and contain NC system water.

Technical Specification (TS) 3.4.6.2 states the NC system leakage shall be limited to:

a. No pressure boundary leakage,
b. 1 gpm unidentified leakage,
c. 1 gpm primary-to-secondary leakage through all SGs and 500 gallons per day through any one SG,
d. 10 gpm identified leakage from the NC system,
e. 40 gpm controlled leakage at a NC system pressure of 2235 +/- 20 psig, and
f. 1 gpm leakage at a NC system pressure of 2235 +/- 20 psig from any NC system pressure isolation valve [EIIS:ISV] specified in Table 3.4-1.

These conditions are applicable in Modes 1 (Power Operation), 2 (Startup), 3 (Hot Standby), and 4 (Hot Shutdown). The TS further states with any NC system leakage greater than any one of the above limits, excluding Pressure Boundary leakage and leakage from NC system Pressure Isolation valves, reduce the leakage rate to within the limits within 4 hours or be in at least Hot Standby within the next 6 hours and in Mode 5 (Cold Shutdown) within the following 30 hours.

In the past, the NC system total, identified, and unidentified leakages have been computed using the following calculations:

Total Leakage = (NC system Mass Change) + (VCT Mass Change) + (PZR Mass Change)
Identified Leakage = (NCDT Mass Change) + (PRT Mass Change)
Unidentified Leakage = Total Leakage - Identified Leakage

Description of Event

On December 7, 1993, Systems Engineering (SES) personnel were investigating a problem involving valve 2NI-54A, Cold Leg Accumulator 2A Discharge Check Valve. The problem involved valve stem packing leakoff from the valve. In the course of the investigation, during review of the associated flow diagram drawings, it was discovered that the stem leakoff from the valve had a direct flow path to the NCDT. The personnel involved realized that this resulted in water from the Refueling Water Storage Tank (FWST) being added to the NCDT via the Cold Leg Accumulators (CLAs). Since the mass in the NCDT was used as a part of the calculation for identified and subsequently for unidentified NC system leakage, and the mass of the CLAs is not, the addition of water from the FWST would change the NCDT mass and the results of the two calculations. It was also determined that other inputs existed to the NCDT and PRT which were adding water to the tanks from sources other than the NC system or interconnected auxiliary systems containing NC system water. These inputs could cause the results of the calculations to be non-conservative.

The SES personnel initiated Problem Investigation Process (PIP) O-M93-1253 to investigate the circumstances surrounding the problem and determine appropriate corrective actions. Since the affected calculations were used to monitor compliance with TS 3.4.6.2, present and past operability evaluations were initiated. The present operability for both Units was evaluated on December 9, 1993. The NC system Leakage Calculation Program was determined to be conditionally operable as long as the total leakage remained less than 1 gpm. Concurrent modifications were performed to remove all inputs to the NCDT from sources other than the NC system or auxiliary systems containing NC system water. Inputs to the PRT from other sources could not be easily removed at this time, and a decision was made to procedurally eliminate the figure for PRT mass from the calculations. Subsequent operability evaluations dated December 10, 1993 and December 13, 1993, were issued for Units 2 and 1 respectively. The evaluations determined the calculation to be presently operable.

Following the modifications and procedural changes, results of the NC system Leakage Calculation were analyzed to determine past operability. The difference in the total leakage prior to and after the modifications and procedural changes was determined. For Unit 1 the difference was determined to be approximately .13 gpm and for Unit 2 the difference was determined to be approximately .34 gpm at the time of discovery. By increasing the previous unidentified leakage calculated during past cycles by these amounts it was determined that the inability to calculate the correct figures for

unidentified leakage could have caused both Units to have exceeded the TS limit in the past. Therefore, the NC system Leakage Calculation was determined to have been inoperable in the past.

Conclusion

This event is assigned a cause of Failure To Consider The System/Component Interaction in the original design of the program for the NC system Leakage Calculation. That is, failure to recognize inputs of water from other systems to the NCDT and PRT.

Failure to recognize these potential inputs and the subsequent effect on the calculation logic could have caused the calculation to be non-conservative. Since the plant personnel had not been aware of these potential inputs being accounted for as identified leakage, they were unaware of potentially exceeding the 1 gpm TS limit. Because they were unaware, no actions were taken to reduce the leakage or shutdown as required by the TS.

Upon discovery of the potential inputs, Temporary Modifications 6315 and 6314 were implemented to remove Safety Injection (NI) system [EIIS:BQ] valve stem leakoff inputs to the NCDT drain headers for both Units. This work was completed using Work Requests (WR) 93089150 and 93089055 on December 13, 1993. Also, the potential for valves 1 & 2NB-352, Reactor Make Up Water Storage Tank Outlet Relief To NCDT, to leak water to the NCDT was eliminated. In conjunction, procedures PT/1 & 2/A/4150/01B, Reactor Coolant Leakage Calculation, were changed to include a step to lock out Operator Aid Computer (OAC) point A0790, PRT Tank Level. Locking out this point will cause the Leakage Program to read the same value for PRT level throughout the calculation; therefore, conservatively eliminating the PRT Level increase from the calculation. A permanent means for removing all inputs to the NCDT and PRT other than from the NC system is currently being investigated. Additionally, appropriate information will be added to the Design Basis Document (DBD) for the NC system to address the NC system Leakage Calculation and the consequences of introducing inputs from other systems into the calculation. A review of the process for implementation of station modifications revealed that mechanisms exist to prevent introduction of modifications which may cause errors in existing calculations.

A review of the Operating Experience Program and Problem Investigation Process Data Bases for the 24 months prior to this event revealed 2 events involving TS violations because of Failure To Consider System/Component Interaction. These were documented on LER 369/93-10 and Special Report 93-04. However, neither of these events involved the NC system or any

sort of calculation being non-conservative due to the failure to consider interaction. Therefore, this event is not considered to be recurring.

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

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

CORRECTIVE ACTIONS:

Immediate: 1) SES personnel initiated PIP 0-M93-1253, to investigate the circumstances surrounding the problem and determine appropriate corrective actions.

Subsequent: 1) SES personnel initiated present and past operability evaluations with regard to compliance with TS 3.4.6.2.

2) Instrumentation and Electrical (IAE) personnel implemented Temporary Modifications 6314 and 6315 to eliminate inputs to the NCDT drain header which are not NC system related.

3) SES personnel verified that potential for Cold Leg Accumulator drain and drain header inputs of FWST water to the NCDT was removed.

4) Operations personnel changed procedures PT/1 & 2/A/4150/01B, Reactor Coolant Leakage Calculation, to conservatively lock out the input from PRT level increases.

Planned: 1) Mechanical Nuclear Engineering personnel will determine the best way to permanently remove non-NC system related inputs from the NC system Leakage Calculation.

2) Modification Engineering personnel will include appropriate information to the Design Basis Document (DBD) for the NC system to address the NC system Leakage Calculation and the consequences of introducing inputs from other systems into the calculation.

SAFETY ANALYSIS:

This event highlights potential non-conservatism in the way that NC system leakage has been calculated in the past. The NC system leakage calculation computer program used changes in the levels in the NCDT and PRT as an indication of the value of identified leakage in the NC system. Since there were inputs to these tanks from sources other than the NC system or interconnected auxiliary systems containing NC system water, the computer program was unable to quantify the true amount of identified NC system leakage. Had the program been more conservative, then additional amounts of leakage would have been designated as unidentified leakage. This probably would have required actions to have been taken as appropriate to have either identified the source of the leakage or shutdown the Unit. However, the total leakage from the NC system would not have been different at those times nor would the effect on plant safety have been any different. Presently TSs allow 1.0 gpm of unidentified leakage. The basis for choosing this value is to keep leakage from the NC system as low as possible and 1.0 gpm is considered to be an achievable threshold number. It has been recognized that some amount of NC system leakage is to be expected. Provided that the location and amount of the leakage is known, and does not interfere with any leakage detection capability, then the allowable amount of leakage is increased to 10.0 GPM. The higher limit is known as identified leakage. The identified leakage figure chosen remains sufficiently low enough so that it poses no problems to plant safety or operation. The calculated amount of leakage added to the NCDT and PRT in this event is well below any point that would create operational difficulties. However, the non-conservative calculation may have prevented station personnel from realizing that the TS limit had been reached and actions were necessary to quantify existing leakage. Action to quantify leakage would have included increased surveillance of equipment and systems, and measuring any leakage found. It is unlikely that any action would have been taken at those times to repair a leak due to the operational concerns involved with such a repair and the minute quantity of leakage involved. Therefore, this event is not considered as significant from a safety standpoint and is shown to be technical in nature. At no time were the health and safety of the public or McGuire personnel affected as a result of this event.