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

(704)875-4000

DUKE POWER

January 31, 1991

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 369/90-24-01

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/90-24-01 transmitting additional information as committed in LER 369/90-24 dated September 21, 1990. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i). 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

ADJ/cbl

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

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

Mr. Tim Reed
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

IE22
1/1

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 1 7

TITLE (4) Inleakage On Train A Of The Control Room Ventilation System Exceeded Acceptable Levels Because Of An Unknown

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 8	2 2	9 0	9 0	— 0 2 4	— 0 1	0 9	2 1	9 0	McGuire, Unit 2	0 5 0 0 0 3 7 0
										0 5 0 0 0

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)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.406(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.406(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.406(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Alan Sipe, Chairman, McGuire Safety Review Group	7 0 4 — 8 7 5 - 4 1 8 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 August 22, 1990, at approximately 1445, Mechanical Maintenance (MNT) personnel discovered air inleakage on the Control Room Ventilation (VC) system Train A air handling unit (AHU). This inleakage was discovered after MNT personnel noticed audible leakage on the VC system Train A AHU. The inleakage was estimated by MNT personnel to be several hundred cubic feet per minute (cfm). This unfiltered air inleakage violated the leakage assumptions for the post-accident operator dose according to Technical Specification (TS) requirements. This event is assigned a cause of Unknown because it cannot be determined how the AHU fan housing became damaged, causing the unfiltered air inleakage to occur. Also, it could not be determined when the unfiltered air inleakage on Train A of the VC system AHU fan housing became unacceptable. Therefore, the VC system Train A was inoperable for an indeterminable time period. Unit 1 and Unit 2 were in Mode 1 (Power Operation) at 100 percent power when this VC system inleakage was discovered. MNT personnel immediately sealed the AHU fan housing with RTV sealant. Maintenance Engineering Services (MES) personnel will investigate further a probable failure or deficiency cause for the fan housing damage.

EVALUATION:

Background

There are two independent Trains of the VC [EIIS:VI] system which are designed to maintain a habitable environment in the Control Room [EIIS:NA], Control Room Area, and Switchgear [EIIS:SWGR] Rooms during normal and accident conditions. Based on these criteria, the system is designed as an Engineered Safeguards Features [EIIS:JE] system with absolute and carbon filtration [EIIS:FLT] in the outside air intakes and with equipment redundancies for use as conditions require. The Control Room is designed to be maintained at a positive pressure of >/= 0.125 inches water gauge (w.g.), relative to outside atmosphere during an accident to prevent entry of contaminants. Two 100 percent capacity Outside Air Pressure Filter Trains pressurize the Control Room by providing approximately 1000 cfm of filtered outside air in addition to approximately 1000 cfm of filtered recirculated Control Room air.

TS Bases 3/4.7.6, VC System, states, in part, that the operability of the VC System ensures that the Control Room will remain habitable for Operations personnel during and following all credible accident conditions. The operability of this system in conjunction with Control Room design provisions is based on limiting the radiation exposure to personnel occupying the Control Room to 5 rem or less whole body, or its equivalent. This limitation is consistent with the requirements of General Design Criterion 19 (GDC-19) of Appendix A, Code of Federal Regulations, Title 10, Part 50 (10 CFR 50).

Final Safety Analysis Report (FSAR) Section 15.6.4.3, Environmental Consequences for Loss-Of-Coolant Accidents, Control Room Operator Dose, states, in part, that the maximum postulated dose to a Control Room Operator is determined based on the releases of a Design Basis Accident. The offsite radiological consequences are calculated based on certain assumptions and parameters, which include that the unfiltered inleakage into the Control Room is 10 cfm.

Description of Event

The VC system Train A was declared inoperable on August 21, 1990 at 1705 because of a damaged motor [EIIS:MO] bracket. On August 22, 1990, MNT personnel were repairing the damaged motor bracket as documented in Licensee Event Report (LER) 369/90-23. During this repair, an audible leak was identified by MNT personnel at approximately 1400. MNT personnel discovered a small amount of leakage on the top hatch of the VC system Train A AHU [EIIS:AHU] fan [EIIS:FAN] housing. MNT personnel then notified Performance personnel of this leakage. At 1400, Performance personnel generated Work Request 503951 to seal the inleakage on the VC system Train A AHU at the top hatch and any other locations discovered by inspection (smoke stick). At approximately 1445, MNT personnel, according to Work Request 503951, while using a smoke stick, discovered inleakage at the bottom of the AHU fan housing between the chiller unit [EIIS:CHU] and the fan housing (see page 7

of 7). MNT personnel estimated this leakage to be several hundred cfm. Even though the VC system Train A was declared inoperable on August 21, 1990, at 1705, this inleakage rendered Train A inoperable for an indeterminable time period.

On August 22, 1990, MNT personnel sealed all inleakage areas on the VC system Train A AHU fan housing using Dow Corning RTV Sealant 732. This sealant was approved for the job by Maintenance Engineering Services (MES) Ventilation personnel. MNT personnel performed a functional verification for leakage on the AHU using smoke sticks. No further leakage was found.

On August 22, 1990, at approximately 1825, Performance personnel performed a satisfactory retest on VC system Train A AHU using procedure PT/0/A/4450/08C, Control Area Ventilation System Performance Test. VC system Train A was declared operable on August 22, 1990, at 1845.

Conclusion

This event is assigned a cause of Unknown because during the course of this investigation it could not be determined as to when or how the inleakage developed on the VC system Train A AHU fan housing.

The inleakage on the VC system Train A AHU was due to a separation between the fan housing plate and a 2 x 2 angle iron stiffener. The angle iron stiffener is tack welded on one side to the supports [EIIS:SPT] for the fan housing and the chiller unit. On the other side the angle iron stiffener supports the fan housing. Because of physical constaints which limit maintenance and visual inspections on the VC system AHUs, MNT personnel were incapable of determining how the fan housing and angle iron stiffener separated which allowed the inleakage to develop. The inleakage on the Train A fan housing on the VC system was sealed by MNT personnel using Dow Corning RTV Sealant 732. MES and Design Engineering Site personnel will further investigate a probable failure or deficiency cause for the fan housing damage. MES personnel will perform a visual inspection of the VC system Train B fan housing. Design Engineering personnel will write a Station Problem Report (SPR) to recommend a more permanent sealing method for the Train A fan housing. The McGuire Safety Review group will write an addendum to this report when the investigation performed by MES personnel and Design Engineering personnel is complete.

The VC system Train A AHU has experienced severe vibration problems in the past because of the shaft assembly design. MES Ventilation personnel and Design Engineering personnel did not think that this vibration could be a cause for the fan housing inleakage. Several entries into the fan housing were made by MNT personnel to resolve the vibration problems by modifying the shaft assembly. The access door for the fan housing is in close proximity to the point of damage; however, MES Ventilation personnel stated they believed that entry traffic was not the probable cause for the fan housing deformation. Design Engineering personnel stated that they believed this to be the probable cause.

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	9 0	0 2 4	0 1	4 OF 7

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

Also, it could not be determined when the unfiltered air inleakage developed. During September, 1989, Performance personnel identified dissimilar pressurization performance between the VC system Trains A and B. The performance for VC system Train A was approximately 0.33 inches w.g. and the performance for Train B was approximately 0.23 inches w.g. Performance and Design Engineering personnel developed a test to narrow down areas of possible leakage. This test was conducted on December 11, 1989, by cross connecting the Outside Air Pressure Filter Trains with the opposite AHU Trains. From these test results, Performance and Design Engineering personnel concluded that the leakage existed either as outleakage from Train B AHU or inleakage to Train A AHU. It was suspected that Train B outleakage was most probable. This dissimilar pressurization led Performance and MNT personnel to pursue leakage inspections on Train B of the VC system. An extensive search was made. After the inleakage was sealed on August 22, 1990, on the VC system Train A AHU, the Train A performance increased and the pressure dropped to 0.19 inches w.g. and Train B performance increased and the pressure dropped to 0.20 inches w.g.

An Operating Experience Program (OEP) data base search was conducted for the previous 24 months for TS violations with an Unknown cause. This search revealed one LER involving the VC system. LER 369/89-28 documented the inoperable status of the VC system due to a gap around the VC system AHU access door [EIIS:DR]. The corrective actions from that report were specific for sealing of the access door and would not have prevented or discovered this event. This event is considered to be recurring because both leakage events involved unfiltered air inleakage on the VC system AHUs. LER 369/89-28 involved a cause of a possible Construction/Installation Deficiency.

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: None

Subsequent: MNT personnel stopped the unfiltered air inleakage on the VC system Train A AHU by sealing the gap on the fan housing using Dow Corning RTV Sealant.

Planned:

1) MES personnel will further investigate a probable failure or deficiency cause for the fan housing damage.

2) MES personnel will perform a visual inspection of the VC system Train B fan housing.

3) Design Engineering personnel will write an SPR to recommend a more permanent sealing method for the Train A fan housing.

4) The McGuire Safety Review group will write an addendum to this report when the investigation performed by MES personnel and DE personnel is complete.

SAFETY ANALYSIS:

The design requirements of the VC system are to supply filtered air at a controlled temperature and humidity and to pressurize the Control Room to 0.125 inches w.g. which is to prevent inleakage of unfiltered air. A positive pressure of 0.05 inches w.g. is considered sufficient to prevent inleakage in excess of 10 cfm, which is the assumed leakage value used for radiation dose calculations in Chapter 15 of the FSAR. The VC system helps ensure radiation doses to Control Room personnel remain below 10CFR50, GDC-19 limits.

This separation between the fan housing and the stiffener allowed unfiltered air from the Control Room Area to leak into the AHU at an estimated rate of several hundred cfm. This source of leakage was promptly corrected.

The design basis analysis of the radiation dose to Control Room personnel assumes an inleakage of 10 cfm to account for doors being opened for personnel access. Using the very conservative assumptions employed for design basis analysis, with the additional several hundred cfm inleakage, the system did not maintain the Control Room environment in conformance with GDC-19 criteria. The system was thus inoperable according to the design basis analysis.

During this event, there were no accidents that would have required operation of the VC system to maintain habitability of the Control Room.

The principle contaminant contained in air leaking into the Control Room is assumed to be radioactive Iodine which is very conservatively modeled in dose calculations. Very low amounts of Iodine would be expected to reach the area around the Control Room since this requires passage through either Auxiliary or Turbine Building Ventilation systems [EIIS:VF,VK] or passageways first.

Control Room Operator dose would be further reduced by operation of the Auxiliary Building Ventilation (VA) system. No credit is taken for the VA filtration, with regard to Control Room dose calculation, in mitigating the Emergency Core Cooling System leakage source. However, this system is automatically switched to the filtered exhaust mode of operation on an accident or Blackout signal or if radiation is detected by the exhaust monitor [EIIS:MON]. The VA system has four 50 percent capacity trains for Units 1 and 2 which respond to an accident on either unit thus providing essentially redundant protection. Operation of the VA system in the filtered

exhaust mode by either Train of the system would serve to reduce the calculated dose to Control Room personnel.

In the event the Control Room atmosphere became unbreathable, self contained breathing apparatus (SCBAs) provided in the Control Room area could be employed. Radiation monitors in the Control Room would alert Control Room personnel of high radiation levels.

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

ADDITIONAL INFORMATION:

The following information addresses planned corrective action number 4. This event has been reassigned a cause of Possible Design/Construction/ Installation Deficiency because of MES and Design Engineering personnel's investigation results. MES personnel concluded that the leaking joint on CR-AHU-1 resulted from a design deficiency which was aggravated by poor workmanship during installation of the equipment.

The AHU and its moisture separator were apparently purchased as separate components. Despite the fact that the inlet to the AHU is smaller than the outlet of the moisture separator, no specific design provisions were made to ensure that the respective mating surfaces formed an air tight seal. The installers attempted to resolve the problem by assembling the different sections with bolted steel angle. No gasket of any type was used and the joints were not welded. Based on the above, it appears that the joint could have been leaking since the unit was installed.

This conclusion could not be verified due to the difficulty of accessing the inside surface of the joint. All joints on the AHU have been checked by means of smoke tests and sealed if needed. These joints were sealed with RTV sealant. Additionally, Design Engineering personnel are evaluating alternate methods of sealing leaks in leaking joints.

*U.S. GPO: 1988-520-584/00070

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	9 0	— 0 2 4	— 0 1	7 OF 7

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