



**DUKE POWER**

January 21, 1992

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

Subject: McGuire Nuclear Station Unit 1 and Unit 2  
Docket No. 50-369  
Licensee Event Report 369/91-18, Revision 01

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a), (1) and (d), attached is Licensee Event Report 369/91-18, Revision 01, concerning both trains of the Annulus Ventilation System being inoperable due to causes of Management Deficiency and Deficient Communication. This report is being submitted in accordance with 10 CFR 50.73 (a) (2) (i), 30.75 (a) (2) (v), and 50.73 (a) (2) (vii). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

T.C. McMeekin

TLP/bcb

Attachment

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FE22  
1/1

**LICENSEE EVENT REPORT (LER)**

<b>FACILITY NAME(1)</b> McGuire Nuclear Station, Unit 1	<b>DOCKET NUMBER(2)</b> 05000 369	<b>PAGE(3)</b> 1 OF 9
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**TITLE(4)** Both Trains Of The Annulus Ventilation System Were Inoperable Due To Management Deficiency And Deficient Communication

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 NAME	DOCKET NUMBER(S)
12	18	91	91	18	01	01	17	92	Unit 2	05000 370 05000

<b>OPERATING MODE(9)</b>	1	<b>THIS REPORT IS SUBMITTED PURSUANT TO REQUIREMENTS OF 10CFR (Check one or more of the following)(11)</b>								
<b>POWER LEVEL(10)</b>	100%	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)		
		20.405(a)(1)(i)		50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)		
		20.405(a)(1)(ii)		50.36(c)(2)	X	50.73(a)(2)(vii)				
		20.405(a)(1)(iii)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		OTHER (Specify in Abstract below and in Text)		
		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)(k)					

<b>LICENSEE CONTACT FOR THIS LER(12)</b>		<b>TELEPHONE NUMBER</b>	
<b>NAME</b>	Terry L. Pedersen, Supervisor, Safety Review Group	<b>AREA CODE</b>	704
			875-4487

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT(13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

<b>SUPPLEMENTAL REPORT EXPECTED(14)</b>				<b>EXPECTED SUBMISSION DATE</b>		
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 18, 1991, Instrumentation and Electrical personnel were performing the semi-annual calibration on loop 2IAE-9060, Lower Personnel Air Lock Leak Rate Monitor. During this calibration, door AD 3321, Annulus Ventilation Bypass Door, was latched open to allow for communication between personnel working on the pneumatic module and remote control unit associated with the loop. This door is a Selected Licensee Commitment Fire Door and serves as a pressure boundary for the Annulus Ventilation (VE) system. The door must be posted with a fire barrier tag, and adequate compensatory measures must be implemented to ensure operability of the VE system if the door is opened for periods longer than normal access during Modes 1 (Power Operation), 2 (Startup), 3 (Hot Standby), and 4 (Hot shutdown). During the calibration no fire tags or VE system compensatory measures were in effect. Therefore, both trains of the VE system were inoperable while the door was open. Unit 2 was in Mode 1 at 100 percent power at the time of the event discovery. Further investigation has revealed that door AD 3321 on Unit 2 and door AD 3311, Annulus Ventilation Bypass Door, on Unit 1 have been latched open whenever the semi-annual calibration of the respective Lower Personnel Air Lock Leak Rate Monitor has been performed. Since no compensatory actions had been established during those time periods, both trains of the VE system were inoperable during those times. This event is assigned causes of Management Deficiency and Deficient Communication. Appropriate measures for control of the VE system doors have been implemented.

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**EVALUATION:**

**Background**

The Annulus Ventilation (VE) system [EIIS:VD] is designed to produce and maintain a negative pressure in the Annulus following a Loss of Coolant Accident (LOCA), to minimize the release of radioactive material following a LOCA, and to provide long term fission product removal. Technical Specification (TS) 3.6.1.8 specifies that two independent VE system trains be operable in Modes 1 (Power Operation), 2 (Startup), 3 (Hot Standby), and 4 (Hot Shutdown).

Negative pressure is accomplished by the VE fans [EIIS:FAN] discharging through filters [EIIS:FLT] to the Unit Vent [EIIS:VL], where the release is monitored. This continues until a negative pressure of 4.2 inches water gage (W.G.) is reached. The VE system then goes into a recirculation mode until the negative pressure decays to 1.2 inches W.G. At that setpoint, the fan again discharges to the Unit Vent and the cycle continues. TS 4.6.1.8.d.4 requires that a minimum negative differential pressure of  $\geq 1.2$  inches W.G. shall be maintained between inside the Annulus and outside the Reactor Building during surveillance testing. To accomplish this negative differential pressure, all doors [EIIS:DR] serving as a pressure boundary for the Annulus must remain closed. If one of these doors is to be opened for periods longer than normal access, appropriate compensatory measures must be established to ensure they are closed if required to serve as a pressure boundary.

**Description of Event**

On December 18, 1991, Instrumentation and Electrical (IAE) personnel were performing the semi-annual calibration on loops 2IAE-9050 and 9060, Upper and Lower Personnel Air Lock Leak Rate Monitors, as directed by work requests 02266E and 02265E respectively. The IAE personnel involved were using procedure IP/O/B/3190/26, Volumetrics Leak Rate Calibration, to perform the work. They verified the working copy of the procedure, obtained the necessary test equipment, and proceeded to the Control Room [EIIS:NA] where they consulted the Senior Reactor Operator (SRO) for permission to begin work. The SRO understood the work to be performed involved the Volumetrics equipment inside the Air Locks [EIIS:AL], but did not associate the work with VE system doors. No note or caution was included in the procedure or the work requests about the VE system or the VE system doors. Therefore, no discussion was held concerning the VE system or the VE system doors. The IAE personnel also consulted the Shift Manager about permission for Containment entry. However, since they were only to work in the Air Locks, and not actually enter Containment, no permission was required. No discussion was held concerning the VE system or the VE system doors.

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during the interface with the Shift Manager.

After receiving permission to begin work, the IAE personnel proceeded to contact Radiation Protection (RP) and Security (SEC) personnel for support in performing the tasks. They then proceeded to the Upper Air Lock and performed the calibration on loop 2IAE-9050. The calibration was performed successfully without incident. The Upper Annulus Ventilation Bypass Door was opened during access and egress only; therefore, no compensatory measures were required.

The IAE personnel then consulted appropriate RP and SEC personnel and proceeded to the Lower Air Lock to calibrate loop 2IAE-9060. Because of the physical proximity of door AD 3321, Annulus Ventilation Bypass Door, to the Lower Air Lock Door it was necessary to latch door AD 3321 open as well as leave the Air Lock Door open for communication between the person at the pneumatic module and the person at the remote module of the Leak Rate Monitor. The IAE personnel involved stated that this was the normal way this calibration had been performed in the past and the need to contact OPS personnel again was not recognized since permission to do the work had already been obtained. They also knew that OPS Control Room personnel would receive an alarm [EIIIS:ALM] when they opened the Air Lock Door.

SEC personnel in the Central (CAS) and Secondary Alarm Stations (SAS) received alarms when door AD 3321 was opened. Upon receiving the alarm, CAS and SAS personnel contacted the SEC Officer posted at the door to inform her of the alarm and to inquire as to how long the door would be open. The IAE personnel were questioned as to how long the door would be held open and if the SRO was aware of the work being performed. They stated that the door had to remain open during their calibration testing and they were unsure exactly how long the calibration would take. They also stated OPS was aware of their testing. The SEC Officer posted at the door then relayed this information to SEC personnel in the CAS and SAS.

At some time later, another SEC Officer returning to the SAS after lunch again noted the alarm for door AD 3321 was showing the door open and the alarm was not clearing. He inquired as to the reason and was told that IAE personnel had the door open for a test they were performing. He then contacted the SEC Officer posted at the door and questioned whether or not OPS personnel were aware of the door being open for a prolonged period because of ventilation system and fire watch requirements. The SEC Officer posted at the door questioned the IAE personnel whether OPS Control Room personnel were aware they were holding the door open. The IAE personnel stated that OPS Control Room personnel were aware that they were conducting the Air Lock test and also mentioned that they had contacted the Shift Manager.

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Upon receiving this information the SEC Officer in the SAS attempted to contact the Shift Manager and being unable to do so called the Control Room. He then talked with the SRO and asked if he was aware of the Annulus Ventilation Door being kept open. The SRO replied that he was aware of the testing being done but not aware that the Annulus Ventilation Door was being kept open.

After talking to the SEC Officer, the SRO dispatched OPS personnel to the door to investigate. At about the same time the IAE personnel had finished their work and the Annulus Ventilation Door was closed. The OPS person arrived at the door and informed the IAE personnel that they needed to see the SRO and the Shift Manager. The door was verified to be closed and the open alarm in CAS and SAS cleared. A meeting was held between OPS personnel, the IAE personnel involved, SEC personnel, the Shift Manager, Compliance personnel, and Safety Review Group personnel. It was determined that the door had been open from 1222 until 1330 and that no compensatory measures to insure operability of the VE system had been in place. Therefore, the VE system had been inoperable during this time period. The Unit 2 OPS Manager instructed the SEC personnel present at the meeting to prohibit access to any of the Annulus Ventilation Doors without the express consent of the Shift Manager until further notice. OPS personnel then made appropriate notification to the NRC of the event.

**Conclusion**

This event has been assigned a cause of Management Deficiency resulting from lack of an adequate policy or directive for control of the Annulus Ventilation Doors because corrective action response to previous events was not yet completed.

Past events involving inoperability of both trains of the VE system because of failure to close Annulus Ventilation Doors or establish compensatory measures to ensure they are closed, if required, have resulted in various corrective actions in an attempt to gain positive control of the doors. However, these attempts have proven ineffective in insuring proper measures are taken whenever personnel have a need to access these doors.

The IAE personnel involved in this event felt they were following established work practices and procedures. OPS personnel were contacted prior to the start of the work. However, even though all personnel involved felt they followed the established guidelines and procedures, no mechanism was in place (for the Annulus Ventilation Doors) to stop either OPS or IAE personnel prior to the work being performed and force them to ask the right questions. Therefore, no discussion was held concerning the VE system or Annulus Ventilation Doors.



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The IAE personnel involved stated they were unaware of the requirements for establishing compensatory measures when holding an Annulus Ventilation Door open or even that the door they were holding open was an Annulus Ventilation Door. The procedure in use did not reference the VE system or Annulus Ventilation Doors, nor did the work request. Further investigation has revealed that past calibrations have also caused these doors to be held open with no compensatory measures in effect. Therefore, both trains of the VE system for each unit respectively were inoperable during those time periods, but no one was aware of the problem. However, the IAE personnel involved stated they never left the door and if an event had occurred which caused the VE System Fans to start while they had the Annulus Ventilation Door open they would have quickly noticed the great change in air flow. This would have caused them to close the door and immediately contact OPS Control Room personnel.

The OPS personnel involved were aware of the requirements for Annulus Ventilation Doors. They were also aware that it would be necessary for the IAE personnel involved to pass through the Annulus Ventilation Doors to gain access to the Air Locks, but were not aware that the Annulus Ventilation Door at the Lower Air Lock would have to remain open to perform the work. No mechanism existed to cause the OPS personnel to stop at this point and ask the right questions about the work to be performed or to cause the IAE personnel to tell the OPS personnel all the details of their work.

Previous events involving these doors had led to a planned corrective action (documented on LER No. 369/91-13) to place signs on the Annulus Ventilation Doors to alert personnel accessing the doors of the fact that they were a pressure boundary for the VE system. However, this corrective action had not yet been implemented and no such signs were present to alert the IAE personnel. Also, OPS Management personnel were to implement procedure changes to ensure that whenever the Annulus Ventilation Doors are opened, appropriate compensatory measures are implemented and fire barrier watches established. These changes had not yet been finalized or implemented at the time of this event.

A cause of Deficient Communication has also been assigned because even though SEC personnel noted the open alarm when the door was first opened and questioned the IAE personnel as to whether OPS personnel were aware the Annulus Ventilation Door was open, no follow up took place between SEC personnel and OPS personnel until later. SEC personnel accepted the statement from the IAE personnel that OPS personnel and the Shift Manager were aware of the testing to mean that OPS personnel were aware that the Annulus Ventilation Door would be latched open, even though the question about the status of the door was not answered. Previous events had also led to a planned action to implement appropriate measures for training SEC personnel on the proper procedure for maintaining control of Annulus Ventilation Doors. No such training had yet been implemented at the time of this event. This factor contributed to SEC personnel not realizing the need to

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follow up on the fact that the Annulus Ventilation Door was open with OPS personnel. The SEC Officer returning to SAS at a later time did follow up with OPS personnel and; therefore, discovered the discrepancy through his diligence and attention to detail.

As an interim measure to ensure that positive control existed Station Management personnel met on December 18, 1991, at 2000. The discussion included a review of past events involving Annulus Ventilation doors and the present situation. A decision was made to establish the following controls for the Annulus Ventilation Doors:

- 1) Install a chain and padlock on all Annulus Ventilation Doors with the key controlled by the Shift Supervisor or the Control Room SRO.
- 2) Install a sign on each of the Annulus Ventilation Doors to direct personnel requiring access to contact the Control Room SRO.
- 3) OPS personnel will develop requirements for issue of the key to the padlock to ensure that adequate communication takes place between the personnel requiring access and the Control Room SRO.
- 4) SEC personnel will continuously monitor any unlocked Annulus Ventilation Door to ensure that the doors are closed except during normal access or that compensatory measures are in place.
- 5) Before the key is returned, both SEC personnel and OPS personnel shall verify that the lock and chain have been replaced on the door in question.

Station Management personnel also committed to review any procedures which could potentially affect the Annulus Ventilation Doors and the Maintenance Management Procedure for planning of work associated with working in the vicinity of the Annulus Ventilation Doors.

It was also pointed out during the meeting that Nuclear Station Modifications (NSMs) MG-12400 and MG-22400 were in progress to add alarms in the Control Room to alert OPS Control Room personnel whenever one of the Annulus Ventilation Doors was open for longer than normal access time. The Station Manager asked that these NSMs be expedited.

The Station Manager also requested the Safety Review Group in conjunction with McGuire Training personnel to develop an information package covering the event to be distributed to all appropriate crew supervisors and covered with personnel reporting to them.

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

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

A review of the Operating Experience Program Data Base for the twenty-four months prior to this event revealed three events involving inoperability of both trains of the VE system resulting from Management Deficiency and Deficient Communication. Therefore, this event is considered recurring. These events were documented on Licensee Event Reports (LERs) 370/91-08, 369/91-05, and 369/91-13. Specific corrective actions associated with those events should have prevented this event from occurring. However, the guidance by Management personnel previously planned or provided had either not been completely implemented or was not understood by personnel involved in this event.

**CORRECTIVE ACTIONS:**

- Immediate:**
- 1) OPS and SEC personnel verified that the Annulus Ventilation Door was closed and the open alarm in CAS and SAS cleared.
  - 2) The Unit 2 OPS Manager instructed SEC personnel to prohibit access to any of the Annulus Ventilation Doors without consent from the Shift Manager until further notice.
- Subsequent:**
- 1) A meeting was held by Station Management personnel to ensure that positive control existed for the Annulus Ventilation Doors.
  - 2) Chains and padlocks were installed on all Annulus Ventilation Doors with the keys controlled by OPS personnel.
  - 3) Signs were installed on all Annulus Ventilation Doors to direct personnel requiring access to contact the Control Room SRO.
  - 4) OPS personnel developed requirements to govern issuance of the keys for the Annulus Ventilation Doors.
  - 5) SEC personnel committed to continuously monitor any unlocked Annulus Ventilation Door to ensure that the doors are kept closed except during normal access or that compensatory measures are in place.
  - 6) SEC and OPS personnel committed to verify that the lock and chain are replaced on the door in question before the key is returned each time.



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7) Planning personnel reviewed the Maintenance Management Procedure for planning of work associated with working in the vicinity of the Annulus Ventilation Doors to ensure that appropriate precautionary statements are placed on work requests to alert personnel of the requirements associated with the doors.

**Planned:**

- 1) IAE, Mechanical Maintenance, and OPS personnel will review any procedures which could potentially have effect on the Annulus Ventilation Doors and add appropriate precautionary statements to alert personnel using the procedures of the requirements associated with the doors.
- 2) Project Services personnel will expedite NSM MG-12400 and NSM MG-22400 to add Control Room alarms for the Annulus Ventilation Doors on Unit 1 and Unit 2 respectively.
- 3) Safety Review Group personnel in conjunction with McGuire Training personnel will develop an information package covering the event to be covered with all appropriate site personnel.
- 4) OPS and SEC Management personnel will evaluate the program currently in place for control of Annulus Ventilation Doors and make appropriate changes as required during periods when either unit is below operating Mode 4.

**SAFETY ANALYSIS:**

The VE system is an accident mitigation system. The VE system is only required to function following a LOCA and is actuated by a Containment Hi-Hi pressure signal of 3 psig. The purpose of the VE system is to create and maintain a negative pressure zone in the Annulus to minimize the release of radioactive material, and to provide long term fission product removal. With the Annulus door open, the VE system would be able to function but the negative pressure may be degraded and draw down time could not be met. Therefore, the VE system would not be able to maintain the Annulus design basis negative pressure. At this point, radioactivity is assumed to leak into the Auxiliary Building [EIIS:NF]. However, the Auxiliary Building Ventilation (VA) system [EIIS:VF] along with the VE system would act to filter leakage from Containment. The VA system consists of two trains of exhaust which automatically switch to the filtered exhaust mode of operation on a blackout or LOCA signal, or if radiation is detected by the exhaust radiation monitor

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[EIIIS:RI]. When the VA system switches to the filtered exhaust mode, the supply units and unfiltered exhaust units are secured. Operation of the filtered exhaust units without the benefit of the supply units allows a negative pressure to be established on the Auxiliary Building. This mode of VA system operation coupled with operation of the VE system in the exhaust mode will result in both the Annulus and the Auxiliary Building maintaining a negative pressure with respect to other sources. Since both exhaust paths are filtered, the increase in dose to the public will be minimized. No credit for this interaction is taken in licensing calculations to determine the projected offsite Dose.

The VE system was not challenged nor required to perform the safety function required under accident conditions during any of the time periods associated with this event.

For most accident sequences, there is significant time between when OPS Control Room personnel would be aware that they had a situation which would lead to core damage, and the time that large fission product release would actually occur. The source term used for the offsite dose calculations is currently recognized to contain conservatism with respect to both timing and composition of radioactive releases following a design basis accident. For the highest frequency core damage sequences, one to two hours would be available for OPS Control Room personnel to diagnose the situation and take the appropriate actions required by emergency procedures. Some very unlikely accident sequences exist; however, that could result in core damage in a 30 minute time period. This still reflects significant margin to the expected 15 minute reaction time provided by the steps included in emergency procedures. If an event involving a LOCA had occurred during the time when the doors were open, the personnel involved stated they would have quickly noted the air flow, closed the doors, and reported to OPS Control Room personnel well within allowable time limits.

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