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December 2, 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 369/91-17

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/91-17 concerning the Control Area Ventilation System being inoperable. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i), (a)(2)(v) and (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

ADJ/cbl

Attachment

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NRC Resident Inspector
McGuire Nuclear Station

LICENSEE EVENT REPORT (LER)

FACILITY NAME(1)	DOCKET NUMBER(2)	PAGE(3)
McGuire Nuclear Station, Unit 1	05000 369	1 OF 7

TITLE(4) The Control Area Ventilation System Was Inoperable Due To A Design Deficiency

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(8)
										05000
10	16	91	91	17	0	12	02	91		05000

OPERATING MODE(9)	NM	THIS REPORT IS SUBMITTED PURSUANT TO REQUIREMENTS OF 10CFR (Check one or more of the following)(11)									
			20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)		
POWER LEVEL(10)	0%		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)		OTHER (Specify in Abstract below and in Text)		
			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	
Terry Pedersen, Supervisor, Safety Review	704	875-4487

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
	X NO				
YES (If yes, complete EXPECTED SUBMISSION DATE)					

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines (16)

On October 16, 1991, McGuire Nuclear Station System Engineering personnel conducted a self training review of the Control Area Ventilation system. During the review, System Engineering personnel discovered the Smoke Purge Exhaust Fan would not receive a trip signal on a Diesel Generator sequencer actuation. System Engineering personnel suspected the operation of the Smoke Purge Exhaust Fan could adversely affect the ability of the Control Area Ventilation to function as designed during an emergency situation. Operations Management was notified by System Engineering personnel of the potential problem. Subsequent testing confirmed the Control Area Ventilation system would not maintain a positive pressure in the Control Room as designed with the Smoke Purge Exhaust Fan in operation. This event is assigned a cause of Design Deficiency due to an unanticipated component interaction. Operations personnel placed a safety tag on the control switch for the Smoke Purge Exhaust Fan to prevent operation of the fan. Unit 1 was defueled and Unit 2 was in Mode 1 (Power Operation) at 100 percent power at the time of discovery of the event.

EVALUATION:

Background

The Control Area Ventilation (VC) [EIIS:VI] system consists of three subsystems. The Control Room (CR) subsystem provides a habitable environment for the main Control Room [EIIS:NA] during all modes of operation. The Control Room Area (CRA) subsystem provides heating and cooling for the electrical penetration [EIIS:NH] rooms, battery [EIIS:BY] rooms, motor control center (MCC) rooms, cable [EIIS:CBL] rooms, restricted instrument shop, and mechanical equipment room. The Switchgear (SGR) [EIIS:SWGR] subsystem provides heating and cooling for the four 4.16 KV Essential Auxiliary Power (EPC) [EIIS:EB] system rooms. The VC system equipment rooms are located at three different elevations within the Auxiliary Building (AB) [EIIS:NF]. Cooling water for the VC system is supplied by the Chilled Water (YC) [EIIS:KM] system. There are two redundant trains (A and B) of the VC system.

The two trains of the CR subsystem are cross-connected. Each train consists of a filter [EIIS:FLT] package and an air handling unit (AHU) [EIIS:AHU]. The two trains of the CR subsystem share a smoke purge exhaust fan (SPXF) [EIIS:FAN] to remove smoke or noxious gases within the main CR on demand. The SPXF is not safety related.

Technical Specification (TS) 3/4.7.6, Control Area Ventilation System, requires two independent VC systems to be operable in all modes of operation. TS 3/4.7.6 surveillance requirement 4.7.6 requires verifying that upon actuation of a Diesel Generator sequencer (EQB) [EIIS:EK] the VC system switches into a mode of operation with flow through the High Efficiency Particulate Air (HEPA) filters, charcoal adsorber banks, and maintains a positive pressure of greater than or equal to 1/8 (0.125) inches water gauge (W.G.) in the main CR.

Description of Event

On October 16, 1991, McGuire System Engineering personnel were performing a self training review of the VC system. While reviewing the electrical elementary diagrams for the VC system, Nuclear Production (NP) Engineer A noticed the SPXF would not receive a trip signal upon actuation of the emergency Diesel Generator sequencer. Because of extensive expertise in the area of VC system operation, NP Engineer A suspected the operation of the SPXF could adversely affect the operation of the VC system. On October 16, 1991, at 1600, NP Engineer A notified the Unit 2 Operations (OPS) Manager of the potential inoperability of the VC system when the SPXF was in operation. The Unit 2 OPS Manager notified the OPS Unit Supervisor and requested a safety tag be placed on the SPXF control switch [EIIS:JJ], as a precautionary action, to prevent operation of the SPXF. On October 16, 1991, at 1720, OPS personnel placed a safety tag on the SPXF control switch. In addition, the Unit 2 OPS Manager issued Special Order (S.O.) 91-20 to inform OPS CR personnel that the SPXF should not

be placed in operation except for extreme conditions in the CR.

On October 21, 1991, McGuire System Engineering personnel worked with Performance (PERF) personnel to initiate and incorporate a change to procedure PT/0/A/4450/08C, Control Room Ventilation Performance Test, to allow testing of the VC system with the SPXF in operation provided compensatory measures were in place. Later the same day procedure PT/0/A/4450/08C was performed by McGuire System Engineering personnel and the data obtained confirmed the VC system did not maintain a positive pressure equal to or greater than 0.125 inches W.G. in the main CR with the SPXF in operation. The data obtained by procedure PT/0/A/4450/08C was forwarded to McGuire Engineering to be used in performing an operability evaluation. On October 31, 1991, McGuire Engineering issued a past inoperability statement which stated the VC system had been inoperable while the SPXF was operating. OPS personnel notified the Nuclear Regulatory Commission (NRC) of the VC system inoperability on November 4, 1991 at 1104. OPS personnel were late in making the NRC notification because the past inoperability statement was sent in the mail rather than being FAXed to McGuire. McGuire Engineering personnel were not aware of the reportability requirement for past inoperability issues because the Operability Guidelines (Projects Manual, Doc TG-001) do not contain time frames for reportability. The McGuire Compliance section and McGuire Engineering will work together to review and revise the Operability Guidelines as necessary.

Conclusion

McGuire Engineering personnel determined the VC system had been inoperable when the SPXF was operating. Operation of the SPXF rendered both trains of the VC system inoperable. TS 3/4.7.6 requires two independent VC trains to be operable in all modes of operation; therefore, TS 3/4.7.6 was violated during the times the SPXF was in service. Because OPS personnel were unaware of the fact the SPXF caused the VC system to be inoperable no compensatory action was taken by OPS personnel. OPS personnel have placed the SPXF in service at various intervals in the past to remove smoke and fumes due to maintenance activities (welding, painting, etc.) and at other times to replenish the fresh air supply to the CR. There were no administrative controls in place to control when or how long the SPXF could be in operation because the adverse affect of SPXF operation was not known at the time. This investigation could not determine the exact times and duration of SPXF operation. When OPS personnel were made aware of VC system inoperability due to operation of the SPXF, they took the appropriate corrective action to prevent operation of the SPXF by placing a safety tag on the SPXF control switch. This investigation revealed that prior to October, 1989, the functional description for the VC system was described in System Description MCSD-1211.00-17. The System Description stated the SPXF should be used for intermittent emergency operation to remove smoke from the CR ventilation subsystem. This statement implies the SPXF should not be used to remove smoke or fumes from routine maintenance activities or to replenish the fresh air supply in the CR. In October, 1989, the System Description for the VC system was

replaced by the Design Basis Document (DBD). The DBD states the SPXF is to remove smoke or noxious gases within the main CR on demand. This statement implies there are no restrictions for operation of the SPXF. This investigation concludes there should have been administrative controls in place to limit operation of the SPXF to intermittent emergency use only. This event is assigned a cause of Design Deficiency because of an unanticipated component interaction due to a design oversight because the VC system DBD, System Description, and system reviews failed to identify the inoperability of the VC system due to SPXF operation. McGuire Engineering personnel will conduct an independent review of the Design Basis Document for the VC system to determine if there are any other unanticipated component interactions that could adversely affect the VC system.

A review of the Operating Experience Program (OEP) Database for the 24 months prior to this event revealed 3 events in which the cause was a Design Deficiency because of a design oversight. LER 370/90-01 involved a control valve on the Unit 2 personnel airlock. LER 369/90-10 documents an event in which the VC system was inoperable due to under sized heaters. LER 369/91-03 documents an event in which the VC system was inoperable because the failure mode for the VC system intake radiation monitors [EIIS:MON] and chlorine detectors [EIIS:DET] would have prevented pressurization of the CR. Therefore, this event is considered recurring.

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

This event caused no significant operational problems or difficulties.

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

CORRECTIVE ACTIONS:

Immediate: 1) McGuire System Engineering personnel notified OPS Management of the suspected adverse affect of SPXF operation on the VC system.

Subsequent: 1) OPS personnel placed a safety tag on the SPXF control switch to prevent operation.

2) OPS Management issued S.O. 91-20 to inform OPS personnel of the consequences of SPXF operation.

3) McGuire Engineering issued a Station Problem Report to revise the DBD to reflect inoperability of the VC system during SPXF operation.

Planned: 1) OPS personnel will initiate changes to procedure OP/0/A/6450/11, Control Area Ventilation/Chilled Water System. These changes will incorporate appropriate administrative controls to prevent operation of the SPXF except for extreme conditions in the CR and then only if compensatory measures are in place to ensure the SPXF is stopped if VC system operation during an emergency is required.

2) OPS personnel will initiate and incorporate changes to procedure OP/0/A/6450/11, Control Area Ventilation/Chilled Water System, to allow the Outside Air Pressure Filter Trains to be used to add fresh air to the CR.

3) McGuire System Engineering personnel will evaluate the need to perform a study of the CR air quality to determine if a Nuclear Station Modification to add an auto trip signal to the SPXF is needed and is cost effective.

4) McGuire Engineering personnel will revise the McGuire Nuclear Station DBD to reflect the inoperability of the VC system when the SPXF is in operation.

5) McGuire Engineering personnel will perform a review of the VC system DBD to identify any other unanticipated interactions with non safety related components.

SAFETY ANALYSIS:

In the event of a design basis accident, the design requirements of the VC system are to supply filtered air at a controlled temperature and humidity and to pressurize the CR to equal to or greater than 0.125 inches W.G. which is to prevent inleakage of potentially contaminated air. The VC system helps ensure radiation doses to CR personnel remain below 10CFR50, GDC-19 limits. The McGuire Final Safety Analysis Report (FSAR), Chapter 15, accident analysis conservatively assumes that contaminated air enters the CR at any time post accident when the CR is not pressurized. A continuous inleakage of 10 cfm is considered to account for periods when doors are opened for ingress and egress. The VC system is primarily for removing particulate and Iodine contamination from the supply air. Supply air is supplied from two widely separated intake locations. These intakes are monitored for radioactivity and either intake may be closed should contaminated air be drawn into the intakes. Accident analysis conservatively assumes that both intakes are continuously contaminated. Conservative assumptions are also made concerning the amount of contamination released to the Containment Building, the leakage of contaminated air from the Containment Building, and the amount of contamination bypassing the Annulus Ventilation (VE) [EIIS:VD]

system which filters air leakage from the Containment Building. Although the VC system would not pressurize the CR with the SFXF in operation, the supply rate of air to the CR exceeds the exhaust rate; therefore, very little inleakage would be expected. Infiltration of air from the Auxiliary Building into the CR is very unlikely in post accident operation since the Auxiliary Building Ventilation (VA) [EIIS:VF] system alignment creates a slight vacuum and would act to draw air out of the CR. The CR habitability requirement is to provide a safe environment over a 30 day period of time. It is unlikely that the SPXF would be operated for any extended period of time unless conditions in the CR were such that evacuation would be necessary. Thus, the period of VC system inoperability would be short and the dose consequence further minimized.

The principle contaminant contained in air leaking into the CR is assumed to be radioactive Iodine which is very conservatively modeled in dose calculations. Each unit at McGuire is equipped with an Ice Condenser (NF) [EIIS:BC] system containing a minimum of 2,099,790 pounds of sodium tetraborate ice. The sodium tetraborate solution produced by the melting of ice, during an accident, serves to absorb and retain Iodine released. Any radioactive material released during an accident would be contained in the Containment Building. Any radioactive material leaking from the Containment Building would be filtered and discharged by the VE system. The VE system contains an activated carbon bed to filter elemental and organic Iodine from the air in the annulus. The NF and VE systems combined serve to prevent the release of Iodine to the atmosphere. Very low amounts of Iodine would be expected to reach the area around the CR.

CR Operator dose would be further reduced by operation of the VA system. No credit is taken for the VA system filtration, with regard to CR dose calculation, in mitigating the Emergency Core Cooling System (ECCS) leakage source. However, this system is automatically switched to the filtered exhaust mode of operation on a Safety Injection (SI), Blackout (BO) signal or if radiation is detected by the exhaust monitor [EIIS:MON]. The VA system has four 50 percent capacity exhaust fans 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 CR personnel.

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

A fire in the CR and a simultaneous Loss of Coolant Accident (LOCA) are beyond the design basis for McGuire and is not considered in the McGuire accident analysis.

The health and safety of the public were not affected by this event. At no time was the VC

FACILITY NAME(1)	DOCKET NUMBER(2)	LER NUMBER(6)			PAGE(3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
McGuire Nuclear Station, Unit 1	05000 369	91	17	0	7	OF	7

system required to actuate to mitigate the consequences of an accident while the SPXF was in operation.