



Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East  
Welch, Minnesota 55089

May 12, 1997

10 CFR Part 50  
Section 50.73

U S Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

**PRAIRIE ISLAND NUCLEAR GENERATING PLANT**

Docket Nos. 50-282 License Nos. DPR-42  
50-306 DPR-60

**LER 1-97-06**

**Discovery of Logic Error in Control Room Ventilation System**

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The Licensee Event Report for this occurrence is attached. In the report, we made one new NRC commitment, the italicized corrective action.

This event was reported via the Emergency Notification System in accordance with 10 CFR Part 50, Section 50.72, on April 11, 1997. Please contact us if you require additional information related to this event.

Joel P Sorensen  
Plant Manager  
Prairie Island Nuclear Generating Plant

c: Regional Administrator - Region III, NRC  
NRR Project Manager, NRC  
Senior Resident Inspector, NRC  
Kris Sanda, State of Minnesota

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Attachment

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33). 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.

1 OF 4

### Discovery of Logic Error in Control Room Ventilation System

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
04	11	97	97	-- 06 --	00	5	12	97	Prairie Island Unit 2	05000 306
									FACILITY NAME	DOCKET NUMBER
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)							
			20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)		100	20.2203(a)(1)			20.2203(a)(3)(i)			X 50.73(a)(2)(ii)	50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)	73.71
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)	OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

612-388-1121

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO	SUBMISSION			
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 11, 1997 a condition was identified that is considered outside the 1967 proposed GDC Criterion 20 requirements for protection against single failures. Specifically, a design deficiency exists which could result in the failure to automatically isolate control room outside air supply upon detection of high radiation levels (for conditions where a safety injection would not be required) in the control room. Control room outside air supply isolation logic may be inadequate to assure that control room habitability is not adversely impacted during a radiological release event with a concurrent single failure of the control room radiation monitors. This deficiency has existed since the beginning of plant operation.

Corrective action has been taken to ensure the outside air supply to the control room is isolated prior to conducting any plant operations which may result in a radiological release with the potential to exceed control room allowable doses. A design change to modify the logic to make the high radiation actuation logic meet the single failure criterion is being developed.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)	PAGE (3)
Prairie Island Nuclear Generating Plant Unit 1	05000 282	YEAR	SEQUENTIAL NUMBER
		REVISION NUMBER	2 OF 4
97	-- 06 --	00	

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

EVENT DESCRIPTION

On April 11, 1997 while both units were operating at 100% power, a condition was identified that is considered outside the 1967 proposed GDC Criterion 20 requirements for protection against single failures. This condition was discovered during engineer review of the system logic diagrams. Specifically, a design deficiency exists which could result in the failure to automatically isolate control room outside air supply upon detection of high radiation levels in the control room. Control room outside air supply isolation logic may be inadequate to assure control room habitability is not impacted during radiological release events.

The 1967 proposed GDC Criterion 20 specifies that redundancy be designed into the protection systems sufficient to assure that no single failure or removal from service of any component will result in loss of the protective function.

During a postulated fuel handling accident or other radiological event which results in high radiation levels in the control room and does not result in safeguards actuation, a single failure of one of the control room radiation monitoring trains could result in radiologically contaminated outside air being drawn into the control room. (Note that if the event requires initiation of a safety injection signal, then the single failure criterion would be met because there would be additional signals to the dampers.) The scenario of concern is the single failure of a train of control room air radiation monitors<sup>1</sup> on the same train as the air handler<sup>2</sup> in service prior to the event. If the radiation monitor for the operating train fails, the two in series dampers<sup>3</sup> for the outside air supply on that train do not isolate since they are both controlled by the same radiation monitor signal. The operating air handler may then draw in radiologically contaminated air.

CAUSE OF THE EVENT

Cause of the event is apparent oversight during original plant design.

ANALYSIS OF THE EVENT

The probability of a fuel handling accident or other radiological event which does not cause a safeguards actuation signal occurring coincident with a failure of the control room radiation monitor

<sup>1</sup> (EIS System Identifier: IL; EIS Component Identifier: MON)

<sup>2</sup> (EIS System Identifier: VI; EIS Component Identifier: AHU)

<sup>3</sup> (EIS System Identifier: VI; EIS Component Identifier: DMP)

LICENSEE EVENT REPORT (LER)  
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

signal is low. In this situation, the redundant radiation monitor would have isolated the other train of control room outside air supply. The operators have control room indication including:

- High Radiation Train A Panel Alarm
- High Radiation Train B Panel Alarm
- Control Room Air Supply Monitor A Alarm
- Control Room Air Supply Monitor B Alarm
- Rad Monitor Downscale Failure Panel Alarm
- Position Indication of Train A PAC Filter outside air supply damper
- Position Indication of Train B PAC Filter outside air supply damper
- 121 Control Room Alt air supply open indication light
- 121 Control Room Alt air supply closed indication light
- 122 Control Room Alt air supply open indication light
- 122 Control Room Alt air supply closed indication light
- 121 Control Room vent dampers improper alarm
- 122 Control Room vent dampers improper alarm

The indications in the control room are sufficient to allow the operator to diagnose and respond to this postulated event. The position of the outside air supply dampers can be controlled from the control room. Therefore, since the operators had the indications and controls necessary to place the ventilation system in the appropriate configuration, the significance of this event on health and safety of the public was minimal.

Since the single failure criterion is part of the plant design basis, the event is reportable pursuant to 10CFR50.73 (a)(2)(ii)(B) "In a condition that was outside the design basis of the plant . . ."

### CORRECTIVE ACTION

#### Immediate Corrective Action:

The immediate corrective action was to manually isolate outside air supply to the control room. Isolation of outside air does not impact the design basis function of the system since the dampers which were closed are normally closed after receipt of a control room radiation monitor or safeguards actuation signal. The isolation of outside air does not adversely affect the cooling capability of the control room ventilation system, since the system is designed to remove all heat loads in the isolated configuration.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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

## Intermediate Corrective Action:

The outside air dampers have been reopened. Radiological release events which do not actuate safeguards have been evaluated to determine possible doses to the control room assuming the outside air dampers open. Except for a fuel handling accident in containment or the spent fuel pool, the analysis of accidents show that the dose received in the control room with full outside air flow from one train of control room ventilation is within limits. Administrative controls have been applied which require isolation of the outside air supply during activities which could potentially result an irradiated fuel integrity breach.

## Long Term Corrective Action:

*A design change to modify the logic to make the high radiation actuation logic meet the single failure criterion is being developed.*

FAILED COMPONENT IDENTIFICATION

None

PREVIOUS SIMILAR EVENTS

LER 1-94-11 reported another instance of a design that did not meet the single failure criterion.