NMC
Committed to Nuclear Excellence

Mano K. Nazar
Site Vice President
Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC
1717 Wakonade Dr. East • Welch MN 55089

September 16, 2002 10 CFR 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 1-02-01: Condition Prohibited By Technical Specifications Due to Potential For Auxiliary Building Special Vent Zone Boundary Degradation

The Licensee Event Report for this occurrence is attached. In the report, we made no new NRC commitments. Please contact us if you require additional information related to this event.

M. K. Nazar

Mano K. Nazar
Site Vice President
Prairie Island Nuclear Generating Plant

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

Attachment

IE22

NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001

Estimated burden per response to comply with this mandatory information collection request. 50 hours Reported lessons learned are incorporated into the licensing process and fed back to industry Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U S Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503 If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Prairie Island Nuclear Generating Plant Unit 1	05000 282	1 OF 6

TITLE (4)
Condition Prohibited by Technical Specifications Due to Potential Auxiliary Building Special Vent Zone Boundary Degradation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	16	02	02	– 01 –	00	09	16	02	Prairie Island Unit 2	05000 306
									FACILITY NAME	DOCKET NUMBER

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)			
OPERATING MODE (9)	1	20 2201(b)	20 2203(a)(3)(ii)	50 73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
POWER LEVEL (10)	100	20 2201(d)	20.2203(a)(4)	50 73(a)(2)(iii)	50.73(a)(2)(x)
		20.2203(a)(1)	50 36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
		20 2203(a)(2)(i)	50 36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73 71(a)(5)
		20.2203(a)(2)(ii)	50 36(c)(2)	50.73(a)(2)(v)(B)	OTHER
		20 2203(a)(2)(iii)	50 46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A
		20 2203(a)(2)(iv)	50 73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
		20 2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
		20 2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
		20 2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Robert Alexander	651-388-1121

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

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 15 single-spaced typewritten lines) (16)

Prairie Island Technical Specification 3.6.E.2 states that; "Openings in the Auxiliary Special Ventilation Zone are permitted provided they are under direct administrative control and can be reduced to less than 10 square feet within 6 minutes following an accident".

On July 16, 2002, while both units were operating at 100% power, a potential uncontrolled Auxiliary Building Special Vent Zone (ABSVZ) boundary leakage path was identified. Upon discovery of the potential deficiency, the doors from the "Hot" Chemistry Lab to the ABSVZ were treated as openings in the boundary and were placed under administrative controls as allowed by the Technical Specifications.

The cause of the event is attributed to design changes that were performed during plant construction in 1973, which realigned "Hot" Chemistry Lab ventilation supplies and failed to recognize the potential effect on the ABSVZ boundary.

Future design changes or continued use of administrative controls are being evaluated as corrective actions to resolve this issue.

No equipment failures occurred during this event.

EVENT DESCRIPTION

Prairie Island Technical Specification 3.6.E.2 states that: "Openings in the Auxiliary Special Ventilation Zone are permitted provided they are under direct administrative control and can be reduced to less than 10 square feet within 6 minutes following an accident".

To implement this requirement, the Auxiliary Building Special Vent Zone (ABSVZ) boundary is identified on plant drawings, and openings created in the boundary are controlled per administrative instructions.

On July 16, 2002, a Plant Engineer identified a potential ABSVZ boundary leakage path as described below. This was identified while performing a "10 CFR 50.59 Screening" evaluation for a proposed temporary modification to increase cooling to the "Hot" Chemistry Lab.

The existing ABSVZ boundary in the 715' elevation is defined to be (in Prairie Island terms) the G-line wall, and the "Hot" Chemistry Lab is inside of this boundary. There is supply ventilation ducting from the Turbine Building Ventilation System[1] to the "Hot" Chemistry lab that penetrates the ABSVZ boundary on the 715' elevation. This system uses supply booster fans[2] to provide this supply ventilation airflow. The fans and dampers[3] in this ducting do not receive an automatic signal to stop/close on a start of the Auxiliary Building Special Ventilation (ABSV) System,[4] creating an uncontrolled opening in the ABSVZ boundary.

During an accident that generates a Safety Injection signal such as a Loss of Coolant Accident (LOCA), the ABSV system starts and the "Hot" Chemistry Lab supply booster fans could continue to supply air to the "Hot" Chemistry Lab. As the doors[5] between the "Hot" Chemistry Lab and the ABSVZ are not part of the ABSVZ boundary, they have not been controlled. There is a chance that the doors may have been left open at one time or other, and these supply booster fans would then be supplying air to the ABSVZ through the open doors. With the supply booster fans for the "Hot" Chemistry Lab operating, the pressure in the "Hot" Chemistry Lab may be positive with respect to the ABSVZ. If the "Hot" Chemistry lab doors were open, it is not clear that the ABSV system could still draw a vacuum in the ABSVZ with this additional air source. In this configuration, a concern exists for a bypass flow path for the activity in the ABSVZ during a LOCA.

With this potential air source, the adequacy of the ABSVZ boundary could be questioned. The integrity of the ABSVZ boundary affects the ability of the ABSV system to perform its required functions of establishing and maintaining a negative pressure in the ABSVZ needed for filtering containment and Emergency Core Cooling System (ECCS)[6] leakage.

---

[1] EIIS System Identifier: VK
[2] EIIS System Identifier: VK; Component Identifier: FAN
[3] EIIS System Identifier: VK; Component Identifier: DMP
[4] EIIS System Identifier: VF;
[5] EIIS System Identifier: VF; Component Identifier: DR
[6] EIIS System Identifier: JE

With the open ventilation path to the ABSVZ not being controlled per our administrative instructions in place to implement the provisions of Technical Specification 3.6.E.2, the event was determined to be reportable under 10 CFR 50.73(a)(2)(i)(B).

CAUSE OF THE EVENT

Design changes were implemented during plant construction in 1973, which realigned the "Hot" Chemistry Lab ventilation supplies from the Auxiliary Building Normal Ventilation to the Turbine Building Ventilation System. These were performed to provide a positive pressure in the "Hot" Chemistry Lab relative to the Auxiliary Building. The affect on the ABSVZ was not explicitly addressed in these design changes. Discussions with personnel involved with the design changes also indicate that the effect on the ABSVZ may have been overlooked. It is not known if this issue had ever been addressed previously (i.e., no documentation to this effect has been identified).

Pre-operational testing of the ABSV system was performed with the doors between the ABSVZ and the "Hot" Chemistry Lab closed. It was not addressed in this testing, or subsequently, that the position of these doors could potentially affect the ABSVZ and ABSV System performance.

ANALYSIS OF THE EVENT

The function of the ABSVZ and ABSV System is to collect and filter leakage into the ABSVZ during a LOCA to maintain off-site and control room personnel doses within acceptable limits. In order to accomplish this function, the system needs to be able to draw a negative pressure in the ABSVZ. Thus, ABSVZ integrity is important for the ABSV system to be able to perform the required function. In order to provide ABSVZ integrity, doors that penetrate the boundary are controlled and the Auxiliary Building normal ventilation system is automatically isolated on start of the ABSV system.

The existing ABSVZ boundary in the 715' elevation is defined to be (in Prairie Island terms) the G-line wall, and the "Hot" Chemistry lab is inside this boundary. There is supply ventilation ducting from the Turbine Building Ventilation System to the "Hot" Chemistry lab that penetrates the ABSVZ boundary on the 715' elevation. This system uses supply booster fans to provide this supply ventilation airflow to the room and sample hoods. The fans and dampers in this ducting do not receive an automatic signal to stop/close on a start of the ABSV System, creating an uncontrolled opening in the ABSVZ boundary. The doors between the "Hot" Chemistry Lab and the Auxiliary Building, 715' elevation, were not identified as ABSVZ boundary doors. Thus, the potential existed for an open ventilation path to the ABSV system.

During an accident that generates a Safety Injection signal, such as a LOCA, the ABSV system starts. However, the supply booster fans for the "Hot" Chemistry Lab could continue to operate. Under these conditions, should a door between the "Hot" Chemistry Lab and the Auxiliary Building be open, supply booster fans would then be supplying air to the ABSVZ. With the supply and exhaust fans for the "Hot" Chemistry Lab operating, the system is designed to normally maintain a positive pressure in the "Hot" Chemistry Lab relative to the ABSVZ. If the "Hot" Chemistry Lab doors are open, then this could be an

additional air leakage path into the ABSVZ, and it is not clear that the ABSV system could still draw a vacuum in the ABSVZ with this additional potential air source. The integrity of the ABSVZ boundary affects the ability of the ABSV system to perform it's required functions of establishing a negative pressure in the ABSVZ, filtering containment and Emergency Core Cooling System (ECCS)[7] leakage, and maintaining off-site and Control Room[8] personnel doses within limits. It is possible for the supply booster fans for the "Hot" Chemistry Lab to be operating such that pressure in the "Hot" Chemistry Lab is positive with respect to the ABSVZ. In this configuration, a concern exists for a bypass flow path for the activity in the ABSVZ during a LOCA if a door were to be open.

OPERABILITY AND RISK SIGNIFICANCE

To assess past operability and risk significance, the following evaluation was conducted which reviewed the previous three years to determine if at anytime during this interval the system or boundary was not capable of performing its required function.

A surveillance test is performed quarterly on the ABSV system per Technical Specifications. Each ABSV system train is tested separately, with a superimposed 10 square foot opening in the ABSVZ boundary, to verify that it can draw a measurable negative pressure in the ABSVZ within six minutes. In addition to testing the capability of the ABSV system, this testing also confirms the integrity of the ABSVZ boundary. Thus, as both trains of ABSV are tested every quarter, the integrity of the ABSVZ boundary is confirmed twice per quarter. The negative pressure is measured on the 715' elevation. During the time frame considered in this significance evaluation, this surveillance testing has been completed successfully every time. Therefore, there have been several confirmations of the integrity of the ABSVZ boundary integrity. The position of the "Hot" Chemistry Lab to Auxiliary Building doors was not controlled during this test. That is, it is not known for certain if the doors were open or closed. However, this testing provides reasonable assurance that the system coupled with the boundary integrity would have been able to perform the required functions.

Although the surveillance testing provides reasonable assurance of the ABSVZ boundary integrity during this time period, there is still a possibility that the doors from the "Hot" Chemistry Lab to the Auxiliary Building may have been propped open at one time or another. The affect of this occurring is evaluated below.

There are three (3) potential release paths for activity in the containment atmosphere to reach the outside atmosphere, (1) Shield Building Annulus[9], (2) ABSVZ, and (3) Direct (bypassing both the Annulus and the ABSVZ). The paths of concern in this evaluation are the ABSVZ and Direct. Each of these has a maximum allowable leakage rate per Technical Specifications of 0.1 wt %/day for leakage through penetrations to the ABSVZ and 0.01 wt%/day for the Direct leakage pathways. Both of these maximum allowable leak rates are at 46 psig containment internal pressure. These correspond to total

[7] EIIS System Identifier: BP
[8] EIIS System Identifier: NA
[9] EIIS System Identifier: NH

leak rates during testing of 103,200 cc/min for leakage through the penetrations to the ABSVZ and 10,320 cc/min for the Direct Leakage pathways. These maximum leakage rate values are then used in the off-site and Control Room personnel dose analysis for a large break LOCA.

An investigation performed in 1995 assessed the feasibility of reducing the size of the ABSVZ to the 695' elevation. As part of this effort, a one-time test was conducted to determine the affect on the ABSV system with this change in the ABSVZ boundary. This test was performed as follows. With the normal openings (vent ducts, drain lines, etc.) open between the 715' and 695' elevation and all doors open above 715' elevation, a negative pressure was measured on the 695' elevation with one train of ABSV system functioning. This indicates that with several large openings (a total of 316 ft^2) above the 715' elevation the ABSV system would still draw a measurable negative pressure on the 695' elevation. It should be noted that the negative pressure measured on the 695' elevation during the testing was greater than the typical negative pressure measured on the 715' elevation during surveillance testing. This is expected as the ABSV system draws most of its suction from the 695' elevation.

Using the information from this test, a very conservative approach for assessing the significance of this situation would be to assume that all leakage to the ABSVZ, above 695' elevation, is released as direct leakage and the ABSV system only filters the leakage to 695' elevation. A comparison can then be made to determine if the sum of the leakage into the ABSVZ (above 695' elevation) and the Direct Leakage would have resulted in actual leakage values greater than those used in the post-LOCA dose analyses.

As noted above, based on the testing results, the leakage to 695' elevation can be assumed to be filtered. This would include any ECCS leakage (either operational or due to a passive failure of a pump seal) and any containment leakage to this area. The containment leakage paths that could be released into this area are Containment Spray[10] and the Chemical and Volume Control System[11] penetrations[12].

A review of Local Leak Rate Test data for both units since 1998 was performed to determine the penetration leak rates. This review included both the "as found" and the "as left" data to ensure that conservative values are used. This review was conducted by summing the total leak rates for the ABSVZ and Direct pathways and subtracting the leak rates for the containment spray penetrations.

The totals from this review indicate that with the leakage to the ABSVZ above 695' elevation assumed to be Direct leakage, the total Direct leakage would still meet the acceptance criteria in the Technical Specifications (i.e., less than 10,230 cc/min). Thus, there would be no affect on the post-LOCA dose analyses.

---

[10] EIIS System Identifier: BE
[11] EIIS System Identifier: CB
[12] EIIS System Identifier: CB; Component Identifier: PEN

Therefore, the ABSVZ and the ABSV system would have been capable of mitigating the affects of a LOCA and of maintaining the predicted dose to off-site and control room personnel within the previous predicted values in the post-LOCA dose analyses.

Impact on Safety Significance Functional Failure Performance Indicator

The consideration in this case is whether the as-found configuration, by itself, could have resulted in a loss of the ABSV system safety function. As noted above, using the as-found leak rate test results of the past three years, even if the ABSV system was assumed to not be able to maintain negative pressure in the Auxiliary Building, the offsite and control room dose limits would not be exceeded.

CORRECTIVE ACTIONS

Immediate Actions Taken

Upon discovery of the potential deficiency, the doors from the "Hot" Chemistry Lab to the remainder of the ABSVZ were treated as potential openings in the ABSVZ boundary, and as a compensatory measure, were placed under administrative controls in accordance with existing administrative guidance as allowed by the Technical Specifications. An operability determination was performed to assure operability. This restored compliance with Technical Specification 3.6.E.2.

Planned Actions to Prevent Recurrence

1) The immediate action taken is considered a short-term solution. The long-term plan is to implement a design change or continue administrative controls to assure ABSVZ boundary integrity.

2) As part of the corrective action, a review will be performed to ensure there are no other unaccounted for openings in the ABSVZ boundary. In addition, an assessment will be performed to identify if other configuration changes made during the pre-operational period may have unintentionally impacted the licensing or design basis of other systems. These actions will be performed as part of our corrective action process.

FAILED COMPONENT IDENTIFICATION

None.

PREVIOUS SIMILAR EVENTS

None in the previous three (3) years.