NSP

Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East
Welch, Minnesota 55089

December 20, 1995

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

Discovery That the Cooling Water Emergency Intake Line Was Incapable of Achieving the Flow Rate Discussed in the Updated Safety Analysis Report

The Licensee Event Report for this occurrence is attached. In the report, we have made new NRC commitments which are indicated as the statements in italics in the Corrective Action section of the attached report.

This event was reported via the Emergency Notification System in accordance with 10 CFR Part 50, Section 50.72, on November 20. 1995. Please contact us if you require additional information related to this event.

Michael D Wadley
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

Attachment

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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

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.

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 4

Title (4)
Discovery That the Cooling Water Emergency Intake Line Was Incapable of Achieving the Flow Rate Discussed in the Updated Safety Analysis Report

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
11	20	95	95	-- 14 --	00	12	20	95	Prairie Island Unit 2	05000 306
									FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	100	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		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)

NAME	TELEPHONE NUMBER (Include Area Code)
Jack Leveille	612-388-1121

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	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 has been performing engineering design bases recreation for the cooling water system to support the Service Water System Self-Assessment. These activities identified an inconsistency in pre-operational test results for the cooling water emergency intake line and the associated hydraulic calculations for the line. Due to this discrepancy and questions regarding the actual performance of the pre-operational test, a confirmation test of the line was performed to determine the line capacity and quantify any degradation which may have occurred since plant licensing. The results from this testing indicate that the flow capacity of the line has degraded and extrapolation of the test results to lower river levels demonstrates that the flow rates discussed in the Updated Safety Analysis Report cannot be met.

Subsequent analysis has shown that the existing flow capacity is sufficient to provide heat removal capacity during postulated events. Additionally, procedures have been modified to prevent cavitation of the cooling water pumps during conditions requiring use of the emergency intake line.

Inspection and cleaning techniques are being evaluated to monitor and maintain the required flow rate capacity in the line.

EVENT DESCRIPTION

Prairie Island has been performing engineering design bases recreation for the cooling water system (EIIS System Identifier BI) to support the Service Water System Self-Assessment. These activities identified an inconsistency in pre-operational test results for the cooling water emergency intake line and the associated hydraulic calculations for the line.

A backup water supply for the safeguards pumps is provided via an underground pipe which allows water to flow from the river to the safeguards intake bay bypassing the normal intake canal and external circulating water bay. The driving force for this water flow is the head difference between the river and the safeguards bay. Hydraulic design calculations were recovered which substantiated the intake line flow rates cited in the Updated Safety Analysis Report (USAR). During preparation efforts for an engineering self-assessment of the cooling water system pre-operational testing results were recovered. These testing results determined maximum flow rate capability for the line based on normal river water levels. However, no evidence could be located of an evaluation extrapolating these results to minimum river water levels. We subsequently have performed this extrapolation and the results indicate that the line is not capable of passing the USAR cited flows. Due to this discrepancy and questions regarding the actual performance of the pre-operational test, a confirmation test of the line was performed to determine the line capacity and quantify any degradation which may have occurred since plant licensing. The results from this testing indicate that the flow capacity of the line has degraded below the pre-operational test results.

A review of operator actions was performed to determine reasonable operator response in the event of a loss of the normal water supply to the safeguards bay and the subsequent loss of safeguards bay water level. From this review, it was determined, based on present procedural guidance, that the operators would have little warning of this event and may not take appropriate action in a timely manner to prevent loss of bay level. Based on the flow capacity of the line determined from the testing and the absence of operator guidance the line was declared inoperable.

CAUSE OF THE EVENT

The cooling water emergency intake line reduced flow capacity dates back to original design and construction. Acceptance of the line was based on mis-interpretation of the pre-operational test results. Additionally, the line was apparently sized for the required heat removal requirements and not for the capacity of the safeguards cooling water pumps (i.e., because of the large capacity of the cooling water pumps, they could be cavitated even though the emergency intake line is providing sufficient flow to meet the cooling demand) . Rationale for the line size could not be located and any judgment of cause would be speculation.

ANALYSIS OF THE EVENT

The emergency intake line serves as a backup water source to the normal water supply to the safeguards pump bay. The loss of the normal water supply to the intake bay is not postulated to be an immediate loss; i.e., due to the relatively low flow rates and the large water volume available, it will take a substantial period of time before the intake line is the sole source of water to the bay. If the demand on the cooling water system were not reduced below the capacity of the line prior to loss of the normal water source, a loss of the water level in the safeguards intake bay would result. This loss of level would result in cavitation of the safeguards cooling water pumps and degraded system flows. Due to the design of the pumps, it is likely that the pumps could continue to operate for a period of time in this cavitation state; i.e., damage would not be immediate.

Safeguards bay intake level indication is available in the Control Room; however, due to other operational considerations postulated simultaneous with the loss of water level, the decreasing safeguards bay water level may not be noticed. If bay level were lost, and the pumps cavitated, the degraded cooling water system performance would alert operators that a problem existed. The components of concern serviced by the cooling water system during this event are the Unit 1 emergency diesel generators (EDGs), supply to the auxiliary feedwater (AFW)pumps, control room cooling and component cooling heat exchangers. Steps in the Abnormal Operating Procedures would direct operators to reduce the flow demand on the cooling water system below the capacity of the intake line. If these actions were not taken before operation of the Unit 1 EDGs was affected, capability to cross-connect the Unit 2 EDGs to Unit 1 within 10 minutes is provided. This would ensure that both Units would continue to have power. Supply to the AFW Pumps can be secured for at least 20 minutes, allowing time for operator action to restore the cooling water system. Control Room cooling and component cooling system can survive a loss of cooling water for longer time periods. Thus, redundant capabilities and available time would have assisted in mitigating the consequences of this event.

As discussed above, analysis of potential scenarios demonstrates that there would have been no impact on the health and safety of the public. Additionally, the procedural changes discussed below ensure that there will be no impact on the health and safety of the public as a result of the recently determined lower flow rate through cooling water emergency intake line. This event is reportable pursuant to the requirements of 10CFR 50.73(a)(2)(ii)(B).

CORRECTIVE ACTION

Procedural changes were made to enhance operator response to events which could result in the eventual loss of the normal supply to the safeguards bay. These procedure changes have been validated on the simulator and training performed.

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

A method of periodic testing of the line is being investigated to monitor any further flow capacity degradation. A frequency for this testing, yet to be determined, will be based on the amount of degradation detected from the latest testing and the number of years the line has been in service. In addition, different methods for periodic flushing of the line are being investigated.

Inspection of the line is planned (taking into consideration the location and configuration of the line) in an attempt to determine the cause of the degradation in flow capacity. Based on this inspection, if possible, a method of cleaning will be developed and implemented.

FAILED COMPONENT IDENTIFICATION

None.

PREVIOUS SIMILAR EVENTS

We reported another discovery of cooling water flow rate lower than the USAR design value as Unit 1 LER 95-009.