Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East
Welch, Minnesota 55089

September 1, 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

Hydraulic Flow Modeling of the Cooling Water System
Has Shown Lower Than Design Flows to Some Components

The Licensee Event Report for this occurrence is attached. In the report, we made no new NRC commitments.

This event was reported via the Emergency Notification System in accordance with 10 CFR Part 50, Section 50.72, on August 2, 1995. Please contact us if you require additional information related to this event.

Michael D Wadley

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

070006

IE22

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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 U1	05000 282	1 OF 4

TITLE (4) Hydraulic Flow Modeling of the Cooling Water System Has Shown Lower Than Design Flows to Some Components

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
									Prairie Island U2	05000 306
8	2	95	95	-- 09 --	00	09	01	95	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
	20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iv)	X	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 (Include Area Code)
R G Fraser	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 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 has been performing an engineering self-assessment in connection with an upcoming Service Water System Operational Performance Inspection. To support the self-assessment program, a new thermal hydraulic computer model of the heat removal paths to the ultimate heat sink (the cooling water system) was developed.

Preliminary runs of the computer model using worst case assumptions have been completed. The model predicts cooling water flows to the Unit 1 diesel generators heat exchangers and to both units' containment fan-coil units to be significantly below the values assumed in the USAR. Evaluation of the effect of the reduced cooling water flows was completed, and, in both cases, the reduced cooling water flow still provides adequate heat removal. Therefore, the components are considered operable but degraded since design margin has been reduced. Further analysis remains to be done.

EVENT DESCRIPTION

Prairie Island has been performing an engineering self-assessment in connection with an upcoming Service Water System Operational Performance Inspection. To support the self-assessment program, a new thermal hydraulic computer model of the heat removal paths to the ultimate heat sink (the cooling water system)(EIIS System Identifier BI) was developed.

Preliminary runs of the computer model using worst case assumptions have been completed. The model predicts cooling water flows to the Unit 1 diesel generators heat exchangers (EIIS Component Identifier HX) and to both units' containment fan-coil units (EIIS Component Identifier FCU) to be significantly below the values assumed in the USAR. Evaluation of the effect of the reduced cooling water flows was completed, and, in both cases, the reduced cooling water flow still provides adequate heat removal. Therefore, the components are considered operable but degraded since design margin has been reduced. Further analysis remains to be done, but on August 2, 1995, it was determined that the event should be reported based on the information at hand.

CAUSE OF THE EVENT

Current analyses using the thermal hydraulic computer model have produced results different from the USAR.

Design basis research determined that the following worst-case scenario should be evaluated:

- Design basis accident on one unit
- Hot shutdown on the other unit
- Loss of offsite power
- Worst case single active failure
- Loss of instrument air

The original cooling water system thermal-hydraulic analyses could not be recovered. Review of pre-operational testing provides evidence that the instrument air system was assumed to be operable since it is powered by the safeguards diesel generators.

Instrument air provided for the isolation of the cooling water to the turbine-generator hydrogen coolers through closure of a non-safeguards control valve and throttling of the cooling water through the component cooling water heat exchangers via a temperature control valve. The component cooling temperature control valve repositions to the open position upon loss of instrument air. With instrument air available to perform these functions, maximum cooling water availability for safeguards components was ensured. Loss of instrument air would result in loss of these isolation capabilities. Exercising of the cooling water system model with the assumptions given above resulted in predicted cooling

water flow to fan-coil units and Unit 1 diesel generators heat exchangers less than the values given in the USAR. Further evaluation showed that heat removal capability is still adequate to mitigate the postulated accident.

ANALYSIS OF THE EVENT

The cooling water system model output predicts flows to fan-coil units and Unit 1 diesel generators heat exchangers to be significantly less than USAR values.

Further evaluation of fan-coil unit performance and of containment temperature and pressure response were done. The evaluation shows that, though design margin is reduced, the fan-coil units can still remove the heat required for accident mitigation, and containment design values are still met.

Further evaluation of diesel generator heat exchanger performance was also done. The evaluation shows that, though design margin is reduced, the heat exchangers can still remove the heat required to support the diesel generators in a fully loaded condition.

The plant instrument air compressors are powered by safeguards diesel generators, with each of the 3 compressors powered by different diesel generator. The air compressors, though non-safety related, have proven to be very reliable over the life of the plant. Assuming air compressors are available, one of the 3 compressors is adequate to supply the total instrument air demand during the accident. The cooling water system model, when run with instrument air available, predicts cooling water flow to all safeguards components as specified in the USAR.

The scenario has been evaluated from a risk assessment perspective. The probability of the scenario occurring was determined to be approximately 2.3E-9/year. The total Prairie Island Core Damage Frequency, obtained from the Individual Plant Examination, is 5E-5/year. Therefore, the probability of the scenario occurring is approximately four orders of magnitude less than the total Prairie Island Core Damage Frequency.

Since all components are operable and the probability of the worst case scenario occurring is significantly below the plant Core Damage Frequency, it is concluded that the reduced cooling water flow prediction has no impact on the health and safety of the public. The event is reportable pursuant to 10CFR50.73(a)(2)(ii)(B).

CORRECTIVE ACTION

Changes in system design and operation will be made to improve the design margin to the Unit 1 diesel generators and both units' fan-coil units. Many possibilities are being evaluated.

Cooling water system design basis studies using the new computer model are still in progress. Detailed models of the fan-coil units' performance are being developed to evaluate postulated low cooling water pressures in the fan-coil units. If other

deficiencies are identified, further corrective actions will be developed, and a supplemental report will be submitted.

FAILED COMPONENT IDENTIFICATION

None.

PREVIOUS SIMILAR EVENTS

There have been no previous similar events reported at Prairie Island.