Northern States Power Company
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East
Welch, Minnesota 55089

May 5, 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 1-97-04
AMSAC Actuation Blocking Setpoint Inadvertently Set Non-conservatively High

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 April 4, 1997. Please contact us if you require additional information related to this event.

K J Albrecht for

Joel P Sorensen
Plant Manager
Prairie Island Nuclear Generating Plant

I022 1/1

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

Attachment

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)
AMSAC Actuation Blocking Setpoint Inadvertently Set Non-conservatively High

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	05000 306
04	04	97	97	-- 04	00	5	5	97	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	1	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)

During review of system documentation by the System Engineer, it was determined that the AMSAC C-20 Permissive Setpoint was non-conservative with respect to the USAR value. As stated in USAR section 7.11, the C-20 permissive arms AMSAC when turbine load is greater than 40% power. It was determined that the actual setpoint used by AMSAC corresponded to a turbine (reactor) power of approximately 48% power. This is non-conservative to the USAR requirement of 40% power. This condition has apparently existed since original installation of the AMSAC systems in 1989/90.

The AMSAC timer function (Variable Actuation Delay of 27.5 to 225 seconds) was also found to have the incorrect setpoints. The effect on the time delay was to shift the setpoint line described in USAR Fig. 7.11-2 towards the maximum time delay curve and actually exceeded the maximum time delay curve between approximately 46% and 55%power.

The cause of the event was the assumption that First Stage Turbine impulse pressure was linear from 0% to 100% turbine load when, in fact, it is non-linear less than 10% turbine load.The AMSAC setpoints were revised within approximately 24 hours of discovery. Other setpoints that could have been mis-set by a similar error were reviewed for problems.

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

EVENT DESCRIPTION

The purpose of the ATWS Mitigating System Actuating Circuitry (AMSAC[1]) is to mitigate the effects of a failure of the Reactor Protection System[2] to trip the reactor[3] in the event of a transient. This is required to prevent reactor coolant system[4] pressure from exceeding 3200 psig (ASME Boiler and Pressure Vessel Code Level C service limit). The mitigation is accomplished by tripping the turbine[5] and initiating auxiliary feedwater[6] flow, anticipating a loss of heat sink, after the reactor protection system[7] has been given sufficient time to trip the reactor.

During review of system documentation by the System Engineer, it was determined that the AMSAC C-20 Permissive Setpoint was non-conservative with respect to the USAR. As stated in USAR section 7.11, the C-20 permissive arms the AMSAC when turbine load is greater than 40% power. It was determined that the actual setpoint used by AMSAC was 196.8 psig on both units which corresponded to approximately 40% of Full Load impulse pressure which was presumed to be linearly proportional to Turbine Load. Review of the actual plant data during the Unit 2 shutdown for the January 1997 refueling outage and the Unit 1 turbine valve test in January of 1997 showed that a setpoint of 196.8 psig actually corresponds to a turbine (reactor) power of approximately 48% power. This is non-conservative to the USAR requirement of 40% power. This condition has apparently existed since original installation of the AMSAC systems in 1989/90. Based on data for Unit 1's impulse pressures at 49% power and 100% power, the actual plant setpoint for 40% power was calculated to be approximately 144 psig. This setpoint corresponds to approximately 39% power (1% conservatism for instrument uncertainties) for Unit 1 and 38% power for Unit 2.

Subsequent to the 1 hour notification it was determined that the AMSAC timer[8] function (Variable Actuation Delay of 27.5 to 225 seconds) was also found to have incorrect setpoints. This had a slight effect on the variable actuation time delay associated with AMSAC. The cause of this discrepancy was identical to the C-20 setpoint as the setpoint was based on percentage of full load turbine impulse pressure vs an impulse pressure corresponding to applicable power level. The effect on the time delay was to shift the setpoint line described on USAR Fig. 7.11-2 towards the maximum time delay curve and actually exceeded the maximum time delay curve between approximately 46% and 55%power.

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[1] (EIIS System Identifier: JC)
[2] (EIIS System Identifier: JC)
[3] (EIIS System Identifier: JC; EIIS Component Identifier: RCT)
[4] (EIIS System Identifier: AB)
[5] (EIIS System Identifier: TA; EIIS Component Identifier: TRB)
[6] (EIIS System Identifier: BA)
[7] (EIIS System Identifier: JC)
[8] (EIIS System Identifier:; JC; EIIS Component Identifier: TMR)

Both Unit 1 and Unit 2 AMSAC System C-20 Permissives were affected by the non-conservative setpoints. Unit 1 at time of discovery was at 100% power. Unit 2 was at 36% power and administratively held from exceeding 40% power due to ATWS/AF System concerns. Both units' AMSAC variable time delays were also affected non-conservatively and exceeded the maximum time delay curve between 46% and 55% power.

CAUSE OF THE EVENT

The cause of the event was the incorrect assumption that the First Stage Turbine impulse pressure was linear from 0% to 100% turbine load when in fact it is non-linear less than 10% turbine load and is 0 psig up to approximately 6% power.

ANALYSIS OF THE EVENT

The AMSAC system was considered inoperable for both Units between 40% and 55% until the setpoints were corrected. However, the AMSAC system would have actuated to start Auxiliary Feedwater and initiate a Turbine Trip above power levels of approximately 48% upon detection of a Loss of Feedwater ATWS condition. Therefore with Unit 1 operating above 55% power (100% at time of discovery) it would have provided its required function. Unit 2 was operating at 36% power at time of discovery and was administratively restricted to less than 40% power until the setpoint was adjusted. The AMSAC system is not required to be operable below 40% power as it is normally blocked in this condition. Even though AMSAC could not have been considered operable between a power level of approximately 40% to 55%, the safety significance is minimal for two reaons. One is that the time that the plant operates in this range during a fuel cycle is very small. In addition, the AMSAC Generic Design Package (WCAP-11436) section 7.0 states that: ". . . AMSAC is not required to actuate at or below 70% power to limit peak pressure in the unlikely event of a loss of normal feedwater ATWS event. However, in order to limit the amount of RCS voiding to that previously predicted, the C-20 power level should be reduced to 40% power." Therefore, health and safety of the public were minimally affected by this event.

AMSAC is a licensing basis requirement for events beyond the plant's design basis (i.e., for events where it is assumed that there is a common mode failure of both trains of the Reactor Protection System). Since this event involved the plant being in a condition outside of the current licensing basis as described in the USAR, it is considered reportable pursuant to the requirements of 10 CFR 50.73(a)(2)(ii)(B).

CORRECTIVE ACTION

The AMSAC setpoints were revised using actual plant data for impulse pressure between approximately 40% and 100% Turbine Load assuming linear response over this range. It was verified that impulse pressure is approximately linear from 15% to 100% power. The setpoints were changed within approximately 24 hours of discovery.

In review of Reactor Protection functions that could also have been similarly affected, P-7 was identified as a potential concern but was found to be acceptable because Technical Specification 2.3.B states that "At Power" reactor trips that are blocked at low power shall be unblocked $\geq$ 10% of full load turbine impulse pressure. P-7 Interlock is set < 10% of full load turbine impulse pressure. The P-2 Interlock is similar and acceptable for the same reason.

Review of the control functions that use impulse pressure as an input showed that no changes were necessary (Rod Control, FW Control & Steam Dump).

FAILED COMPONENT IDENTIFICATION

None.

PREVIOUS SIMILAR EVENTS

None.