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Nuclear Management Company, LLC
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East • Welch MN 55089

July 6, 2001

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 No. 50-306 License No. DPR-60

LER 2-01-04: Manual Turbine Trip/Reactor Trip due to High Differential Condenser Backpressure

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 50, Section 50.72, on May 9, 2001. Please contact us if you require additional information related to this event.

Joel P. Sorensen
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 2	05000 306	1 OF 4

TITLE (4)
Manual Turbine Trip/Reactor Trip due to High Differential Condenser Backpressure

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
05	09	01	01	– 04 –	00	07	06	01	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)					
		20.2201(b)	20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
POWER LEVEL (10)	12	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)	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)
Arne Hunstad	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).	√ NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On May 9, 2001, Unit 2 was undergoing an orderly shutdown as a result of the declared inoperability of D5 and D6 Diesel Generators (Unit 2 LER 01-03). At about 2006, with the reactor at 12% power, the turbine was manually tripped when 2A/2B Condenser differential pressure reached 2.5" Hg. The reactor tripped automatically as a result of the turbine trip.

After the trip, vacuum continued to decrease in both condensers until vacuum was completely lost by 2047. After the vacuum loss, water was observed coming from the condenser air ejector discharge to atmosphere. Additional operator checks of the air ejectors noted water in the air ejector flowmeter, and that the 2B Condenser air ejector suction piping was hot while 2A Condenser piping was at ambient temperature. Actions were taken to drain the water from the air ejector discharge. At approximately 2243, condenser vacuum began a slow recovery without any significant operator intervention other than draining the discharge line. Vacuum was fully recovered by approximately 0945 on May 10.

EVENT DESCRIPTION

On May 9, 2001, Unit 2 was undergoing an orderly shutdown as a result of the declared inoperability of D5 and D6 Diesel Generators (Unit 2 LER 01-03). At about 2006, with the reactor at 12% power, the turbine[1] was manually tripped when 2A/2B Condenser[2] differential pressure reached 2.5" Hg. The reactor tripped automatically as a result of the turbine trip.

After the trip, vacuum continued to decrease in both condensers until vacuum was completely lost by 2047. After the vacuum loss, water was observed coming from the condenser air ejector discharge to atmosphere. Additional operator checks of the air ejectors noted water in the air ejector flowmeter, and that the 2B Condenser air ejector suction piping was hot while 2A Condenser piping was at ambient temperature. Actions were taken to drain the water from the air ejector discharge. At approximately 2243, condenser vacuum began a slow recovery without any significant operator intervention other than draining the discharge line. Vacuum was fully recovered by approximately 0945 on May 10.

During the shutdown, all equipment operated as expected with the following exceptions:

1. The turbine gland sealing steam pressure was not responding as desired and the manual bypass was opened to maintain header pressure.

2. 22B Feedwater Heater level control was not properly responding to an indicated high level. The level control was placed in manual.

3. Air ejector air discharge flow increased to approximately the maximum indicated flow (12 scfm) for a limited duration approximately 40 minutes prior to the trip, and then returned to normal prior to the trip.

CAUSE OF THE EVENT

A root cause investigation team was assembled. Their investigation focused on all contributors to loss of condenser vacuum. Inspection and testing took place during the 3-week shutdown. Many scenarios were eliminated based on data from operating history, testing and calculation. Other scenarios were studied in more detail.

Only two scenarios remained as potential causes:

1. Degraded main condenser capability due to air accumulation in the condenser followed by an energy introduction.

[1] EIIS Component Identifier: TRB
[2] EIIS Component Identifier: COND

2. Air leakage through the Moisture Separator Reheater (MSR) relief valves to the condensers due to inadequate sealing steam pressure.

ANALYSIS OF THE EVENT

The event is reportable under 10CFR50.73(a)(2)(iv)(A) as an automatic actuation of the reactor protection system in response to the manual turbine trip. The health and safety of the public were unaffected since plant systems responded as designed to the trip.

The event involved a scram with a "loss of normal heat removal" in that the main condenser was lost. Loss of the main condenser eliminated steam dump to condenser as a heat removal path, but steam dump to atmosphere was available.

Performance Indicator Assessments

This event affects the number of unplanned scrams per 7,000 hours, but the unit has had 3 or fewer scrams in the last 7,000 hours.

The event involved a scram with a loss of normal heat removal in that the main condenser was lost. The unit had had no events involving loss of normal heat removal in the past 12 quarters.

Safety System Unavailability is addressed in Unit 2 LER 01-03.

Significance Determination

A sensitivity risk assessment was performed. The risk level for this event is considered to be non-risk significant because the event results in an increase of the Core Damage Frequency risk of less than 1E-6/year (PSA Applications Guide, EPRI TR-105396, August 1995). Conditional Core Damage Probability is below 1E-6.

CORRECTIVE ACTION

Several actions were taken in the areas of inspection, verification, calibration, and repair.

The following actions will be taken:

1. Identify and implement air ejector operational requirements or modifications that will prevent high air inleakage flows from flooding the air ejectors.

2. Identify and implement the operational requirements or modifications necessary to ensure adequate sealing steam pressure to the MSRs.

3. Increase gland steam header pressure to the maximum feasible pressure.

FAILED COMPONENT IDENTIFICATION

None.

PREVIOUS SIMILAR EVENTS

There have been previous events due to vacuum problems reported at Prairie Island, but the causes of those events have been ruled out for this event.