



June 15, 2010

L-PI-10-055
10 CFR 50.73

U S Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Prairie Island Nuclear Generating Plant Unit 2
Docket 50-306
License No. DPR-60

LER 50-306/2010-001-00, Unit 2 Turbine Trip during Reactor Shutdown Resulting in a Reactor Scram

Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, herewith encloses Licensee Event Report (LER) 50-306/2010-001-00.

On April 16, 2010, the Prairie Island Nuclear Generating Plant's (PINGP) Unit 2 reactor down power began in preparation for Unit 2, Cycle 26 Refueling Outage (2R26). At approximately 13% power the turbine automatically tripped due to a greater than 2.5 inch Hg pressure differential between the A and B condensers.

The steam plant and reactor protection system responded as expected to the initial event. After the reactor trip, operators responded in accordance with procedures, recovered vacuum, and continued with the Unit 2 shutdown.

Summary of Commitments

This letter contains no new commitments and no changes to existing commitments.

A handwritten signature in black ink, appearing to read 'Mark A. Schimmel'.

Mark A. Schimmel
Site Vice President, Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Prairie Island, USNRC
Resident Inspector, Prairie Island, USNRC
Department of Commerce, State of Minnesota

ENCLOSURE

LICENSEE EVENT REPORT 50-306/2010-001-00

4 Pages Follow

NRC FORM 366 9-2007		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104		EXPIRES: 08/31/2010	
LICENSEE EVENT REPORT (LER) (See reverse for required number of digits/characters for each block)							
1. FACILITY NAME Prairie Island Nuclear Generating Plant Unit 2				2. DOCKET NUMBER 05000306		3. PAGE 1 of 4	
4. TITLE Unit 2 Turbine Trip during Reactor Shutdown Resulting in a Reactor Scram							
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY
04	16	2010	2010	001	00	06	15
						8. OTHER FACILITIES INVOLVED	
						FACILITY NAME	DOCKET NUMBER
						FACILITY NAME	DOCKET NUMBER
9. OPERATING MODE Mode 1		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)					
		<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)		
		<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
		<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
		<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
10. POWER LEVEL 13%		<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)		
		<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)		
		<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)		
		<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER		
		<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A		
12. LICENSEE CONTACT FOR THIS LER							
NAME Sam J DiPasquale, P.E.				TELEPHONE NUMBER (Include Area Code) 651.388.1121 x7350			
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT							
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT
14. SUPPLEMENTAL REPORT EXPECTED					15. EXPECTED SUBMISSION DATE		
<input type="radio"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE). <input checked="" type="radio"/> NO					MONTH	DAY	YEAR
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)							
<p>On April 16, 2010, the Prairie Island Nuclear Generating Plant's (PINGP) Unit 2 reactor down power began in preparation for 2R26 refueling outage. At approximately 13% power the turbine automatically tripped due to a greater than 2.5 inch Hg pressure differential between the A and B condensers.</p> <p>The steam plant and reactor protection system responded as expected to the initial event. After the reactor trip, operators responded in accordance with procedures, recovered vacuum, and continued with the Unit 2 shutdown.</p>							

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EVENT DESCRIPTION

At 19:04 on 4/16/2010, the Prairie Island Nuclear Generating Plant's (PINGP) Unit 2 reactor down power began in preparation for 2R26. At 22:37 with reactor power at approximately 13% power the turbine¹ automatically tripped due to a greater than 2.5 inch Hg pressure differential between the A and B condensers²

This caused an automatic trip of the turbine, and a subsequent automatic trip of the reactor. The steam plant and reactor protection system³ responded as expected to the initial event. After the reactor trip, operators responded in accordance with procedures, recovered vacuum, and continued with the Unit 2 shutdown.

EVENT ANALYSIS

The causal evaluation determined that at 19:04 on 4/16/2010, Unit 2 began a normal shutdown in preparation for 2R26. At approximately 13% power, the turbine automatically tripped due to a greater than 2.5 inch Hg pressure differential between the A and B condensers.

This was due to a partial opening of the Moisture Separator Reheater⁴ (MSR) safety valves caused by a lack of gland sealing steam⁵ to the MSR safety valves. Stagnant steam in the relatively cool piping on the 715 ft level of the Unit 2 turbine building condensed and collected at low points in the gland seal steam line to the MSR safety valves on the south side of the turbine. This condensation eventually blocked the flow of sealing steam.

As the MSR shell pressure became sub-atmospheric the lack of sealing steam to the MSR safety valves allowed the MSR safety valves to partially open and air to flow into Condenser A, rapidly decreasing its vacuum. Since the vacuum in Condenser B did not immediately drop, a differential pressure of greater than 2.5 in. Hg between the condensers developed. This caused an automatic trip of the turbine, and a subsequent automatic trip of the Unit 2 reactor.

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) because of the automatic reactor scram while critical. The turbine condensers have no active safety function. Therefore, this event does not represent a safety system functional failure for Unit 2.

· EIIS System Code: TA
· EIIS System Code: SG
· EIIS System Code: JC
· EIIS System Code: SB
· EIIS System Code: TC

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SAFETY SIGNIFICANCE

The operating crew responded to the reactor trip utilizing emergency operating procedures for reactor trip and reactor trip recovery and transitioned into normal shutdown procedures. Therefore, this event did not affect the health and safety of the public.

CAUSE**Root Cause**

The causal evaluation determined that the root cause of the event was a build up of condensation that blocked the flow of sealing steam to the MSR safety valves. This allowed the MSR safety valves to partially open and caused condenser vacuum to decrease rapidly. This led to the chain of events that resulted in the Unit 2 reactor trip.

Contributing Causes

1. Inadequate procedural guidance associated with gland sealing steam and alarm responses were identified.
2. Degraded gland seal segments on Low Pressure Turbine (LP) 2 allowed more air into the condenser, creating more potential for a loss of vacuum, and could degrade air ejector performance.
3. Several of the actions identified for similar events in 2001 and 2003 were not completed or were not effective, allowing the same circumstances to be present to cause a repeat event.

CORRECTIVE ACTION

The slope of the Unit 2 gland seal steam line to the MSR safety valves on the south side of Unit 2 was adjusted to prevent water build up in that line. The slope of the other gland seal steam lines (including both sides of Unit 1), will be inspected for the appropriate slope.

Additional Corrective Actions:

1. Procedure Change Requests (PCRs) for Power, Shutdown and Alarm Response procedures have been initiated to address the procedural deficiencies.
2. The degraded LP1 and LP2 steam gland seal segments were replaced as part of the originally scheduled Unit 2 outage work. The Unit 1 turbine(s) gland seal segments were replaced in the prior Unit 1 outage.
3. Improvements to the Corrective Action Process were identified by a separate causal evaluation.

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PREVIOUS SIMILAR EVENTS

A LER historical search was conducted and no similar LER events at PINGP with the same root cause were identified in the last three years.