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

Prairie Island Nuclear Generating Plant Unit 1
Docket 50-282
Renewed License No. DPR-42

Licensee Event Report (LER) 50-282/2015-004-00, Manual Reactor Trip Due to Trip of
Condensate and Main Feedwater Pump

Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM") encloses Licensee Event Report (LER) 50-282/2015-004-00, Manual Reactor Trip Due to Trip of Condensate and Main Feedwater Pump.

Summary of Commitments

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

Kevin Davison
Site Vice President, Prairie Island Nuclear Generating Plant
Northern States Power Company – Minnesota

Enclosure (1)

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

ENCLOSURE 1

LICENSEE EVENT REPORT 50-282/2015-004-00

NRC FORM 366 (01-2014)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB: NO. 3150-0104		EXPIRES: 01/31/2017																																						
LICENSEE EVENT REPORT (LER) (See Page 2 for required number of digits/characters for each block)																																												
1. FACILITY NAME Prairie Island Nuclear Generating Plant Unit 1				2. DOCKET NUMBER 05000 - 282		3. PAGE 1 OF 4																																						
4. TITLE Manual Reactor Trip Due to Trip Of Condensate and Main Feedwater Pump																																												
5. EVENT DATE			6. LER NUMBER		7. REPORT DATE		8. OTHER FACILITIES INVOLVED																																					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR																																				
5	31	2015	2015	- 004 -	00	7	23	2015																																				
9. OPERATING MODE Mode 1			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)																																									
10. POWER LEVEL 100%			<table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> 20.2201(b)</td> <td><input type="checkbox"/> 20.2203(a)(3)(i)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td> <td><input type="checkbox"/> 50.73(a)(2)(vii)</td> </tr> <tr> <td><input type="checkbox"/> 20.2201(d)</td> <td><input type="checkbox"/> 20.2203(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(1)</td> <td><input type="checkbox"/> 20.2203(a)(4)</td> <td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(viii)(B)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(i)</td> <td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(iii)</td> <td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(ii)</td> <td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(x)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iii)</td> <td><input type="checkbox"/> 50.36(c)(2)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(A)</td> <td><input type="checkbox"/> 73.71(a)(4)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(iv)</td> <td><input type="checkbox"/> 50.46(a)(3)(ii)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(B)</td> <td><input type="checkbox"/> 73.71(a)(5)</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(v)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td> <td><input type="checkbox"/> OTHER</td> </tr> <tr> <td><input type="checkbox"/> 20.2203(a)(2)(vi)</td> <td><input type="checkbox"/> 50.73(a)(2)(i)(B)</td> <td><input type="checkbox"/> 50.73(a)(2)(v)(D)</td> <td>Specify in Abstract below or in NRC Form 366A</td> </tr> </table>						<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)	<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
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12. LICENSEE CONTACT FOR THIS LER																																												
LICENSEE CONTACT Frank Sienczak				TELEPHONE NUMBER (Include Area Code) 651-267-1740																																								
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT																																												
CAUSE	SYSTEM	COMPONENT	MANU- FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU- FA CTURER	REPORTABLE TO EPIX																																			
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<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE).						<input checked="" type="checkbox"/> NO																																						
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)																																												
On May 31, 2015, at 2220 CDT, Prairie Island Nuclear Generating Plant (PINGP) Unit 1 reactor was manually tripped while operating at 100 percent power due to a lockout trip of 11 Condensate Pump followed by a lockout trip of 11 Main Feedwater Pump. The manual reactor trip was directed by the annunciator response procedure for the lockout alarm, C47010-0101, 11 FEEDWATER PUMP LOCKED OUT. This also resulted in a turbine trip as designed. The Operations crew entered the reactor trip emergency operating procedures and stabilized the unit in Mode 3, at normal operating pressure and temperature. All control rods fully inserted into the core following the trip.																																												
The manual trip is reportable per 10 CFR 50.72(b)(2)(iv)(B). The Auxiliary Feedwater System actuated to start the auxiliary feedwater pumps as designed on low narrow range steam generator level and provided makeup flow to the steam generators. The auxiliary feedwater actuation is reportable per 10 CFR 50.72(b)(3)(iv)(A). Steam generator levels have been returned to normal.																																												
The cause for 11 Condensate Pump Motor failure was due to voids within the insulation resulting from inadequate Vacuum Pressure Impregnation (VPI). The voids allowed partial discharge to occur while in-service, which caused a turn to turn failure and a subsequent groundwall failure.																																												
Corrective action is to determine the best test method(s) for identifying motor insulation degradation and initiate additional actions to perform implementation of these test methods.																																												

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@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 an 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.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
Prairie Island Nuclear Generating Plant Unit 1	05000 - 282	YEAR	SEQUENTIAL NUMBER	REV NO	2 OF 4
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NARRATIVE

On May 31, 2015, at 2220 CDT, Prairie Island Nuclear Generating Plant (PINGP) Unit 1 reactor was manually tripped while operating at 100 percent power due to a lockout trip of 11 Condensate Pump (145-251) followed by a lockout trip of 11 Main Feedwater Pump (145-261). The manual reactor trip was directed by the annunciator response procedure for the lockout alarm, C47010-0101, 11 FEEDWATER PUMP LOCKED OUT. This also resulted in a turbine trip as designed. The Operations crew entered the reactor trip emergency operating procedures and stabilized the unit in Mode 3, at normal operating pressure and temperature. All control rods fully inserted into the core following the trip.

The manual trip is reportable per 10 CFR 50.72(b)(2)(iv)(B). The Auxiliary Feedwater System¹ actuated to start the auxiliary feedwater pumps as designed on low narrow range steam generator level and provided makeup flow to the steam generators. The auxiliary feedwater actuation is reportable per 10 CFR 50.72(b)(3)(iv)(A). Steam generator levels have been returned to normal.

Following the reactor trip, 15A Feedwater Heater Relief Valve failed to reset. 12 Main Feedwater Pump was subsequently secured resulting in 15A Feedwater Heater Relief Valve reseating successfully. Steam generators were supplied by 12 Motor Driven Auxiliary Feedwater Pump and decay heat was removed by the condenser steam dump system.

This event was entered into the Corrective Action Program (AR 01481297).

EVENT ANALYSIS

On May 31, 2015, at 2220 CDT, 11 Condensate Pump locked out, causing 11 Feedwater Pump to lockout. A manual reactor trip was initiated due to the lockout of 11 Feedwater Pump. Both 11 Condensate and 11 Feedwater Pumps were in-service and control logic worked as designed and expected. Initial walkdowns found the Overcurrent Relay 50G/13-7, 11 Condensate Pump Overcurrent Relay had its flag dropped, indicating a ground fault occurred. Initial troubleshooting identified that the motor² had shorted to ground.

Failure investigation of the motor was performed on June 6, 2015. The investigation performed disassembly, visual inspections, insulation resistance testing, and surge testing of the motor. The investigation identified a groundwall insulation failure at the mid-point of the stator core, 120 degrees clockwise (CW) when referenced to the T-leads and viewed from the ODE (Top). The bottom coil

¹ EIIIS System Code – BA

² IEEE Component Code – MO

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failed in the slot region. One core hot spot (greater than 10 degrees Centigrade (C) over ambient) was noted at a location unrelated to the groundwall failure. The faulted coil was then cold stripped for further analysis and identified that a turn to turn short occurred. With a turn to turn short, a hot spot develops inside the winding, and quickly thermally degrades the groundwall insulation to the point of failure to ground. During the cold stripping process of the winding, cross sections of various windings were cut to evaluate successful resin impregnation. Results from the inspection identified several voids throughout multiple coils. Voids inside a winding may cause partial discharge to occur inside the void area, which in turn will degrade turn insulation.

Based on the available evidence and information gathered during the failure investigation, voids were found in windings of the 11 Condensate Motor. Voids in windings occur due to inadequate resin penetration during the vacuum impregnation process. These voids allowed partial discharge and potential fretting to occur while the motor was in-service. The partial discharging slowly degraded the turn to turn insulation. Once the turn to turn insulation failed, a hot spot developed. The hot spot rapidly degraded groundwall insulation to the point of failure. The motor successfully passed all final tests after rewind because the voids had not resulted in degradation of insulation at that point in time.

There were no complications during the shutdown as all control rods fully inserted and Reactor Pressure Vessel pressure was maintained by normal means. All systems actuated as required. The auxiliary feedwater pumps actuated as designed on low steam generator level. This is reportable under 10 CFR 50.73(a)(2)(iv)(A), any event or condition that results in manual or automatic actuation of any of the systems listed in paragraph 10 CFR 50.73(a)(2)(iv)(B)(1), Reactor Protection System (RPS) including: reactor scram or reactor trip, and in paragraph 10 CFR 50.73(a)(2)(iv)(B)(6), Pressurizer Water Reactor (PWR) auxiliary or emergency feedwater system.

SAFETY SIGNIFICANCE

This event did not challenge nuclear safety as all plant systems responded as designed. The reactor was manually tripped in accordance with the annunciator response procedure. There were no radiological, environmental, or industrial impacts associated with this event and PINGP did not affect the health and safety of the public.

CAUSE

The cause evaluation determined that 11 Condensate Pump Motor failure was due to voids within the insulation resulting from inadequate Vacuum Pressure Impregnation (VPI). The voids allowed partial discharge to occur while in-service, which caused a turn to turn failure and a subsequent groundwall failure.

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Prairie Island Nuclear Generating Plant Unit 1	05000 - 282	<table border="1"><tr><td data-bbox="1045 352 1133 394">YEAR</td><td data-bbox="1133 352 1317 394">SEQUENTIAL NUMBER</td><td data-bbox="1317 352 1382 394">REV NO</td></tr><tr><td data-bbox="1045 394 1133 422">2015</td><td data-bbox="1133 394 1317 422">- 004</td><td data-bbox="1317 394 1382 422">- 00</td></tr></table>	YEAR	SEQUENTIAL NUMBER	REV NO	2015	- 004	- 00	4 OF 4
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2015	- 004	- 00							

Current motor Preventive Maintenance (PM) testing strategies cannot detect turn to turn or groundwall insulation degradation.

SPEC E260-0001-005, Electric Motors Spec for Motor Rewind and Repair – Generic (superseded by SPEC E260-0001-006), did not call out documentation requirements for compliance with the specified VPI process and the requirements to ensure void inspection checks were performed and documented.

CORRECTIVE ACTION

- (IA 01481297-15) Immediate Actions: Identify vendor and align vendor resources for performing additional testing that can detect turn to turn insulation degradation for the following motors: Condensate, Heater Drain, and Cooling Tower Pumps. Initiate necessary work orders and Work Management forms to schedule in accordance with motor failure risk/consequence.
- (CA 01481297-14) Determine the best test method(s) for identifying motor insulation degradation and initiate additional actions to perform implementation of these test methods.
- (CA 01481297-18) Review SPEC E260-0001-006, Motor Repair and Refurbishment Specification, for adequate technical requirements and documentation pertaining to the VPI process.

PREVIOUS SIMILAR EVENTS

A LER historical search was conducted with the following results:

LER 1-06-01, Unit 1 Reactor Trip and LER 1-06-01 Rev. 1, Unit 1 Reactor Trip Supplement 1, for 11 Condensate Pump Motor insulation failure. This event is relevant because both cases resulted in groundwall insulation failures. In both cases 11 Condensate Pump motor lockout, satisfied the logic to trip 11 Feedwater Pump. The control logic worked as designed and expected to protect the feedwater pump.

(CE 01481644-02) Condensate Pump Logic Trip. The evaluation was completed by Sargent and Lundy and has submitted a proposal to engineering for the modification for the Condensate and Feedwater System Time Delay Project.