



MAY 04 2015

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

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

Licensee Event Report (LER) 50-306/2015-001-00, 21 Fan Coil Unit Leak –
Containment Declared Inoperable

Northern States Power Company, a Minnesota corporation, doing business as
Xcel Energy (hereafter "NSPM"), encloses Licensee Event Report (LER)
50-306/2015-001-00, 21 Fan Coil Unit (FCU) Leak – Containment Declared Inoperable.

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 Nuclear Generating Plant, USNRC
Resident Inspector, Prairie Island Nuclear Generating Plant, USNRC
Department of Commerce, State of Minnesota

ENCLOSURE 1

LICENSEE EVENT REPORT 50-306/2015-001-00

5 Pages Follow

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.

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 2	2. DOCKET NUMBER 05000 - 306	3. PAGE 1 OF 5
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4. TITLE
21 Fan Coil Unit (FCU) Leak – Containment declared Inoperable

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
3	7	2015	2015	001	00	5	4	2015	FACILITY NAME	DOCKET NUMBER
										05000
										05000

9. OPERATING MODE Mode 4	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)									
10. POWER LEVEL 0%	<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"/>	50.73(a)(2)(vii)(A)
	<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"/>	50.73(a)(2)(viii)(B)
	<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)(ix)(A)	<input type="checkbox"/>	50.73(a)(2)(ix)(A)
	<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)(iv)(A)	<input type="checkbox"/>	50.73(a)(2)(x)
	<input type="checkbox"/>	20.2203(a)(2)(ii)	<input type="checkbox"/>	50.36(c)(1)(ii)(A)	<input type="checkbox"/>	50.73(a)(2)(iv)(A)	<input type="checkbox"/>	50.73(a)(2)(v)(A)	<input type="checkbox"/>	73.71(a)(4)
	<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"/>	50.73(a)(2)(v)(B)	<input type="checkbox"/>	73.71(a)(5)
	<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"/>	50.73(a)(2)(v)(C)	<input type="checkbox"/>	OTHER
	<input type="checkbox"/>	20.2203(a)(2)(v)	<input type="checkbox"/>	50.73(a)(2)(i)(A)	<input checked="" type="checkbox"/>	50.73(a)(2)(v)(C)	<input type="checkbox"/>	Specify in Abstract below or in NRC Form 366A		
<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)					

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME Penny S. Oleson	TELEPHONE NUMBER (Include Area Code) 651-267-1750
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
<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)

At 11:55 CST on March 7, 2015, Unit 2 was at Mode 4 when a small cooling water leak was identified on the 21 Containment Fan Coil Unit (FCU) east face U-bend on the northeast corner bottom bundle. Unit 2 Containment was declared inoperable per Technical Specifications (TS) 3.6.1, Condition A, Containment inoperable, applicable in MODES 1, 2, 3, and 4. Immediate actions were taken to isolate the FCU within 1 hour from the initial identification of the leak and Containment was declared operable at 1220 CST on March 7, 2015.

This condition is reportable under 10 CFR 50.72(b)(3)(v)(C): Any event or condition that at the time of discovery could have prevented the fulfillment of the safety function of structures or systems that are needed to control the release of radioactive material. ENS 50870 was submitted at 14:05 CST. The plant remains in a safe condition and there was no effect to the health and safety of the public. The NRC Resident Inspector was notified.

The cause has been determined to be deformation of the FCU faces as a result of freezing of the 21 and 22 FCU faces during a refueling outage in 2013 (2R28). The identified leaking faces were replaced on 03/13/2015. The remaining FCU faces subjected to freezing are scheduled to be replaced during the next Unit 2 refueling outage Fall 2015 (2R29). Increased inspections of the FCUs will remain in effect until corrective actions have been implemented.

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.

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NARRATIVE

The Fan Coil Units (FCUs¹) and associated Cooling Water (CL) system are expected to be leak tight inside containment. On 03/07/2015, Unit 2 was at MODE 4. At 11:55 CST during an inspection of the Unit 2 FCUs in Containment maintenance identified the initial leak on the east lower face of the 21 FCU. Unit 2 Containment was declared inoperable due to a breach of the CL system inside containment (Reference 01469164 in the Corrective Action Program).

During subsequent inspections to validate the leak location and perform an extent of condition, additional leaks were identified on the east upper face of the 21 FCU. Once the CL system was isolated to the 21 FCU Containment, integrity was restored and the 21 FCU was declared inoperable.

On 3/11/2015 Unit 2 was in Mode 5. During an inspection of the 22 FCU, leakage was identified on the south upper face on a copper U-bend. No additional leaks were identified on the 22 FCU. Work orders were utilized to replace both the east upper and east lower 21 FCU faces along with the south upper 22 FCU face.

On 3/13/2015 a leak was reported on the 22 FCU east upper face during restoration. This was documented in the Corrective Action Program (AR 01469614 and 01469995). Subsequent pressure testing of the entire FCU face, including tube to tube sheet leak testing, did not identify any leaks. The pressure test parameters and results were entered into the Corrective Action Program (AR 01470172).

Due to prior FCU leaks, a scheduling task had been added as an interim action to increase frequency of inspections of Fan Coil Units for possible leaks (AR 01463696-01). The increased inspections for both Units started the week of 4/1/2015.

The 21 Containment FCU is considered part of the Containment boundary. There were potential nuclear, radiological, and industrial safety impacts in that this leak could have allowed a radiological release to the environment through the cooling water system in the event of a Design Basis Accident (DBA).

This event is reportable under 50.72(b)(3)(v)(C) as an event or condition that could have prevented fulfillment of a safety function of structures or systems that are needed to control the release of radioactive material.

EVENT ANALYSIS

The Containment Cooling System for each Unit consists of four FCUs located in the Reactor Containment Vessel. The FCU design has 8 faces (1 upper/1 lower per side) for a total of thirty-two faces per Unit. The FCU faces are heat exchangers that are cooled by cooling water or chilled water which cool and dehumidify air as it is pulled through the faces by the fan. The cooled air is then discharged through ductwork to either the containment dome or containment gaps.

¹ EIS System Code - FCU

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The FCUs use CL as the cooling medium which is not isolated in the event of a DBA. The FCUs (and associated CL system) are a pressure boundary for containment and are required to be operable during a DBA.

Freezing of 21 and 22 FCU during 2R28

During the Unit 2 refueling and steam generator replacement outage in the fall of 2013 (2R28), the site utilized a weather curtain outside the Containment Shield Building opening and an air curtain inside the Containment Equipment Hatch to limit the opening size required to move equipment in and out of Containment. This caused outside air to enter both the annulus and Containment whenever equipment was moved in and out of Containment.

On 11/24/2013 the Emergency Response Computer System (ERCS) reported a temperature of 33.8 degrees Fahrenheit for Containment Air. The lowest temperature recorded by the plant that day was 23 degrees Fahrenheit. An OPR was performed which noted there was reasonable assurance that the actual temperature inside containment, and one floor up and 30 feet away from the equipment hatch, had dropped below freezing (32 degree Fahrenheit) on 11/24/2013 (OPR 01410533-07). Both the 21 and 22 FCU are located in this area.

A work order for supplemental Containment heating was put into place to require heating to be blown onto the reactor head and accumulators. The supplemental heat was not for use on the FCUs.

On 12/4/2013, station personnel identified a burst copper U-bend tube on 21 FCU (AR 01409236). The initial investigation did not detect leakage. Both 21 and 22 FCU were isolated at the time with limited water in the FCUs and no water pressure on the FCUs. On 12/12/2013 at 0223 an operator observed leakage from the 21 FCU. A plan was developed to inspect the other FCUs. The operability determination and causal evaluation determined the most probable cause was freezing of the FCU tubing with 11/24/2013 the most probable date the freezing occurred (OPR 01410533-07). Further, the 21 and 22 FCU were the only two of four Unit 2 FCUs that were subjected to freezing temperatures on this date. (01410533-01).

Hydro tests were performed on both the 21 and 22 FCU at 110% of normal operating pressure to determine the extent of leakage on each FCU. The leaks identified using this process were all resolved.

Work orders to replace 21 and 22 FCU faces affected as a result of freezing are scheduled for the next Unit 2 outage in the fall of 2015 (Work Orders 495400 and 509209).

Current Leaks On 21 And 22 FCU Associated With Prior Freezing

All leaks in 2R28 identified during troubleshooting using a pressure test 10% greater than the operating pressure of the CL system were resolved. There is no defined process for pressure testing FCUs following freezing of the tubes as this is outside the design specifications of the system. However, the vendor technical manual for the FCUs does specify pressure test requirements following maintenance repairs at 225 psig.

The leaks identified on the 21 FCU on 3/7/2015 and the 22 FCU on 3/11/2015 were the result of continued effects of stress as a result of freezing in 2R28. These leaks were not apparent in 2R28 and did not occur during pressure testing at 110% of operating pressure. Therefore, the pressure testing in 2013 of the leaking FCU faces at 110% of operating pressure was not sufficient to address future degradation.

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On 3/13/2015 the site replaced the 21 FCU east upper and lower face and 22 FCU south upper face ahead of the scheduled work orders in the upcoming Unit 2 outage (Work Orders 495400-01 and 518759-01). The remaining 21 and 22 FCU faces affected by the freezing, but not currently leaking, are scheduled to be replaced in the next refueling outage (2R29). Interim actions to detect FCU leaks are in place with the increased frequency of FCU inspections.

SAFETY SIGNIFICANCE

The FCU is considered part of the Containment boundary and a leak could cause a breach to this boundary which could result in radioactive release from Containment into the CL system and off-site dose to the public during a DBA.

In the event of an accident, the cooling water supply and return isolation valves position to full open to satisfy their safeguards function. In the event of FCU or associated piping rupture, the containment remote manual motor operated isolation valves would be closed to prevent the entry of non-borated water into containment. Pressure against the closed isolation valves is maintained by equalizing lines. The water supply for this "seal" is provided by the cooling water system pumps (3 motor driven and 2 diesel driven) which take suction from the Mississippi River.

The Containment Air Cooling System is sized such that any three fan coil units will provide adequate heat removal capacity from the Reactor Containment during normal and full-power operation to maintain interior air temperatures below the maximum temperature allowable at any component, and to obtain temperatures below 104 degrees Fahrenheit in accessible areas during hot standby operation. The fan coil units are also used for emergency cooling under post-accident conditions.

On 3/7/2015, the CL leak was isolated within 1 hour from the initial confirmation of the leak. The leak was minimal and contained within the water box of the 21 FCU. The health and safety of the public were not affected.

Additional pressure tests were performed on both 21 and 22 FCUs to address all leaks. There is a moderate risk of having a recurrence of through wall tube leaks on the remaining 21 and 22 FCU faces affected by freezing until the scheduled replacement in 2R29 (Fall 2015). Therefore, interim actions to address the condition include increased frequency of inspections for Unit 2 FCU leakage (PMCR-1464844 (U2)).

CAUSE

The cause has been determined to be a result of freezing of the FCU faces during a refueling outage in 2013 (2R28). The leaks were caused by tubes that had been stressed during the freezing in 2013 but were not actively leaking at normal CL pressure. The pressure testing in 2013 of the leaking FCU faces at 110% of operating pressure was not sufficient to address future degradation.

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CORRECTIVE ACTION

On 3/13/2015 the 21 FCU East upper and lower face and the 22 FCU south upper face were replaced.

The remaining 21 and 22 FCU faces affected by the freezing, but not currently leaking, are scheduled to be replaced in the next refueling outage (2R29). Interim actions to detect for FCU leaks are in place with the increased frequency of FCU inspections.

PREVIOUS SIMILAR EVENTS

The following events are FCU related; however, the cause of the 21 FCU leak is not similar to those previously reported.

LER 50-282/2015-002-00, 14 Containment Fan Coil Unit (FCU) Leak (lower head). The causal evaluation determined there is an inadequate design of cooling water (CL) connection to the FCU which allows for misalignment and leakage.

LER 50-282/2015-001-00, 14 Fan Coil Unit Leak (Lower face on northwest corner). The causal evaluation for this event determined that the 45 ft-lbs torque value chosen by site based on the 23 Containment FCU gasket leak, resulted in allowable torque margin to stop leakage post-maintenance, but did not prevent it from occurring on 14 Containment FCU in November 2014.

LER 50-306/2014-002-00, 23 Fan Coil Unit Lower Northeast Face Corner Gasket Leaking. The 23 Containment FCU gasket leak is similar to the 14 Containment FCU header gasket leaks. The revised torquing value of 45 ft-lbs under the CAPR was ineffective, that caused a leak to occur on 14 Containment FCU gasket.

On May 20, 2012, with Unit 2 in Mode 5, a leak was identified on 23 Containment FCU, CL flange, gasket. Per the Work Order, the gasket removed for the FCU to CL flange that was leaking on the 23 FCU was inspected and found to be in good condition. The CL pipe flanges were also inspected during the leak repairs. The sealing surfaces were experiencing heavy pitting. The Cooling Water piping at this joint is constructed of carbon steel. Carbon steel is susceptible to corrosion and can cause pitting on unprotected surfaces. The most likely cause of the leak on the 23 FCU was pitting of the pipe flange mating surfaces.

On October 24, 2012, with Unit 1 in Mode 4, a gasket leak was identified on the #1 face of the 12 Containment FCU. The most likely cause of the leak on the 12 FCU was exceeding the service life of the header box gasket.