Xcel Energy®

AUG 05 2015

L-PI-15-066
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
Renewed License No. DPR-60

Licensee Event Report (LER) 50-306/2015-003-00, Unit 2 Turbine/Reactor Trip – Low Bearing Oil Pressure

Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM"), encloses Licensee Event Report (LER) 50-306/2015-003-00, Unit 2 Turbine/Reactor Trip – Low Bearing Oil Pressure

Summary of Commitments

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

Scott Sharp FOR Kevin Davison

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

Enclosure

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

LICENSEE EVENT REPORT 50-306/2015-003-00

3 pages follow

NRC FORM 366 (01-2014) | U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 | EXPIRES: 01/31/2017

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	2. DOCKET NUMBER	3. PAGE
Prairie Island Nuclear Generating Plant Unit 2	05000 - 306	1 OF 3

4. TITLE

Unit 2 Turbine/Reactor Trip – Low Bearing Oil Pressure

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
										05000
6	7	2015	2015	– 003	– 00	8	5	2015	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

Mode 1

10. POWER LEVEL

100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☑ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Penny S. Oleson	651-267-1750

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

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE). ☑ NO				

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

On June 7, 2015, at 0735, the Unit 2 Reactor automatically tripped while operating at 100 percent power due to an automatic Turbine trip due to low bearing oil pressure. The crew entered the reactor trip emergency operating procedure and stabilized the unit in Mode 3 at normal operating pressure and temperature. All control rods fully inserted into the core following the trip. All safety functions operated as designed. The automatic reactor 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 returned to normal. There was no effect on Unit 1 as a result of this trip.

Normal bearing oil discharge pressure is approximately 19 psi when the turbine is at 1800 rpm and oil is being supplied from the main oil pump. The turbine will trip when 2 out of 3 bearing oil pressure instruments reach 6 psi. Troubleshooting performed in support of the event identified a cracked and broken weld on a reducing flange for the line that supplies high pressure oil to the Seal Oil skid and Auto Stop Oil. This was the component that failed and resulted in the loss of pressure to the turbine oil bearings. Corrective actions taken included repairing the broken weld, restoring the oil skid to operation, performing an extent of condition evaluation, and entering separate corrective actions to inspect piping connections in the Unit 1 and Unit 2 turbine oil reservoirs.

NARRATIVE

On June 7, 2015, Unit 2 Turbine Bearing Oil Pressure was normal at approximately 19 psig. At approximately 05:00, the Unit 2 Turbine Bearing Oil Pressure started to decrease. The Unit 2 Turbine Bearing Oil Pressure decreased at an increasing rate until at 07:35 oil pressure sharply decreased from approximately 17.7 psi to a level that required a turbine trip (trip setpoint is 6 psi). Unit 2 Turbine Bearing Oil Pressure quickly recovered from a low point as indicated on Emergency Response Computer System (ERCS) of 4.3 psi at 07:36:19 to above 16 psi at 07:36:21. Turbine Bearing Oil Pressure was able to be maintained by the Turning Gear Oil Pump while the turbine was on turning gear at a nominal pressure of 21 psi. The Unit 2 Turbine was removed from the turning gear at 00:30 on June 8, 2015. The oil system was shut down a short time thereafter. Oil was drained from the Unit 2 Turbine Oil Reservoir on June 8, 2015 at 06:00. As a result of the investigation, the site identified a circumferential crack on a welded joint upstream of check valve 2T0-303 on June 8, 2015 at 18:23. (Corrective Action Program (CAP) Action Request (AR) 1482236). The weld was repaired by Work Order 524416-06 on June 10, 2015.

The Auxiliary Feedwater System[1] 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 was reportable per 10 CFR 50.72(b)(3)(iv)(A). Steam generator levels returned to normal. Auxiliary Feedwater was secured.

EVENT ANALYSIS

Troubleshooting performed in support of the event identified a cracked and broken weld on a reducing flange for the line that supplies high pressure oil to the Seal Oil skid and Auto Stop Oil (Direct Cause). This was the component that failed and resulted in the loss of pressure to the turbine oil bearings.

A Failure Modes and Effects Analysis (FMEA) was performed using available information. The component that failed was not available for inspection in support of the FMEA development as it was required to be reused to restore the system. New spare parts were not available.

Under WO 524416, the site ground the failed welded fitting, repaired damaged material, and reused the reducing flange. The site discovered that the weld that had broken lacked weld penetration and had significant voids in the weld. There also appears to be a brittle failure of some of the base metal of the flange. However, the majority of the failure occurred in the weld region.

The turbine oil reservoir and associated components and piping were supplied as a skid from Westinghouse with no unique equipment identifiers for the piping or valves inside the reservoir. Based on the condition of the weld on the reducing flange, it is most likely an original weld. If there was frequent inspection, the added stress applied during the disassembly process could contribute to the failed weld; therefore, maintenance history for the check valves was reviewed to determine how often they were inspected. The check valve nearest to the failure, 2T0-303, appears never to have been inspected. Another small check valve near the failure, 2T0-304, had only been inspected once. Therefore, inspection of these check valves did not likely contribute to this

[1] EIIS System Code – BA

failure. Additionally, as there is no evidence that 2T0-303 has previously been disassembled, changes in gasket thickness from original configuration during reassembly is also not a probable cause for the failure.

The piping and welds for the section of piping from check valve 2T0-303 to the downstream orifice were replaced due to the poor quality of welds. Additional inspections will be performed on other welds in the turbine oil reservoir to ensure similar conditions do not exist.

SAFETY SIGNIFICANCE

This event did not challenge nuclear safety as all plant systems responded as designed. The automatic reactor trip occurred as designed because of the automatic turbine trip. There were no radiological, environmental, or industrial impacts associated with this event. The health and safety of the public and site personnel were not at risk at any time during this event.

CAUSE

Poor weld quality reduced the strength of the welded connection resulting in a broken weld at the connection of the main oil pump discharge to the high pressure seal oil supply. This resulted in a diversion of oil flow from the bearing oil supply piping. The poor weld quality combined with the normal stresses that occur in an operating system over the life of the plant led to the failure of the weld.

CORRECTIVE ACTION

- Perform weld repair, internal Unit 2 turbine oil reservoir piping. Complete (Work Order 524416-06).
- Inspect piping connections in the Unit 2 Turbine Oil Reservoir to determine if the fit up is appropriate and inspect welds for cracks (CA 1482090-11).
- Inspect piping connections in the Unit 1 Turbine Oil Reservoir to determine if the fit up is appropriate and inspect welds for cracks (CA 1482090-12).

PREVIOUS SIMILAR EVENTS

None.