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L-PI-15-032
10 CFR 50.73

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

Prairie Island Nuclear Generating Plant Units 1 and 2
Dockets 50-282 and 50-306
Renewed License Nos. DPR-42 and DPR-60

Licensee Event Report (LER) 50-282/2014-004-01, Lack of Appropriate Fuse Protection for Emergency Oil Pump Control Circuit

Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM"), encloses LER 50-282/2014-004-01, Lack of Appropriate Fuse Protection for Emergency Oil Pump Control Circuit.

The LER supplement clarifies why the legacy condition occurred, adds details to the safety significance section regarding the cabling and fire areas affected, and removes corrective action information not related to the direct cause.

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 50-282/2014-004-01

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 (PINGP) Unit 1	05000 - 282	1 OF 3

4. TITLE

Unanalyzed Condition Due To Lack of Appropriate Fuse Protection - Supplement

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
8	8	2014	2014	– 004 –	01	03	31	2015	PINGP Unit 2	05000-306
									FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

Unit 1 - Mode 1
Unit 2 - Mode 1

10. POWER LEVEL

Unit 1 - 100%
Unit 2 - 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)
Frank Sienczak	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-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE). ☑ NO

15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

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

On August 8, 2014, the Appendix R program engineer identified a licensee reportable legacy issue. As a result of external industry operating experience, a drawing review was performed and it was determined that the control circuits for the DC Emergency Oil Pumps for both Unit 1 and Unit 2 are not fused properly. Therefore, an overload within the control circuit could result in a fire that could propagate to multiple fire areas affecting safe shutdown equipment that could be compromised, which affects the 10 CFR 50 Appendix R safe shutdown analysis. Based on this information, the determination was made that this condition meets the reporting criteria for 10 CFR 50.73(a)(2)(ii)(B), any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety.

The causal evaluation determined that the plant designer did not fuse the DC Emergency Oil Pump circuit separate from the power cables because they were concerned that inadvertent fuse failure would fail the DC Emergency Oil Pump and damage the turbine bearings. Inconsistency in manufacturing of fuses at the time of design could lead to some fuses failing open even if the conditions should not have caused the fuse to fail open.

Corrective Actions have been initiated to modify the DC Emergency Oil Pump control circuit over-current protection to protect the control circuit from over-current conditions and perform an evaluation of the Service Building DC system to determine if there are other instances where protection was sacrificed for reliability.

NARRATIVE

On August 8, 2014, the Appendix R program engineer identified a licensee reportable legacy issue. As a result of external industry operating experience, a drawing review was performed and it was determined that the control circuits for the DC Emergency Oil Pumps[1] for both Unit 1 and Unit 2 are not fused properly. Therefore, an overload within the control circuit could result in a fire that could propagate to multiple fire areas affecting safe shutdown equipment that could be compromised, which affects the Appendix R safe shutdown analysis.

Based on this information, the determination was made that this condition meets the reporting criteria for 10 CFR 50.73(a)(2)(ii)(B), any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety. Compensatory measures were already in place in accordance with F5 Appendix K, Fire Protection Systems Functional Requirements, for impaired fire protection equipment. The hourly fire watch was in place in the affected locations as a result of previous conditions.

The unanalyzed conditions that challenged the Appendix R safe shutdown analysis were identified at several stations during extent of condition reviews of operating experience. The condition occurred because of inadequate overcurrent protection in the original plant wiring design. These direct current (DC) circuit[2] vulnerabilities conflict with the requirements of Title 10 CFR Part 50 Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979 for common enclosure.

[1] IEEE Component Code - P
[2] EIIS System Code – EI

EVENT ANALYSIS

This condition is a legacy design issue that does not provide control power fuses for the control circuit for the DC Emergency Oil Pumps.

When the DC Emergency Oil Pump was designed and installed the philosophy was to maximize the reliability and availability of certain "last line of defense" oil pumps; therefore, fuses were not included in the control circuit for the emergency oil pump to eliminate the failure mode of inadvertent fuse failure. This philosophy of minimum electrical protection for maximum reliability/availability was applied for "last line of defense" systems.

SAFETY SIGNIFICANCE

The regulatory consequence of this issue is a licensee event report since the requirements of 10 CFR 50 Appendix R were not met. There were no actual nuclear, industrial, or environmental consequences because a fire did not occur and damage credited safe shutdown equipment. The potential nuclear consequence is that a fire could affect cables in multiple fire areas where redundant safe shutdown equipment is located which could impact the credited safe shutdown equipment. In the event of a fire in the circuitry, the DC Emergency Oil Pump control circuit could result in a fire in multiple fire areas.

The deficiency could have led to the inability of operators to take manual action to shut down the plant in the event of a fire. However, the following fire protection features would have provided the defense-in-depth necessary to compensate for the deficiency.

The affected cables are located in Fire Areas 13, 18, 58/73, 31, 32, 69 and 70:

- Fire Area 13 - Control room does not have an automatic suppression system but has a functional ionizing fire detection system installed in the area and is continually occupied.

- Fire Area 18- Relay and Cable Spreading Room has an automatic total room flooding carbon dioxide fire suppression system and a functional ionizing fire detection system installed in the area.
- Fire Areas 58/73 - 695' Aux Building do not have an automatic suppression system installed in the area where the affected cables are routed, but has a functional ionizing fire detection system installed in the area.
- Fire Areas 31 and 32- Aux Feedwater Pump rooms do have an automatic wet-pipe fire suppression system installed in the area where the cables are routed, and has a functional ionizing fire detection system installed in the area.
- Fire Areas 69 and 70- Unit 1 and Unit 2 Turbine Building do have automatic wet-pipe fire suppression systems installed in these areas where the affected cables are routed, and has a functional ionizing fire detection system installed in the areas.

Additionally, the fire barriers between these areas are rated for greater than 20 minutes as listed in the fire hazard analysis and compensatory measures were already in place in accordance with F5 Appendix K, Fire Protection Systems Functional Requirements, for impaired fire protection equipment.

CAUSE

The designer did not fuse the DC Emergency Oil Pump control circuit separate from the power cables because they were concerned that inadvertent fuse failure would fail the DC Emergency Oil Pump and damage the turbine bearings. This design deliberately eliminated inadvertent fuse failure as failure mode for the pump. Inconsistency in manufacturing of fuses at the time of design could lead to some fuses failing open even if the conditions should not have caused the fuse to fail open.

CORRECTIVE ACTIONS

Immediate action taken: an hourly fire watch was established as a compensatory measure for this condition in accordance with procedure F5 Appendix K, Fire Protection Systems Functional Requirements.

Corrective Action (CA) has been initiated to modify the DC Emergency Oil Pump control circuit over-current protection. The recommended modification is to install control power fuses that will protect the control circuit from over-current conditions.

Corrective Action (CA) was performed to evaluate the Service Building DC system to determine if there are other instances where protection was sacrificed for reliability. No other instances were identified.

PREVIOUS SIMILAR EVENTS

None.