



January 28, 2011

L-PI-11-003
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
License Nos. DPR-42 and DPR-60

LER 50-282/2010-004-00, Battery Charger Inoperability due to Potential Undervoltage Conditions

Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, herewith encloses Licensee Event Report (LER) 50-282/2010-004-00.

Summary of Commitments

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

A handwritten signature in black ink that reads 'Kevin Davison'.

Kevin Davison
Plant Manager, Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Prairie Island Nuclear Generating Plant (PINGP), USNRC
Resident Inspector, PINGP, USNRC
Department of Commerce, State of Minnesota

ENCLOSURE

LICENSEE EVENT REPORT 50-282/2010-004-00

4 Pages Follow

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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, (3150-0066), 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 Prairie Island Nuclear Generating Plant Unit 1	2. DOCKET NUMBER 05000 282	3. PAGE 1 OF 4
---	--------------------------------------	--------------------------

4. TITLE
Battery Charger Inoperability due to Potential Undervoltage Conditions

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
10	22	2010	2010	004	00	01	28	2011	Prairie Island Unit 2	05000 306
									FACILITY NAME	DOCKET NUMBER
										05000

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 checked="" type="checkbox"/> 50.73(a)(2)(vii)						
10. POWER LEVEL 100%	<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 checked="" 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 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 checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A						

12. LICENSEE CONTACT FOR THIS LER

NAME Jon Anderson	TELEPHONE NUMBER (Include Area Code) 651.388.1121 x7309
----------------------	--

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
<input type="radio"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE).	<input checked="" type="radio"/> NO			

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

Safety related battery chargers have the potential to stop providing an output, or "lock up", if their AC input voltage drops below their nameplate minimum voltage of 90% of 480V at the battery charger Motor Control Center. Exact voltage, duration of voltage dip, and charger loading conditions which cause lock up of chargers are unknown. If a reduction in input voltage results in a battery charger locking up, the battery charger will not be able to recharge the battery from a partially discharged state unless operator actions are taken to restore the battery charger.

On October, 22, 2010, an operability determination concluded that specific Design Basis Accident scenarios may include this undervoltage condition which could cause the battery chargers to lock up. The design basis requirements of the safeguards battery are such that it can carry expected shutdown loads for the DC system for one hour. Compensatory measures in the form of new operator actions have been put in place to support restoration of the battery chargers within this timeframe.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO	
Prairie Island Nuclear Generating Plant Unit 1	05000 282	2010	- 004	- 00	2 OF 4

EVENT DESCRIPTION

At the Prairie Island Nuclear Generating Plant (PINGP), the safeguards 125 VDC Electrical Power System¹ for each unit consists of two independent and redundant safety related DC electrical power subsystems (Train A and Train B). 125 VDC Subsystems 11 and 12 serve Unit 1 and 125 VDC Subsystems 21 and 22 serve Unit 2. Each subsystem consists of one 125 VDC battery, battery charger, and associated distribution equipment.

The 125 VDC Systems supply instrumentation, control, and motive power to safety related equipment. Redundant safety related equipment is divided between the two DC subsystems associated with each unit such that the loss of one DC subsystem does not affect redundant circuits.

There are five safeguards battery chargers, one per 125 VDC Subsystem plus one portable battery charger. The installed battery chargers are supplied from the associated safeguards 480 VAC System Motor Control Center (MCC)². The battery chargers supply DC electrical power to the connected loads while maintaining the safeguards batteries in a fully charged condition during normal operation.

Safety related battery chargers have the potential to stop providing an output, or "lock up", if their AC input voltage drops below their nameplate minimum voltage of 90% of 480V at the battery charger MCC. Exact voltage, duration of voltage dip, and charger loading conditions which cause lock up of chargers are unknown. On October 22, 2010, an operability determination concluded that specific Design Basis Accident (DBA) scenarios may include this undervoltage condition which could cause the battery chargers to lock up. Compensatory measures were put in place to restore the battery chargers in the event of battery charger lock up.

The past operability review performed in December of 2010 concluded that there is reasonable doubt that the battery chargers would have performed their safety functions if called upon during the scenarios discussed in the October 22, 2010 operability determination. On December 23, 2010, with PINGP Units 1 and 2 operating in MODE 1 at 100% power, this condition was reported via ENS Notification #46508.

The reported condition represents inoperability of the battery charger in both trains of the 125 VDC Electrical Power System. This is reportable as common-cause inoperability of independent trains or channels under 10 CFR 50.73(a)(2)(vii), a condition that could have prevented fulfillment of a safety function under 10 CFR 50.73(a)(2)(v)(D), and an unanalyzed condition under 10 CFR 50.73(a)(2)(ii)(B).

¹ EIIS System Code: EJ

² EIIS System Code: ED

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER	3. PAGE
Prairie Island Nuclear Generating Plant Unit 1	05000 282	YEAR 2010 - SEQUENTIAL NUMBER 004 REV NO - 00	3 OF 4

EVENT ANALYSIS

Review of analytical documentation identified two DBA scenarios in which the battery charger's AC input voltage could reach values low enough to cause the chargers to lock up. The DBA scenarios are 1) Safety Injection (SI) with Loss of Offsite Power (LOOP) and 2) SI without LOOP. A condition evaluation found that voltages calculated during the DBA for a dual unit trip with one unit in Safety Injection (SI) and the other unit in Hot Shutdown may result in a voltage dip of 80% or below at one or more battery charger MCC's depending on the plant distribution system configuration and grid system conditions. 80% was used in the evaluation based on past integrated SI test SP1083 test data and conditions in which the 12 Battery Charger experienced lock up. The evaluation also concluded that during an SI, when powered by any of the emergency diesel generators³, the potential exists for the battery chargers to experience inadequate input voltage that could cause them to lock up due to out of sequence loading occurring. The evaluation concluded that this would only affect the battery chargers that are on an SI unit during a LOOP and would not affect the battery chargers on the non-SI unit.

If a reduction in input voltage results in battery charger lock up, the battery charger will not be able to recharge the battery from a partially discharged state without manual action. The design basis requirements of the safeguards battery is such that it can carry expected shutdown loads for the DC system for one hour. However, a specific battery charger would not be able to recharge the battery or supply its emergency loads if it locks up and is not restarted before minimum battery terminal voltage is reached. Operator actions would need to be taken to restore the battery charger.

Procedure changes have been made to support restoration of the battery charger. Emergency procedures were revised to verify that battery charger operation is normal. Abnormal operating procedures were revised to add specific guidance to restore the battery chargers. Staffing concerns have been addressed by designating a Battery Charger Watch.

The condition described in this LER represents a Safety System Functional Failure reportable under 10 CFR 50.73(a)(2)(v)(D).

SAFETY SIGNIFICANCE

Under certain undervoltage conditions, the battery chargers may lock up. As discussed above, the safety related batteries have design basis requirements to carry expected shutdown loads for the DC system for one hour. Operating procedures were in place to give guidance to restart the battery chargers if a voltage transient had occurred.

³ EIS System Code: EK

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO	
Prairie Island Nuclear Generating Plant Unit 1	05000 282	2010	- 004	- 00	4 OF 4

CAUSE

A 1994 design change replaced the battery chargers. The new chargers were susceptible to the lock up condition as described above. The potential for the battery chargers to lock up was not detected by post-modification testing.

CORRECTIVE ACTION

To address staffing concerns, the responsibilities of a designated Battery Charger Watch were outlined in an operating procedure. Procedure changes have been made to support restoration of the battery chargers.

A modification will be installed during or prior to the Unit 1 2011 refueling outage to ensure that 12 Battery Charger will perform its design function. Additional steps to resolve the existing non-conforming condition on the remaining battery chargers are being driven by the corrective action program.

PREVIOUS SIMILAR EVENTS

LER 50-282/2010-005-00 was submitted on November 8, 2010. This LER reported the failure to complete Surveillance Requirements (SR) as required by TS.

SR 3.8.1.10(c) is partially fulfilled by the performance of SP 1083. In 1997, during performance of the Integrated SI test for Unit 1, the 12 Battery Charger stopped running (due to undervoltage conditions) after bus restorations. In 1999, SP1083 was changed to turn off the 12 Battery Charger during the performance of the SP. In September of 2010, site personnel determined that the SP 1083 testing configuration did not fulfill the TS requirements.

In October of 2010, additional evaluations were completed to review the extent of the condition experienced by 12 Battery Charger for other voltage support considerations for all four station Battery Chargers. These evaluations identified the condition reported in this LER.