



**Nebraska Public Power District**

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NLS2016037

June 27, 2016

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555-0001

Subject: Licensee Event Report No. 2016-002-00  
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to forward Licensee Event Report 2016-002-00.

There are no new commitments contained in this letter.

Sincerely,

Oscar A. Limpas  
Vice President Nuclear-  
Chief Nuclear Officer

/dv

Attachment: Licensee Event Report 2016-002-00

cc: Regional Administrator w/attachment USNRC - Region IV	NPG Distribution w/attachment
Cooper Project Manager w/attachment USNRC - NRR Plant Licensing Branch IV-2	INPO Records Center w/attachment via ICES entry
Senior Resident Inspector w/attachment USNRC - CNS	SORC Chairman w/attachment
SRAB Administrator w/attachment	CNS Records w/attachment

IE 22  
NRR



**LICENSEE EVENT REPORT (LER)**  
(See Page 2 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 FOIA, Privacy and Information Collections 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.

<b>1. FACILITY NAME</b> Cooper Nuclear Station	<b>2. DOCKET NUMBER</b> 05000298	<b>3. PAGE</b> 1 of 4
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**4. TITLE**  
De-Energized High Pressure Coolant Injection Auxiliary Lube Oil Pump Caused By Light Bulb Failure Results in Loss of Safety Function

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
04	26	2016	2016	002	00	06	27	2016	FACILITY NAME	DOCKET
										05000
										05000

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (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)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<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)	<input checked="" 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)(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)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
<b>10. POWER LEVEL</b> 100	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<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)(C)	<input type="checkbox"/> 73.77(a)(1)
	<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)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

LICENSEE CONTACT Jim Shaw, Licensing Manager	TELEPHONE NUMBER (Include Area Code) (402) 825-2788
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**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
B	BJ	IL	N431	Y					


<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b> MONTH: DAY: YEAR:
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**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On April 26, 2016, it was noted that the green off light for High Pressure Coolant Injection (HPCI) auxiliary lube oil pump (ALOP) in the Control Room, was not illuminated. A non-licensed operator was dispatched to the HPCI ALOP starter and reported the green bulb appeared to have shattered in the socket. HPCI was declared inoperable at 1754 Central Daylight Time (CDT) resulting in entry into Technical Specifications Limiting Condition of Operation 3.5.1, Condition C, HPCI System Inoperable.

Investigation found the 125 volts direct current fuse open circuited and the local indication green light and socket were damaged. The cause of the failure was determined to be a lack of engineering knowledge which led to a design change in 1984 in the HPCI ALOP starter circuitry that diminished the robustness of the circuit with respect to a specific failure modality; direct short circuiting within the indication bulb itself. The HPCI system was restored to operable status on April 28, 2016, at 1245 CDT.

This event is being reported as a loss of safety function due to HPCI being a single-train safety system. The potential safety consequences of this event were minimal due to the limited duration the condition existed and the redundant/diverse core cooling systems which remained operable.

NRC FORM 366A	U.S. NUCLEAR REGULATORY COMMISSION (11-2015)	APPROVED BY OMB: NO. 3150-0104 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 FOIA, Privacy and Information Collections 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.	EXPIRES: 10/31/2018	
 <b>LICENSEE EVENT REPORT (LER) CONTINUATION SHEET</b>				
<b>1. FACILITY NAME</b>  Cooper Nuclear Station	<b>2. DOCKET NUMBER</b>  05000- 298	<b>3. LER NUMBER</b>		
		YEAR  2016	SEQUENTIAL NUMBER  - 002	REV NO.  - 00
<b>NARRATIVE</b>				
<b>PLANT STATUS</b>				
Cooper Nuclear Station (CNS) was in Mode 1, Power Operation, at 100 percent, steady-state power at the time the condition was identified. Service Water Pump "B" and Service Water Booster Pump "B" were inoperable when HPCI (High Pressure Coolant Injection) was inoperable. No other emergency core cooling systems were inoperable during the event.				
<b>BACKGROUND</b>				
The HPCI System (EIS:BJ) provides protection to the core for the case of a small break in the reactor coolant pressure boundary which does not result in rapid depressurization of the reactor vessel (EIS:RPV). The HPCI System permits the nuclear plant to be shutdown while maintaining sufficient reactor vessel water inventory until the reactor vessel is depressurized. The HPCI System continues to operate until reactor vessel pressure is below the pressure at which Low Pressure Coolant Injection (EIS:BO) operation or Core Spray System (EIS:BM) operation can be used to maintain core cooling.				
HPCI consists of a steam turbine assembly (EIS:TRB) driving a multi-stage booster and main pump assembly (EIS:P) and system piping, valves, controls and instrumentation. The HPCI turbine is driven by steam from the reactor which is generated by decay and residual heat.				
A control governor (EIS:65) receives a HPCI flow signal and adjusts the turbine steam control valve (EIS:SCV) so that HPCI design pump discharge flow rate is obtained. The flow signal used for automatic control of the turbine is derived from a differential pressure measurement across a flow element (EIS:FE) in the HPCI pump discharge pipeline. The governor controls the pressure applied to the hydraulic operator of the turbine control valve, which, in turn, controls the steam flow to the turbine.				
Upon receipt of the actuation signal, the auxiliary oil pump starts, providing hydraulic pressure for the turbine stop valve and turbine control valve hydraulic operator. The flow signal will ramp the control governor until rated flow is achieved. As hydraulic oil pressure is developed, the turbine stop valve and the turbine control valve open simultaneously and the turbine accelerates toward the speed setting of the control governor. As HPCI flow increases, the flow signal adjusts the control governor setting so that design flow is maintained.				
<b>EVENT DESCRIPTION</b>				
On April 26, 2016, while performing a walkdown of Control Room panels, it was noted that the green off light for HPCI auxiliary lube oil pump (ALOP) was not illuminated. The bulb was replaced and the replacement bulb did not illuminate. A non-licensed operator was dispatched to the HPCI ALOP starter and reported the green bulb was broken and appeared to have shattered in the socket. An attempt was made to start the ALOP with the control switch and the pump did not start. The ALOP is required to start in order to open the steam admission valves for the HPCI turbine. The HPCI system was declared inoperable at 1754 Central Daylight Time (CDT) resulting in entry into Technical Specifications (TS) Limiting Condition of Operation 3.5.1, Condition C, HPCI System Inoperable.				

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<b>1. FACILITY NAME</b> Cooper Nuclear Station		<b>2. DOCKET NUMBER</b> 05000- 298		<b>3. LER NUMBER</b> <table border="1"> <thead> <tr> <th>YEAR</th> <th>SEQUENTIAL NUMBER</th> <th>REV NO.</th> </tr> </thead> <tbody> <tr> <td>2016</td> <td>- 002</td> <td>- 00</td> </tr> </tbody> </table>		YEAR	SEQUENTIAL NUMBER	REV NO.	2016	- 002	- 00
YEAR	SEQUENTIAL NUMBER	REV NO.									
2016	- 002	- 00									
<b>NARRATIVE</b> <p>Investigation found the 125 volts direct current (VDC) fuse open circuited and the local indication green light and socket were damaged. The green bulb and socket were replaced as well as the red bulb. The 125 VDC fuses were also replaced. The HPCI system was restored to operable status on April 28, 2016, at 1245 CDT after post work testing had been satisfactorily completed.</p> <p>Examination of the local green indication bulb and socket, and a review of the circuit schematic found that the light did not have a dropping resistor. In this circuit, a dropping resistor helps prevent the fuse in the HPCI ALOP control circuit from opening by limiting current in the indication bulb side of the circuit if a short circuit in the bulb were to occur.</p> <p>The original HPCI starter circuit utilized a local indication light with a dropping resistor. The circuit was modified in 1984 by the vendor to accommodate environmental requirements. A direct voltage light and socket were substituted for the dropping resistor and light combination. Consequently, if the indication light were to short it would open circuit the 125 VDC portion of the starter circuit. The commercial grade bulb that failed was a 3 watt bulb with a 120MB base style.</p> <p><b>BASIS FOR REPORT</b></p> <p>The HPCI System is a single train safety system. This condition is reportable in accordance with 10 CFR 50.73(a)(2)(v) as "any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to...(D) Mitigate the consequences of an accident." The event was reported as Event Notification Number 51886.</p> <p><b>SAFETY SIGNIFICANCE</b></p> <p>This is a Safety System Functional Failure. There were no actual safety consequences associated with this event. The potential safety consequences of this event were minimal due to the limited duration the condition existed and the redundant/diverse core cooling systems which remained operable. The HPCI ALOP performance had been previously tested satisfactory at 1312 CDT on the day of the failure. The HPCI system is an emergency core cooling system designed to inject water into the reactor vessel to provide core cooling. The total duration of inoperability, including the time prior to discovery of the condition was less than the 14 day Technical Specification Completion Time. During the time period of inoperability, other core cooling systems (Automatic Depressurization System, Core Spray, and Low Pressure Coolant Injection) were operable and would have adequately responded to a design basis event. The Reactor Core Isolation Cooling system was also operable during this event.</p> <p><b>CAUSE</b></p> <p>A lack of engineering knowledge led to a design change in 1984 in the HPCI ALOP starter circuitry that diminished the robustness of the circuit with respect to a specific failure modality; direct short circuiting within the indication bulb itself.</p>											

<b>NRC FORM 366A</b>	<b>U.S. NUCLEAR REGULATORY COMMISSION</b> (11-2015)	<b>APPROVED BY OMB: NO. 3150-0104</b> 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 FOIA, Privacy and Information Collections 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.	<b>EXPIRES: 10/31/2018</b>
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CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Cooper Nuclear Station	05000- 298	YEAR	SEQUENTIAL NUMBER	REV NO.
		2016	- 002	- 00

**NARRATIVE**

**CORRECTIVE ACTIONS**

Develop and implement training to the engineering population with respect to this failure modality. The training will be given to the engineering population in the next available Engineering Support Program training sessions, and will be incorporated into initial training for new-hire engineers.

**PREVIOUS EVENTS**

LER 2016-001-00 - On April 25, 2016, HPCI was declared inoperable due to a failure of the HPCI ALOP. An electrical relay in the starter circuit prematurely failed after only 133 hours of operation.

LER 2013-001-00 - A review of industry operating experience identified a susceptibility for unfused remote Direct Current Ammeter Circuits causing a secondary fire due to multiple fire induced faults.