



Nebraska Public Power District

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NLS2016077
December 19, 2016

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

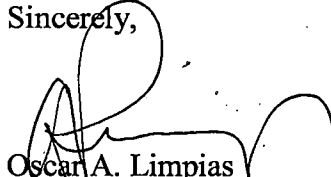
Subject: Licensee Event Report No. 2016-007-00
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to forward Licensee Event Report 2016-007-00.

There are no new commitments contained in this letter.

Sincerely,



Oscar A. Limpas
Vice President Nuclear-
Chief Nuclear Officer

/jo

Attachment: Licensee Event Report 2016-007-00

cc: Regional Administrator w/attachment USNRC - Region IV	NPG Distribution w/attachment
Cooper Project Manager w/attachment USNRC - NRR Plant Licensing Branch IV	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

IE22
NRR



LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R 3 for instruction and guidance for completing this form
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 e-mail to Infocollections.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.

1. FACILITY NAME

Cooper Nuclear Station

2. DOCKET NUMBER

05000298

3. PAGE

1 of 4

4. TITLE

Isolation of Shutdown Cooling due to Relay Maintenance Results in a 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	
10	28	2016	2016	007	00	12	19	2016	FACILITY NAME	DOCKET	
										05000	
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)								
5			<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 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)
10. POWER LEVEL 000			<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

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	TO EPIX
B	BO	RLY	GE	Y					

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 October 28, 2016, during replacement of relay PCIS-REL-K27 at Cooper Nuclear Station (CNS), the action of installing a new relay onto the shared plastic DIN rail disturbed the mounting rail in a manner that caused contacts of the adjacent relay, PCIS-REL-K30, to open. This caused Shutdown Cooling (SDC) isolation valve RHR-MO-17 to close, which actuated the logic to trip the running 'A' Residual Heat Removal (RHR) pump.

Operations declared 'A' RHR SDC subsystem inoperable at 09:24 hours and entered Limiting Condition for Operation (LCO) 3.9.7, Condition A, and Condition C. Alternate Decay Heat Removal remained in service throughout the event. Event Notification 52327 was made to the Nuclear Regulatory Commission Operations Center.

While SDC was out of service, PCIS-REL-K27 work was completed. SDC was declared operable at 05:30 hours on October 29, 2016, and was placed in service at 18:30 hours, and the LCO was exited.

The root cause of the event is that CNS did not identify the risk from mechanical agitation during Primary Containment Isolation System (PCIS) relay installation; therefore, the risk was not adequately evaluated or mitigated. To prevent recurrence, CNS will revise Procedure 0.50.5 to list the relays or other devices which could impact SDC when in service.

This is a Safety System Functional Failure.

NRC FORM 366
(11-2015)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104

EXPIRES: 10/31/2018

**LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Cooper Nuclear Station	05000- 298	YEAR 2016	SEQUENTIAL NUMBER - 007	REV NO. - 00

NARRATIVE**PLANT STATUS**

Cooper Nuclear Station (CNS) was in Mode 5, Refueling, at 0 percent power, at the time of the event.

BACKGROUND

The safety objective of the Residual Heat Removal (RHR) system [EIS:BO] is to provide core cooling, in conjunction with other Emergency Core Cooling Systems, and to provide containment cooling as required during abnormal operational transients and postulated accidents. The RHR system consists of two heat exchangers [EIS:HX], four main system pumps [EIS:P], and associated piping, valves [EIS:V], controls and instrumentation. Irradiated fuel in the shutdown reactor core generates heat during the decay of fission products and increases the temperature of the reactor coolant. The decay heat must be removed to reduce the temperature of the reactor coolant to less than or equal to 212 degrees Fahrenheit (F) in preparation for performing Refueling or Cold Shutdown maintenance operations, or the decay heat must be removed for maintaining the reactor in Hot Shutdown condition.

Shutdown Cooling (SDC) is a subsystem of RHR and is placed in operation during a normal reactor shutdown and cooldown. Reactor Coolant is pumped by the RHR main system pumps from recirculation loop 'A' through the RHR heat exchangers prior to returning to the reactor vessel through connections to their respective recirculation loop.

The relays used in the Primary Containment Isolation System (PCIS) logic are model CR120A industrial relays [EIS:RLY] manufactured by General Electric. The CR120A relay has a max voltage rating of 300 volts and is a small multi-circuit AC control relay. The relays are popular due to their small size and long mechanical life. CNS currently performs predictive maintenance plans on the relays to replace the coils on a 10-year frequency.

EVENT DESCRIPTION

On October 28, 2016, SDC isolation valves RHR-MO-17 and RHR-MO-18 were open with RHR Loop A in RHR SDC flush lineup, with an intention of placing RHR Loop A in SDC. The Alternate Decay Heat Removal (ADHR) system was maintaining Reactor Pressure Vessel (RPV) and Spent Fuel Pool temperature.

Work orders were created to replace twenty-seven PCIS relay coils, including relay coil for PCIS-REL-K27, in Refueling Outage (RE29). During testing after completion of the work order, it was identified that the PCIS-REL-K27 relay did not actuate as expected (delayed response). This led to a revision of the work order to replace the entire relay instead of just a coil replacement. This required more wires to be lifted and the relay to be removed from the DIN rail and replaced.

SDC was placed in service at 08:49 hours on October 28, 2016. Subsequently, during replacement of the PCIS-REL-K27 relay, the action of installing a new relay onto the shared plastic DIN rail disturbed the mounting rail in a manner that caused the 1-2 contact of the adjacent relay, PCIS-REL-K30, to open. This caused RHR-MO-17 to close, which actuated the logic to trip the running 'A' RHR pump. Operations declared A RHR SDC subsystems inoperable at 09:24 hours and entered Technical Specification (TS)

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Cooper Nuclear Station	05000- 298	YEAR	SEQUENTIAL NUMBER	REV NO.
		2016	- 007	- 00

NARRATIVE

Limiting Condition for Operation (LCO) 3.9.7, Condition A, Required Action A.1, "Verify an alternate method of decay heat removal is available within 1 hour and once per 24 hours thereafter;" entered TS LCO 3.9.7, Condition C, Required Action C.1, "Verify reactor coolant circulation by an alternate method within 1 hour from discovery of no reactor coolant circulation and once per 12 hours thereafter;" and also entered TS LCO 3.9.7, Condition C, Required Action C.2, "Monitor reactor coolant temperature hourly." ADHR remained in service throughout the event and the plant remained aligned for natural circulation. Spent fuel pool weir temperature monitoring was commenced to verify natural circulation. No increase in RPV temperature was observed and there was no impact to plant operations.

While SDC was out of service, PCIS relay K27 work was completed. SDC was declared operable at 05:30 hours on October 29, 2016, and TS LCO 3.9.7, Condition A was exited. The plant remained in TS LCO 3.9.7, Condition C, and aligned for Natural Recirculation, until SDC was placed in service at 18:30 hours on October 29, 2016, at which time TS LCO 3.9.7, Condition C was exited.

BASIS FOR REPORT

This event is reportable in accordance with 10 CFR 50.73(a)(2)(v)(D) as a condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat. Event Notification 52327 was made to the Nuclear Regulatory Commission Operations Center per 10 CFR 50.72(b)(3)(v).

SAFETY SIGNIFICANCE

This is a Safety System Functional Failure because of the loss of the shutdown cooling function of the RHR system. The plant was in MODE 5 performing refueling activities and conducting an Operations with a Potential for Draining the Reactor Vessel activity. The shutdown cooling function of RHR was required to be operable per TS. The Division 1 RHR system was fully functional except for the isolation of RHR-17MV. During the loss of SDC, decay heat removal was being provided by the ADHR system. The reactor coolant temperature did not change during the event. 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 decay heat removal equipment which remained available.

CAUSE

The root cause is that CNS did not identify the risk from mechanical agitation during PCIS relay installation; therefore, the risk was not adequately evaluated or mitigated.

CORRECTIVE ACTIONS

To prevent recurrence, CNS will revise Procedure 0.50.5 to list the relays or other devices which could impact SDC when in service.

NRC FORM 366
(11-2015)

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Cooper Nuclear Station	05000- 298	YEAR 2016	SEQUENTIAL NUMBER - 007	REV NO. - 00

NARRATIVE**PREVIOUS EVENTS**

On May 30, 2015, steam flashing in the SDC line occurred, creating pressure transients that caused RHR-MO-17 and RHR-MO-18 to close. The steam flashing occurred due to temperature in the SDC line being at or near saturation temperature causing localized boiling then void collapse with coolant being drawn from the reactor vessel thru the reactor recirculation system. This event was reported under LER 2015-004-00, Isolation of Shutdown Cooling Results in a Loss of Safety Function, dated July 29, 2015.

On October 14, 2012, flashing of the hot reactor coolant to steam occurred, causing a pressure spike that exceeded 72 psig. Consequently, RHR-MO-17 and RHR-MO-18 closed, isolating the RHR SDC loop. This event was reported under LER 2012-004-00, Isolation of Shutdown Cooling Results in Loss of Safety Function, dated December 6, 2012.