



Nebraska Public Power District

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NLS2015095

July 29, 2015

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

Subject: Licensee Event Report No. 2015-004-00
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to forward Licensee Event Report 2015-004-00.

There are no new commitments contained in this letter.

Sincerely,

Oscar A. Limpias
Vice President Nuclear-
Chief Nuclear Officer

/jo

Attachment: Licensee Event Report 2015-004-00

cc: Regional Administrator w/attachment
USNRC - Region IV

NPG Distribution w/attachment

Cooper Project Manager w/attachment
USNRC - NRR Project Directorate IV-1

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

COOPER NUCLEAR STATION

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IE22
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**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.

1. FACILITY NAME

Cooper Nuclear Station

2. DOCKET NUMBER

05000298

3. PAGE

1 of 3

4. TITLE

Isolation of Shutdown Cooling 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 NUMBER		
05	30	2015	2015	004	00	07	29	2015	FACILITY NAME	DOCKET NUMBER		
										05000		
9. OPERATING MODE			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)									
4			<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(i)(C)		<input type="checkbox"/> 50.73(a)(2)(vii)	
			<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 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)(ii)		<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)	
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)(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 checked="" 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 type="checkbox"/> 50.73(a)(2)(v)(D)		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	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A					

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 May 30, 2015, at 03:27, Cooper Nuclear Station placed the "B" Loop of Residual Heat Removal (RHR) in the Shutdown Cooling (SDC) mode of operations and entered Mode 4, Cold Shutdown, at 04:15. At 04:58, isolation signals from pressure switches (RR-PS-128A and/or RR-PS-128B) were received and, SDC suction isolation valves RHR-MO-17 and RHR-MO-18 closed, resulting in a loss of SDC.

Investigation revealed the event was initiated by steam flashing in the SDC line. This flashing created pressure transients, causing 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. SDC was restored at 05:20 on May 30, 2015. The root cause of the event was determined to be a design vulnerability and subsequent operation of the SDC system that resulted in a trip of the SDC suction valves due to sub-cooling and flashing in the RHR or Reactor Recirculation (RR) system. To prevent recurrence, CNS will initiate an Engineering Change request to move the location of the input pressure signals required to meet requirements of Technical Specification 3.3.6.1, Table 3.3.6.1-1, 6(a) from the RR line to the Vessel Steam Dome.

This is a Safety System Functional Failure.



LICENSEE EVENT REPORT (LER)

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NARRATIVE

PLANT STATUS

Cooper Nuclear Station (CNS) was at 0 psig reactor pressure, in Mode 4, Cold Shutdown, 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 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.

Pressure switches [EIS:PS] RR-PS-128A and RR-PS-128B function to protect SDC suction piping from overpressure. Isolation valves [EIS:ISV] RHR-MO-17 and RHR-MO-18 are interlocked to close and remain closed on reactor pressure greater than 72 psig.

EVENT DESCRIPTION

On May 30, 2015, at 03:27, the "B" Loop of RHR was placed in the SDC mode of operations. At 04:15, the plant entered Mode 4. Isolation signals from pressure switches (RR-PS-128A and/or RR-PS-128B) were received at 04:58. SDC suction isolation valves RHR-MO-17, located outside primary containment, and RHR-MO-18, located inside primary containment closed, resulting in a loss of SDC.

Investigation revealed the event was initiated by steam flashing in the SDC line. This flashing created pressure transients, causing 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. The pressure perturbations are created as the voids form and then collapse due to the sub-cooled coolant temperature. The pressure switches then actuated due to these pressure perturbations and caused an isolation of the SDC system by closing RHR-MO-17 and RHR-MO-18. SDC was restored at 05:20 on May 30, 2015.

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During the loss of SDC, forced circulation of the reactor core was not lost. The Reactor Recirculation (RR) loop "A" system remained in service. Based on indications from the RR system "A" loop, temperature indications showed in an increase of 18 degrees F, from 186 to 204 degrees F. The vessel drain temperature increased from 190 to 210 degrees F for a heat up of 20 degrees F during the same time period.

BASIS FOR REPORT

This event is reportable under 10 CFR 50.73(a)(2)(v)(B). This was a condition which could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat.

SAFETY SIGNIFICANCE

This is a Safety System Functional Failure. The actual and potential safety consequences of this event were minimal because the isolation of the RHR Shutdown Cooling suction valves occurred due to a momentary isolation signal and did not impact the ability to restore the valves to the open position for restoring SDC to service. The interlock feature performed as designed and caused RHR-MO-17 and RHR-MO-18 to close when high pressure was present.

This event did not challenge the ability to maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident.

CAUSE

The root cause of the event was determined to be a design vulnerability and subsequent operation of the SDC system that resulted in a trip of the SDC suction valves due to sub-cooling and flashing in the RHR or RR system.

CORRECTIVE ACTIONS

To prevent recurrence of this event, CNS will initiate an Engineering Change request to move the location of the input pressure signals required to meet requirements of Technical Specification 3.3.6.1, Table 3.3.6.1-1, 6(a) from the RR line to the Vessel Steam Dome.

PREVIOUS EVENTS

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.