Nebraska Public Power District

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NLS2017046
April 27, 2017

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

Subject: Licensee Event Report No. 2017-002-00
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to forward Licensee Event Report 2017-002-00.

There are no new commitments contained in this letter.

Sincerely,

Kenneth Higginbotham
Vice President Nuclear-
Chief Nuclear Officer

/jo

Attachment: Licensee Event Report 2017-002-00

cc: Regional Administrator w/attachment
USNRC - Region IV

Cooper Project Manager w/attachment
USNRC - NRR Plant Licensing Branch IV

Senior Resident Inspector w/attachment
USNRC - CNS

SRAB Administrator w/attachment

NPG Distribution w/attachment

INPO Records Center w/attachment
via ICES entry

SORC Chairman w/attachment

CNS Records w/attachment

IE22
NRR

COOPER NUCLEAR STATION
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NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by 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)

(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/)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Cooper Nuclear Station	05000298	1 of 4

4. TITLE

Valve Test Failures Result in Condition Prohibited by Technical Specifications and 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
										05000
02	28	17	2017 -	002 -	00	04	27	2017	FACILITY NAME	DOCKET
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
10. POWER LEVEL	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
100	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☒ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER (Include Area Code)
Jim Shaw, Licensing Manager	(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	REPORTABLE TO EPIX
B	SB	RV	T020	Y	X	SB	RV	T020	Y

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO				

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

In February and March 2017, three Main Steam Safety Relief Valve (SRV) body assemblies (main body and pilot assembly) and the remaining five SRV pilot assemblies were tested at National Technical Systems Laboratories (formerly Wyle Laboratories). These SRVs had been removed from Cooper Nuclear Station during Refueling Outage 29 in the Fall of 2016. One SRV pilot assembly failed the as-found lift pressure testing; another SRV pilot assembly was conservatively considered a failure due to lack of as-found lift pressure test data since it was inadvertently disassembled prior to performing the as-found lift pressure test.

There were two causes for the failures. One of the SRV pilot assemblies failed due to corrosion bonding; the other SRV pilot assembly failed due to a lack of a barrier to prevent inadvertent disassembly of the SRV pilot prior to testing.

Although the Technical Specifications limits related to the set point lift pressures of the SRV pilot valve assemblies were exceeded, an analysis indicates that the design basis pressures to ensure safety of the reactor vessel and its pressure related appurtenances were not challenged. Public safety was not at risk. Safety to plant personnel and plant equipment was not at risk.

NARRATIVE

PLANT STATUS

Cooper Nuclear Station (CNS) was in Mode 1, Power Operations, 100 percent power, at the time of discovery i.e., February 28, 2017.

BACKGROUND

The pressure relief system includes three American Society of Mechanical Engineers code safety valves (SV) [EIIS:SB] and eight safety relief valves (SRV) [EIIS:RV], all of which are located on the main steam lines [EIIS:SB] within the drywell [EIIS:NH], between the reactor vessel [EIIS:RPV] and the first main steam isolation valve [EIIS:ISV]. The SVs provide protection against over pressurization of the nuclear system and discharge directly into the interior space of the drywell. The SRVs discharge to the suppression pool and provide three main functions: overpressure relief operation to limit the pressure rise and prevent safety valve opening, overpressure safety operation to prevent nuclear system over pressurization, and depressurization operation (opened automatically or manually) as part of the emergency core cooling system [EIIS:BJ, BM, BO].

Technical Specifications (TS) Limiting Condition for Operation 3.4.3 requires the safety function of seven SRVs and three SVs to be operable. The nominal set pressure and tolerances for these valves are established in CNS TS Surveillance Requirement (SR) 3.4.3.1.

The SRVs installed at CNS are Target Rock Model 7567F, two-stage, pilot-actuated valves with pilot assemblies comprised of Stellite 21 pilot discs and Stellite 6B pilot body seats. The pilot assemblies had been in continuous service since the Fall of 2014.

In 2015, five of eight SRV pilot valve assemblies removed in the Fall of 2014 failed to lift within the TS lift setpoint requirements. The cause of these failures was determined to be corrosion bonding. Corrective actions included submitting a TS change to the Nuclear Regulatory Commission requesting setpoint changes as noted in EE 10-053, "Margin Evaluation for SRVs Out-of-Service," and reducing the number of operable SRVs from seven to five. This action has not been completed.

EVENT DESCRIPTION

Three Main Steam SRV body assemblies (main body and pilot assembly) and the remaining five SRV pilot assemblies, removed during Refueling Outage (RE) 29 in the Fall of 2016, were tested at National Technical Systems Laboratories (NTS; formerly Wyle Laboratories). One SRV pilot assembly failed the as-found lift pressure testing; another SRV pilot assembly was conservatively considered a failure due to lack of as-found lift pressure test data since it was disassembled prior to performing the as-found lift pressure test.

The pressure setpoint for SRV pilot assembly serial number 377 is 1090 psig. The TS SR 3.4.3.1 as-found limit of acceptance is 1090 +/- 3%. The first actual lift pressure of this SRV pilot assembly was recorded as 1127 psig. Second and third lifts were performed with the results being 1113 psig and 1106 psig respectively.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Cooper Nuclear Station	05000- 298	2017	- 002	- 00

NARRATIVE

SRV pilot assembly serial number 382 was inadvertently disassembled by Target Rock technicians prior to the performance of the as-found lift test, thus due to the absence of as-found test data, the results were conservatively considered a failure of the ±3% setpoint criteria.

BASIS FOR REPORT

CNS is reporting this event as an operation or condition prohibited by plant TS per 10 CFR 50.73(a)(2)(i)(B), and also as a condition that could have prevented the fulfillment of the safety function of structures or systems as defined under 10 CFR 50.73(a)(2)(v).

An engineering analysis demonstrated that the reactor vessel would not be challenged during an overpressure event. In addition, an analysis determined that the existing Minimum Critical Power Ratio (MCPR) operating limit would have protected the MCPR safety limit in the event of an anticipated operational occurrence. As such, this event will not be counted as a Safety System Functional Failure to the Nuclear Regulatory Commission performance indicator since no loss of safety function occurred.

SAFETY SIGNIFICANCE

Although the TS SR related to the set point lift pressures of the SRV pilot valve assemblies was exceeded, an analysis of this event indicates that the design basis pressures to ensure safety of the reactor vessel and its pressure related appurtenances were not challenged. Public safety was not at risk. Safety to plant personnel and plant equipment was not at risk.

CAUSE

Corrosion bonding was determined to be the cause of SRV pilot serial number 377 failing its lift test.

The lack of a barrier to prevent inadvertent disassembly of SRV pilot serial number 382 prior to the as found testing resulted in the conservative failure of the ±3% setpoint criteria. The conservative failure of serial number 382 eliminated margin for the remaining SRV pilots.

CORRECTIVE ACTIONS

As reported in LER 2015-001-01, presuming that no technical reason is discovered to prevent the following, submit a TS change to the Nuclear Regulatory Commission requesting setpoint changes as noted in EE 10-053; NEDC-33 543P, Revision 0, Class III, DRF 0000-0103-4647, dated February 2010; GE-H NEDC-3362OP, Revision 0, May 2011; and GE-H, report 002N5242.R0, entitled, Cooper Cycle 28 SRV Set Point Study. This action has not been completed.

In addition, CNS will ensure that Target Rock's procurement documentation includes a mechanism to prevent the inadvertent disassembly of a CNS SRV pilot valve prior to performance of the as-found setpoint testing.

NARRATIVE

PREVIOUS EVENTS

Licensee Event Report (LER) 2015-001-01 – On January 26 and February 11, 2015, five of eight Target Rock SRV pilot valves assemblies failed to lift within TS lift setpoint requirements. National Technical Systems, formerly Wyle Laboratories, performed this testing. The pressure setpoint for SRV pilot assembly serial number 385 was 1090 +/-3%; it lifted at 1124 psig. The pressure setpoint for SRV pilot assembly serial number 386 was 1100 +/-3%; it lifted at 1192 psig. The pressure setpoint for SRV pilot assembly serial number 1242 was 1090 +/- 3%; it lifted at 1267.7 psig. The pressure setpoint for SRV pilot assembly serial number 1243 was 1100 +/- 3%; it lifted at 1139 psig. The pressure setpoint for SRV pilot assembly serial number 1241 was 1090 psig +/-3%; it lifted at 1138 psig. Subsequent informational lifts were performed for all of the failed assemblies and were within TS pressure setpoint tolerances. The direct cause of the failures was corrosion bonding.

LER 2011-005-00 – On June 22, 2011, one of eight Target Rock SRV pilot valve assemblies failed to lift within TS lift setpoint requirements. Wyle Laboratories performed this testing. The pressure setpoint of the failed pilot assembly was 1090 +/- 32.7 psig; it lifted at 1199 psig. Two subsequent informational lifts were performed for the SRV pilot assembly and were within the TS pressure setpoint tolerances. The mechanistic cause was the same as reported in previous LERs, pilot disc-to-seat corrosion bonding.

LER 2010-001-00 – On January 12, 2010, two of eight Target Rock SRV pilot valve assemblies failed to lift within TS lift setpoint requirements. Wyle Laboratories performed this testing. The pressure setpoint for the first pilot assembly is 1100 +/- 33.0 psig; the SRV pilot assembly lifted at 1166 psig. The pressure setpoint for the second pilot assembly is 1090 +/- 32.7 psig; it lifted at 1139 psig. Two subsequent informational lifts were performed for both SRV pilot assemblies and were within the TS pressure setpoint tolerances. The mechanistic cause was the same as reported in previous LERs, pilot disc-to-seat corrosion bounding.

LER 2008-002-00 – On July 7 through July 9, 2008, the results of Target Rock SRV test data performed at Wyle Laboratories identified that one of eight SRV pilot assemblies failed as-found pressure setpoint testing. The SRV pilot assembly lifted at 1165 psig, outside its TS setpoint tolerance of 1100 +/- 33.0 psig. The mechanistic cause was pilot disc-to-seat corrosion bounding between the Stellite 21 pilot disc and Stellite 6B pilot body seat to cause the SRV pilot assembly to lift outside its TS setpoint tolerance.

LER 2007-002-00 – On February 28 through March 2, 2007, the results of Target Rock SRV tests performed at Wyle Laboratories identified that one of eight SRV pilot valve assemblies failed to lift within its TS lift setpoint of 1090 +/- 32.7 psig. The failure was a result of sufficient corrosion bonding between the SRV pilot valve assembly Stellite 21 disc and the pilot valve Stellite 6B body seat to cause the SRV pilot valve to lift outside its TS setpoint tolerance.