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NLS2019037
August 09, 2019

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

Subject: Licensee Event Report No. 2019-001-01
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to forward Licensee Event Report 2019-001-01.

There are no new commitments contained in this letter.

Sincerely,

John Dent, Jr.
Vice President Nuclear -
Chief Nuclear Officer

/jo

Attachment: Licensee Event Report 2019-001-01

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

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NRC FORM 366 (04-2018) 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 a 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 Number |
| | | | | | | | | | | 05000 |
| 03 | 06 | 2019 | 2019 | - 001 | - 01 | 08 | 09 | 2019 | Facility Name | Docket Number |
| | | | | | | | | | | 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)(iii) | ☐ 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) |
| **10. Power Level** | ☐ 20.2203(a)(2)(ii) | ☐ 50.36(c)(1)(ii)(A) | ☐ 50.73(a)(2)(v)(A) | ☐ 73.71(a)(4) |
| | ☐ 20.2203(a)(2)(iii) | ☐ 50.36(c)(2) | ☐ 50.73(a)(2)(v)(B) | ☐ 73.71(a)(5) |
| | ☐ 20.2203(a)(2)(iv) | ☐ 50.46(a)(3)(ii) | ☐ 50.73(a)(2)(v)(C) | ☐ 73.77(a)(1) |
| 100 | ☐ 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 | Manufacturer | Reportable To ICES | Cause | System | Component | Manufacturer | Reportable To ICES |
|---|---|---|---|---|---|---|---|---|---|
| B | 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 14 single-spaced typewritten lines)

On March 4, March 5, and March 6, 2019, three of eight Target Rock safety relief valve (SRV) pilot assemblies, removed during Refueling Outage 30, failed to lift within Technical Specifications (TS) lift setpoint requirements. The pressure setpoint of the first failed pilot assembly was 1090 psig; the SRV pilot assembly lifted at 1256.2 psig. The pressure setpoint of the second failed pilot assembly was 1080; the SRV pilot assembly lifted at 1208.5 psig. The pressure setpoint of the third failed pilot assembly was 1090; the SRV pilot assembly lifted at 1124.2 psig. Three subsequent lifts were performed for all failed SRV pilot assemblies and the results were within the TS pressure setpoint tolerances.

The cause of the failures was determined to be corrosion bonding.

Although the setpoint lift pressures of the SRV pilot valve assemblies exceeded TS requirements, an analysis of this event concluded the thermal limits and American Society of Mechanical Engineers overpressure transients did not exceed allowable limits. Public safety was not at risk. Safety to plant personnel and plant equipment was not at risk.

A TS Amendment to TS 3.4.3 will be submitted that will address the failure to meet the TS criteria for the Target Rock two-stage SRVs. Following submittal, a tracking mechanism will be established for TS change approval.

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. LER NUMBER | | |
|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REV NO. |
| Cooper Nuclear Station | 05000-298 | 2019 | - 001 | - 01 |

NARRATIVE

## PLANT STATUS

Cooper Nuclear Station (CNS) was in Mode 1, Power Operation, at 100 percent power, when the event was discovered; i.e., March 6, 2019.

## BACKGROUND

The pressure relief system includes three American Society of Mechanical Engineers (ASME) 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 Specification (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 tolerances for these valves are established in CNS TS Surveillance Requirements (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 installation in Refueling Outage (RE) 29, (Fall of 2016).

Corrosion bonding is an industry known problem with Target Rock Model 7567F two-stage relief valves in which the pilot valve bonds/sticks to the in-body seat, resulting in an increased pressure needed to lift the valve. After the corrosion bonding is "broken" following the initial lift, the subsequent lifts are within tolerance.

## EVENT DESCRIPTION

In the Fall of 2018, two main SRVs body assemblies and eight SRV pilot assemblies were removed during RE30. In March 2019, the SRVs were as-found tested at National Technical Systems Laboratories.

The pressure setpoint for SRV pilot assembly serial number 1242 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 at 1256.2 psig, 15.2% above the pressure setpoint. A second, third, and fourth lift was performed and the results were 1095.7 psig, 1092.4 psig, and 1092.9 psig, all three within 3% of the pressure setpoint.

The pressure setpoint for SRV pilot assembly serial number 387 is 1080 psig. The TS SR 3.4.3.1 as-found limit of acceptance is 1080 +/- 3%. The first actual lift pressure of this SRV pilot assembly was recorded at 1208.5 psig, 11.9% above the pressure setpoint. A second, third, and fourth lift was performed and the

results were 1081 psig, 1084.1 psig, and 1082 psig, all three within 3% of the pressure setpoint.

The pressure setpoint for SRV pilot assembly serial number 1241 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 at 1124.2 psig, 3.14% above the pressure setpoint. A second, third, and fourth lift was performed and the results were 1109.7 psig, 1108.1 psig, and 1107.0 psig, all three within 3% of the pressure setpoint.

Following completion of the testing, the pilot assemblies were disassembled and inspected. The results of the inspection did not identify any immediate physical evidence or indications to explain why the pilot assemblies exceeded the lift pressure. There was no internal damage, foreign material, or other adverse indications found.

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 that are needed to mitigate the consequences of an accident as defined under 10 CFR 50.73(a)(2)(v)(D).

SAFETY SIGNIFICANCE

General Electric Hitachi Nuclear Energy performed a study of the SRV setpoint failures. The study determined the ASME overpressure protection and core thermal limits would not have been exceeded. Public safety was not at risk. Safety to plant personnel and plant equipment was not at risk. As such, this event is not considered a Safety System Functional Failure nor a loss of safety function and will not be counted as a Safety System Functional Failure to the Nuclear Regulatory Commission (NRC) performance indicator since no loss of safety function occurred.

CAUSE

The cause of the three SRV pilot valves failing their lift tests was corrosion bonding.

CORRECTIVE ACTIONS

The following corrective actions have been entered into CNS' corrective action program:

1. Track to completion the Boiling Water Reactor Owners Group industry initiative to develop a Technical Specifications Task Force Traveler for TS 3.4.3, including NRC approval, that would address the failure to meet TS criteria for the Target Rock two-stage SRVs.

2. Submit a TS Amendment to TS 3.4.3 that would address the failure to meet TS criteria for the Target Rock two-stage SRVs. Following submittal, establish tracking mechanism for TS change approval.

| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. LER NUMBER | | |
|---|---|---|---|---|
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PREVIOUS EVENTS

Licensee Event Report (LER) 2017-002-00 – In February and March 2017, one Target Rock SRV pilot assembly failed to lift within TS lift setpoint requirements and 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.

LER 2015-001-00 – On January 26 and February 11, 2015, five of eight Target Rock SRV pilot valve assemblies failed to lift within TS lift setpoint requirements. The cause 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. The cause was 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. The cause was corrosion bounding.

LER 2008-002-00 - On July 7 through July 9, 2008, one of eight Target Rock SRV pilot assemblies failed to lift within TS lift setpoint requirements. The cause was corrosion bounding

LER 2007-002-00 - On February 28 through March 2, 2007, one of eight Target Rock SRV pilot valve assemblies failed to lift within its TS lift setpoint. 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.