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PSEG
Nuclear LLC

LR-N19-0110
JAN 0 6 2020

10CFR50.73

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-001

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
Docket No. 50-354

Subject: Licensee Event Report 2019-002-00,
Safety Relief Valve (SRV) As-found Set-point Failures

In accordance with 10 CFR 50.73(a)(2)(i)(B), PSEG Nuclear LLC is submitting Licensee Event Report (LER) Number 2019-002-00, "Safety Relief Valve (SRV) As-found Set-point Failures."

If you have any questions or require additional information, please contact Mr. Francis D. Possessky at (856) 339-1160.

There are no regulatory commitments contained in this letter.

Sincerely,

Steven R. Poorman
Plant Manager
Hope Creek Generating Station

Attachment: Licensee Event Report 2019-002-00

cc: Regional Administrator – Region I, NRC
US NRC NRR Project Manager – Hope Creek
US NRC Senior Resident Inspector – Hope Creek
NJ Department of Environmental Protection, Bureau of Nuclear Engineering
Commitment Coordinator, Hope Creek Generating Station
Corporate Commitment Coordinator, PSEG Nuclear LLC

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 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.

# 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 |
|---|---|---|
| Hope Creek Generating Station | 05000354 | 1 OF 3 |

**4. TITLE**

Safety Relief Valve (SRV) As-found Set-point Failures

| 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 |
| 11 | 07 | 2019 | 2019 | - 002 | - 00 | 01 | 06 | 2020 | | 05000 |
| | | | | | | | | | 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 – Cold Shutdown | ☐ 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) |
| 000 | ☐ 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) |
| | ☐ 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)* |
|---|---|
| Francis D. Possessky, Regulatory Compliance Specialist | (856) 339-1160 |

**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 | | | | | |

| 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)*

On November 08, 2019, Hope Creek Generating Station (HCGS) received results that the second 'as-found' set-point test for safety relief valve (SRV) pilot stage assemblies had exceeded the lift setting tolerance prescribed in Technical Specification (TS) 3.4.2.1. The TS requires the SRV lift settings to be within +/- 3% of the nominal set-point value.

During the twenty-second refueling outage (H1R22), all fourteen SRV pilot stage assemblies were tested at an offsite facility. Between October 22 and November 25, 2019, HCGS received the test results for all fourteen of the SRV pilot valve assemblies. A total of six of the fourteen SRV pilot stage assemblies were outside of the TS 3.4.2.1 specified values. All of the valves failing to meet the limits were Target Rock Model 7567F two-stage SRVs.

Exceeding the set points for five of the six SRV pilot stage assemblies is attributed to corrosion bonding between the pilot discs and seating surfaces, which is consistent with industry experience. The cause of exceeding the sixth SRV set-point was pilot failure or spindle/disc contact wear.

NARRATIVE

## PLANT AND SYSTEM IDENTIFICATION

General Electric – Boiling Water Reactor (BWR/4)
Main Steam – EIIS Identifier {SB}*
Safety Relief Valves – EIIS Identifier {SB/RV}*

*Energy Industry Identification System {EIIS} codes and component function identifier codes appear as {SS/CCC}

## IDENTIFICATION OF OCCURRENCE

Event Date: November 7, 2019
Discovery Date: November 8, 2019

## CONDITIONS PRIOR TO OCCURRENCE

When the reports of the 'as-found' results were received, Hope Creek was in Operational Condition (OPCON) 4, Cold Shutdown, at 0 percent rated thermal power. No other structures, systems or components that could have contributed to the event were inoperable at the time of the event.

## DESCRIPTION OF OCCURRENCE

During the twenty-second refueling outage (H1R22) at Hope Creek Generating Station (HCGS), all fourteen Main Steam safety relief valves (SRV) pilot stage assemblies {SB/RV} were tested at NWS Technologies. The SRVs are Target Rock Model 7567F two-stage SRVs. During the period from October 22 through November 25, 2019, HCGS received the results of the 'as-found' set pressure testing required by Technical Specification (TS) Surveillance Requirement (SR) 4.4.2.2. A total of six of the fourteen SRV pilot stage assemblies had set-point drift outside of the required TS 3.4.2.1 tolerance values of +/-3% of nominal value.

The 'as-found' test results for the six SRVs not meeting the TS requirements are as follows:

| Valve ID | As Found (psig) | TS Lift Setting (psig) | Acceptable Band (psig) | % Difference Actual |
|---|---|---|---|---|
| F013A | 1187 | 1130 | 1096.1 – 1163.9 | 5.04% |
| F013C | 1209 | 1130 | 1096.1 – 1163.9 | 6.99% |
| F013D | 1166 | 1130 | 1096.1 – 1163.9 | 3.19% |
| F013H | 1194 | 1108 | 1074.8 – 1141.2 | 7.76% |
| F013J | 1191 | 1120 | 1086.4 – 1153.6 | 6.34% |
| F013K | 1055 | 1108 | 1074.8 – 1141.2 | -4.78% |

Technical Specification (TS) 3.4.2.1 requires that the safety function of at least 13 of 14 SRVs be operable with a specified code safety valve function lift setting, within a tolerance of +/- 3%. Action (a) of TS 3.4.2.1 specifies "With the safety valve function of two or more of the above listed fourteen safety/relief valves inoperable, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours." This is a condition reportable under 10 CFR 50.73(a)(2)(i)(B).

The extent of condition for this event is to expand the scope of the SRV Group 1 valve testing, per ASME OM Code Section I-1320 for Class 1 Pressure Relief Valves. All fourteen SRV pilot stage assemblies were removed and replaced with tested spares during the refueling outage (H1R22), therefore the extent of condition was satisfied.

| 1. FACILITY NAME | 2. DOCKET | 3. LER NUMBER | | |
|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER |
| Hope Creek Generating Station | 05000354 | 2019 | - 002 | - 00 |

NARRATIVE

## CAUSE OF EVENT

Exceeding the set points for five of the six SRV pilot stage assemblies is attributed to corrosion bonding between the pilot discs and seating surfaces, which is consistent with industry experience. This conclusion is based on previous causal evaluations, the second lift test being within the acceptable band and the repetitive nature of this condition at HCGS and within the BWR industry.

The cause of exceeding the 'K' SRV set point was pilot failure or spindle / disc contact wear. This conclusion is based on a review and disposition of Electrical Power Research Institute (EPRI) TR-105872, "Safety and Relief Valve Testing and Maintenance Guide", Section 3.1, Failure Modes and Failure Cause Analysis.

## SAFETY CONSEQUENCES AND IMPLICATIONS

There were no instances during Cycle 22 that resulted in any of the fourteen SRVs being declared inoperable and there were no events during that cycle that required operation of the SRVs. All SRVs lifted well below the Safety Limit, providing reasonable assurance that accident analysis conclusions would remain valid. The BWR Owners Group has recognized that corrosion bonding occurs during the operating cycle. Once an SRV lifts, the corrosion bond breaks and subsequent openings occur very close to the set point as demonstrated during testing.

Five of the six as-found set-point SRVs are within their Maximum Allowable Percent Increase (MAPI) above SRV nominal set-point criteria established in GE document NEDC-32511P, "Safety Review for Hope Creek Generating Station Safety/Relief Valve Tolerance Analysis"; these SRVs are bounded by their MAPI value.

The 'A' SRV as-found set-point was outside the MAPI above SRV nominal set-point criteria established in GE document NEDC-32511P, "Safety Review for Hope Creek Generating Station Safety/Relief Valve Tolerance Analysis", and a Technical Evaluation was performed. This evaluation concluded that the 'A' SRV set-point drift of 5.04% did not adversely affect the design function of the 'A' Main Steam Line or any segment of the 'A' SRV discharge line.

## PREVIOUS EVENTS

Similar events occurred during the 2015 (H1R19), 2016 (H1R20) and 2018 (H1R21) Hope Creek refueling outages when multiple SRVs were found out of the TS required limits of +/- 3%. These events were reported as LER 354/2015-004-00, LER 354/2016-003-00 and LER 354/2018-002-01.

## CORRECTIVE ACTIONS

1. All 14 SRV pilot stage assemblies were removed and replaced with pre-tested, certified spare pilot valves in H1R22. The replacement pilot valve discs were coated with a platinum coating applied using Plasma Enhanced Magnetron Sputtering (PEMS) to prevent corrosion bonding, which is the most current and effective method endorsed by the BWROG.
2. Replace the remaining installed Target Rock two-stage SRVs with the three-stage SRV model evaluated and implemented through Design Change Package 80122932 during the next Hope Creek Refuel Outages.

## COMMITMENTS

There are no regulatory commitments contained in this LER.