



10 CFR 50.73

CCN: 21-68

July 16, 2021

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Peach Bottom Atomic Power Station (PBAPS) Unit 2
Subsequent Renewed Facility Operating License No. DPR-44
NRC Docket No. 50-277

Subject: Licensee Event Report (LER) 2-2021-002-00 Safety Relief Valve Inoperability
Due to Nitrogen Leakage from Braided Hose Wear

References: None

This subject report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B) for a condition prohibited by Technical Specifications, and 10 CFR 50.73(a)(2)(v)(D) for an event or condition that at the time of discovery could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

There are no commitments contained in this letter. If you have any questions, please contact the Peach Bottom Regulatory Assurance Manager, Matthew K. Rector at (717) 456-4351.

Respectfully,

A handwritten signature in black ink that reads "Matthew J. Herr".

Matthew J. Herr
Site Vice President
Peach Bottom Atomic Power Station

Enclosure

cc: USNRC, Administrator, Region I
USNRC, Senior Resident Inspector
W. DeHaas, Commonwealth of Pennsylvania
S. Seaman, State of Maryland
B. Watkins, PSE&G, Financial Controls and Co-Owner Affairs



LICENSEE EVENT REPORT (LER)

(See Page 3 for required number of digits/characters for each block)
(See NUREG-1022, R.3 for instruction and guidance for completing this form
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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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollections.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk alt: ora_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

| | | |
|--|--------------------------------------|--------------------------|
| 1. Facility Name Peach Bottom Atomic Power Station, Unit 2 | 2. Docket Number 05000 277 | 3. Page 1 OF 3 |
|--|--------------------------------------|--------------------------|

4. Title
Safety Relief Valve Inoperability Due to Nitrogen Leakage from Braided Hose Wear

| 5. Event Date | | | 6. LER Number | | | 7. Report Date | | | 8. Other Facilities Involved | |
|---------------|-----|------|---------------|-------------------|--------------|----------------|-----|------|------------------------------|---------------|
| Month | Day | Year | Year | Sequential Number | Revision No. | Month | Day | Year | Facility Name | Docket Number |
| 05 | 18 | 2021 | 2021 | - 002 - | 00 | 07 | 16 | 2021 | | 05000 |
| | | | | | | | | | Facility Name | Docket Number |
| | | | | | | | | | | 05000 |

| | |
|-------------------------------|-------------------------------|
| 9. Operating Mode 1 | 10. Power Level 010 |
|-------------------------------|-------------------------------|

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

| | | | | |
|---|---|---|---|--|
| 10 CFR Part 20 | <input type="checkbox"/> 20.2203(a)(2)(vi) | <input type="checkbox"/> 50.36(c)(2) | <input type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x) |
| <input type="checkbox"/> 20.2201(b) | <input type="checkbox"/> 20.2203(a)(3)(i) | <input type="checkbox"/> 50.46(a)(3)(ii) | <input type="checkbox"/> 50.73(a)(2)(v)(A) | 10 CFR Part 73 |
| <input type="checkbox"/> 20.2201(d) | <input type="checkbox"/> 20.2203(a)(3)(ii) | <input type="checkbox"/> 50.69(g) | <input type="checkbox"/> 50.73(a)(2)(v)(B) | <input type="checkbox"/> 73.71(a)(4) |
| <input type="checkbox"/> 20.2203(a)(1) | <input type="checkbox"/> 20.2203(a)(4) | <input type="checkbox"/> 50.73(a)(2)(i)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(C) | <input type="checkbox"/> 73.71(a)(5) |
| <input type="checkbox"/> 20.2203(a)(2)(i) | 10 CFR Part 21 | <input checked="" type="checkbox"/> 50.73(a)(2)(i)(B) | <input checked="" type="checkbox"/> 50.73(a)(2)(v)(D) | <input type="checkbox"/> 73.77(a)(1)(i) |
| <input type="checkbox"/> 20.2203(a)(2)(ii) | <input type="checkbox"/> 21.2(c) | <input type="checkbox"/> 50.73(a)(2)(i)(C) | <input type="checkbox"/> 50.73(a)(2)(vii) | <input type="checkbox"/> 73.77(a)(2)(i) |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | 10 CFR Part 50 | <input type="checkbox"/> 50.73(a)(2)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(viii)(A) | <input type="checkbox"/> 73.77(a)(2)(ii) |
| <input type="checkbox"/> 20.2203(a)(2)(iv) | <input type="checkbox"/> 50.36(c)(1)(i)(A) | <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)(v) | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(iii) | <input type="checkbox"/> 50.73(a)(2)(ix)(A) | |

OTHER (Specify here, in abstract, or NRC 366A).

12. Licensee Contact for this LER

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|--|---|
| Licensee Contact Matthew K. Rector, Regulatory Assurance Manager | Phone Number (Include area code) 7174564351 |
|--|---|

13. Complete One Line for each Component Failure Described in this Report

| Cause | System | Component | Manufacturer | Reportable to IRIS | Cause | System | Component | Manufacturer | Reportable to IRIS |
|-------|--------|-----------|--------------|--------------------|-------|--------|-----------|--------------|--------------------|
| B | SB | RV | T020 | Y | | | | | |

14. Supplemental Report Expected

| | | | | | |
|--|--|-------------------------------------|--------------|------------|-------------|
| <input checked="" type="checkbox"/> No | <input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) | 15. Expected Submission Date | Month | Day | Year |
| | | | | | |

16. Abstract (Limit to 1560 spaces, i.e., approximately 15 single-spaced typewritten lines)

On March 21, 2021 it was identified that the Unit 2 instrument nitrogen compressors were increasing in run hours, with all other related parameters steady. The condition was monitored and trended, and investigation determined the most likely cause to be nitrogen leakage within primary containment. In May, a second step increase in nitrogen leakage occurred, after which the decision was made to down power the unit to permit entry into primary containment and investigate the source of leakage. The plant reached a minimum of approximately 10% power to support this evolution. On May 18, 2021 it was discovered by visual observation that the nitrogen supply to a safety relief valve (RV-2-02-071K) was the source of the leak. Stainless steel braided hoses (1/2" Swagelok flexible hoses) which supply and return nitrogen from the actuating solenoid valve had rubbed together and worn such that both hoses had failed. The valve was declared inoperable for its Automatic Depressurization System (ADS) function on May 18, 2021 at 0117. The hoses were replaced, restoring operability on May 18, 2021 at 1225, and the unit was returned to full power. There were no other systems which were inoperable during this evolution that contributed to this event. This condition is reportable under 10 CFR 50.73(a)(2)(i)(B) for a condition not allowed by Technical Specifications and



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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| 1. FACILITY NAME | 2. DOCKET NUMBER | 3. LER NUMBER | | |
|---|------------------|---------------|-------------------|---------|
| | | YEAR | SEQUENTIAL NUMBER | REV NO. |
| Peach Bottom Atomic Power Station, Unit 2 | 05000- 277 | 2021 | - 002 | - 00 |

NARRATIVE

also reportable under 10 CFR 50.73(a)(2)(v)(D) for a loss of safety function for the ADS system, based on subsequent analysis of the leakage.

There were no actual safety consequences as a result of this event.

Unit Conditions Prior to the Event

Peach Bottom Atomic Power Station Unit 2 (PB2) was operating at approximately 10 percent power in MODE 1. There were no structures, systems, or components that were inoperable at the start of the event and contributed to the identified condition.

Description of Event

On March 21, 2021 it was identified that the PB2 nitrogen compressors were increasing in run hours, with all other related parameters steady. In May, a second step increase in nitrogen leakage occurred. Further investigation determined the most likely cause to be leakage within primary containment, after which the decision was made to down power the unit to permit entry into primary containment and investigate the source of any possible leakage. PB2 reached a minimum of approximately 10% power to support primary containment entry. On May 17, 2021 it was discovered by visual observation that the nitrogen supply to a safety relief valve (RV-2-02-071K) was the source of the leakage. The braided stainless steel hoses (i.e., 1/2" Swagelok flexible hoses) which supply and return nitrogen from the actuating solenoid valve for RV-2-02-071K had rubbed together and worn such that both hoses had failed. This valve which supports an Automatic Depressurization System (ADS) function was declared inoperable on May 18, 2021 at 0117.

Analysis of Event

The ADS system is an Emergency Core Cooling System (ECCS) which is designed to provide depressurization of the reactor coolant system during a small break loss of coolant accident if high pressure injection fails or is unable to maintain required water level in the reactor vessel. It reduces the reactor pressure vessel pressure to within the operating pressure range of the low pressure ECCS subsystems so that these subsystems can provide coolant inventory makeup. To accomplish this function, pneumatic power is used to actuate the safety relief valves, which are manufactured by Target Rock.

The effect of this condition is that one of five ADS valves was not considered operable as required by Technical Specifications (TS) Section 3.5.1. The remaining four valves were operable for this function. As such, the unit would have experienced reduced capacity for depressurization if an emergency depressurization was needed. No conditions requiring depressurization were encountered during the period of inoperability. Failure of the nitrogen supply system did not impact the safety relief valve's overpressure relief function and, therefore the valve remained operable for this function.

This event is reportable under 10CFR 50.73(a)(2)(i)(B) since the safety relief valve was considered inoperable for a period greater than permitted by TS. Peach Bottom TS Limiting Condition for Operation 3.5.1, Condition E for one ADS valve inoperable has a Completion Time of 14 days. Since this condition existed for longer than the LCO duration, this reporting criterion applies.



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NARRATIVE

This event is also considered reportable under 10CFR 50.73(a)(2)(v)(D) since the ADS safety function, which is needed to mitigate the consequences of an accident, was impaired. The Bases for TS 3.5.1 states that five ADS valves are required to be operable to provide the ADS function. A single failure in the operable ADS valves results in a reduction in depressurization capability. The leak was identified by walkdown inside containment and was repaired within 12 hours of entering the LCO. Subsequent inspection of the hoses in conjunction with data analysis prior to and after the repair demonstrated a potential loss of safety function, because the leak was larger than the allowable leakage for the ADS accumulators. This failure only impacts the 'K' ADS valve for all sources of nitrogen except the backup bottle source. For the backup bottles, the 'K' and 'G' ADS valve are supplied by a common header, which would potentially be automatically isolated because of high flow through the header due to the leak.

Cause of the Event

Safety relief valve RV-2-02-071K is known to be subject to increased vibration levels, based on measured flow induced vibration within the 'D' main steam line. In November 2016, the actuating solenoid valve was relocated from the safety relief valve to nearby structural steel in an attempt to arrest vibration of the solenoid. The modification was only installed on this valve. This modification required that stainless steel braided hoses be added to and from the solenoid valve to carry nitrogen to the solenoid. Over the course of the current operating cycle, a retaining clip loosened which allowed the hoses to come in contact with each other. At the time of repair, the retaining clip was replaced and the hoses were reoriented to reduce the likelihood of future contact. It is estimated that this leak first began and exceeded allowable leakage rates on or near March 5, 2021.

The identified cause of this event is a design that did not appropriately address known vibration within the system. Additionally, maintenance instructions were not adequate to ensure that the retaining clip was installed correctly and remained in place throughout the cycle.

Corrective Actions

The damaged hoses were replaced and the safety relief valve RV-2-02-071K was restored to operable status (including its ADS function) on May 18, 2021 at 0117 as part of the down power evolution. The investigative product which will determine if additional corrective actions are needed is in progress.

Previous Similar Events

Peach Bottom has submitted Licensee Event Reports in the past for nitrogen leakage to safety relief valves in 2006 (ref. LER 06-002-00) and 2011 (LER 11-003-00). Although each event was due to nitrogen leakage, the causes of the leakage are not similar.