



Beaver Valley Power Station
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August 10, 2022
L-22-186

10 CFR 50.73

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

SUBJECT:
Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
LER 2022-001-00

Enclosed is Licensee Event Report (LER) 2022-001-00, "Manual Reactor Trip and Auxiliary Feedwater Actuation due to Heater Drain System Valve Failure". This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A).

There are no regulatory commitments contained in this submittal. Any actions described in this document represent intended or planned actions and are described for information only.

If there are any questions or if additional information is required, please contact Mr. Steve Sawtschenko, Manager, Regulatory Compliance and Emergency Response, at 724-682-4284.

Sincerely,

A handwritten signature in dark ink, appearing to read "J. Grabnar", written over a horizontal line.

John J. Grabnar

Enclosure: Beaver Valley Power Station, Unit 1 LER 2022-001-00

cc: Mr. D. C. Lew, NRC Region I Administrator
NRC Senior Resident Inspector
Mr. B. Ballard, NRC Project Manager
INPO Records Center (via INPO Industry Reporting and Information System)
Mr. L. Winker (BRP/DEP)

Enclosure
L-22-186

Beaver Valley Power Station, Unit 1 LER 2022-001-00



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

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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 all: oir_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 Beaver Valley Power Station, Unit 1	2. Docket Number 05000 334	3. Page 1 OF 4
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4. Title
Manual Reactor Trip and Auxiliary Feedwater Actuation due to Heater Drain System Valve Failure

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
06	15	2022	2022	- 001 -	00	08	10	2022	Facility Name	Docket Number
										05000

9. Operating Mode 1	10. Power Level 100
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11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

<input checked="" type="checkbox"/> 10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" 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 type="checkbox"/> 50.73(a)(2)(i)(B)	<input 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)	
<input type="checkbox"/> OTHER (Specify here, in abstract, or NRC 366A).				

12. Licensee Contact for this LER

Licensee Contact Steve Sawtschenko, Manager, Regulatory Compliance and Emergency Response	Phone Number (Include area code) 724-682-4284
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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	SN	LCV	M120	Y					

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

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

At 0724 on June 15, 2022 while at approximately 100 percent power, the Beaver Valley Power Station, Unit No. 1 (BVPS-1) reactor was manually tripped due to lowering steam generator water levels. This was due to reduced heater drain flow from the heater drain system (HDS) to the main feedwater pumps (MFPs) when the heater drain receiver normal level control valve, LCV-1SD-106B, experienced a valve plug to stem separation. The Operators manually tripped the reactor as required per the predefined trip criteria for low steam generator water level.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in a manual actuation of the Reactor Protection System, 10 CFR 50.73(a)(2)(iv)(B)(1), and the automatic actuation of the Auxiliary Feedwater System, 10 CFR 50.73(a)(2)(iv)(B)(6). Corrective actions include replacing the plug, stem, and pin (trim) of LCV-1SD-106B with an enhanced design during the next refueling outage (Fall 2022).

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form
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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Beaver Valley Power Station, Unit 1	05000- 334	YEAR 2022	- SEQUENTIAL NUMBER 001	- REV NO. 00

NARRATIVE

Energy Industry Identification System (EIIIS) codes are identified in the text as [XX].

BACKGROUND

The Unit 1 Heater Drains System (HDS) [SN] is designed to collect drains from the feedwater heaters, main turbine reheater steam coils, and moisture separators and deliver the condensate to the Main Feedwater Pumps (MFPs) [SJ] as steam generator feedwater.

Either of two full size heater drain pumps take suction from the heater drain receiver and discharge into the MFP suction header. The MFPs deliver the feedwater to the steam generators.

Normal level is maintained in the heater drain receiver by modulation of the level control valve, LCV-1SD-106B [LCV], at the discharge of the heater drain pumps.

HDS flow rates are based upon supplying sufficient heater drain flow, together with the condensate system [SG], to satisfy the operational requirements of the steam generator MFPs. The HDS is designed to supply 25 percent of full feed flow required for operation of the steam generator MFPs.

DESCRIPTION OF EVENT

At 0100 on June 13, 2022 while at full power operation, heater drain pump flow oscillations were identified with indications that LCV-1SD-106B was binding. An action plan was developed if the LCV were to fail and operators were briefed for a potential controlled down power.

At 0724 on June 15, 2022 while at approximately 100 percent power, the BVPS-1 reactor was manually tripped due to lowering steam generator water levels. This was due to reduced condensate flow from the HDS to the MFPs when LCV-1SD-106B experienced a valve plug to stem separation.

The trip was not complicated and the plant was stabilized in Mode 3. All control rods [AA] fully inserted into the reactor core. The Auxiliary Feedwater System (AFW) [BA] automatically actuated on low steam generator water level as expected, and the AFW system performed as designed. There was no safety-related equipment inoperable at the start of the event that contributed to the event.

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NARRATIVE**CAUSE OF EVENT**

The direct cause of the need to perform the manual reactor trip was the lowering steam generator levels due to reduced heater drain flow from the HDS to the MFPs. This was the result of LCV-1SD-106B experiencing a valve pin failure and plug to stem separation.

The apparent cause is that the design of the valve assembly is less than adequate due to lack of pre-load on the threaded connection at the stem and plug making this connection prone to loosening and separating. Stress and fatigue from system flow induced vibration with this condition led to the wearing away of the stem threads and eventual failure of the locking pin which allowed the stem/plug separation. The pin is intended to only be a locking device and is not designed to support the load applied to the stem. To ensure the pin is not overloaded, the stem must be properly torqued to the valve plug.

A contributing cause is the organization did not have an adequate consequence bias for risk from a previous similar event in May 2021. In May 2021, LCV-1SD-106B also experienced a pin failure and plug/stem separation that resulted in a controlled down power to repair the valve. The valve was repaired by replacing the pin and stem, however the existing plug was reinstalled due to parts availability. It was perceived that the used plug would allow the valve to operate reliably to the next refueling outage and that the organization could predict and control the plant should the valve exhibit degradation. The valve was not classified or evaluated as a single point vulnerability (SPV) to a reactor shutdown.

ANALYSIS OF EVENT

The event was reported per Event Notification 55943 as an event that resulted in the actuation of the reactor protection system, 10 CFR 50.72(b)(2)(iv)(B), and a specific system actuation, 10 CFR 50.72(b)(3)(iv)(A). This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in a manual actuation of the Reactor Protection System, 10 CFR 50.73(a)(2)(iv)(B)(1), and the automatic actuation of the Auxiliary Feedwater System, 10 CFR 50.73(a)(2)(iv)(B)(6).

The plant risk associated with the BVPS-1 reactor trip on June 15, 2022, is considered to be very low. This is based on the change in average core damage frequency derived using the conditional core damage probability and change in average large early release frequency derived using conditional large early release probability for the event. Therefore, this event had very low safety significance.

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NARRATIVE**CORRECTIVE ACTIONS**

Completed Actions:

1) The level control valve, LCV-1SD-106B, was repaired with a new trim. BVPS-1 was returned to service and synchronized to the grid on June 17, 2022.

Planned Actions:

1) Replace the trim of LCV-1SD-106B with an enhanced design during the next refueling outage (Fall 2022). The new valve assembly will have an improved shouldered stem design, a hardened stem pin, and a hardened stainless-steel stem to resolve the potential for loosening.

2) Evaluate whether LCV-1SD-106B should be classified as a SPV.

PREVIOUS SIMILAR EVENTS

A review of the previous three years was performed. A previous event occurred in May 2021 when LCV-1SD-106B failed due to a plug/stem separation. The valve was repaired by replacing the stem and pin, however the existing plug was reinstalled due to parts availability. The organization did not have an adequate consequence bias for risk as it was perceived that the used plug would allow the valve to operate reliably to the next refueling outage, and that the organization could predict and control the plant should the valve exhibit degradation.