NRC FORM 366 (08-2020) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2023

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/)

1. Facility Name	2. Docket Number	3. Page
Calvert Cliffs Nuclear Power Plant, Unit 2	05000318	1 OF 5

4. Title
Pressurizer Safety Valve As-Found Settings (Low) Outside Technical Specification Limits Due to Setpoint Drift

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
09	21	2022	2022	003 -	00	11	21	2022		05000
									Facility Name	Docket Number 05000

9. Operating Mode	10. Power Level
1	100

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

10 CFR Part 20	☐ 20.2203(a)(2)(vi)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(A)	**10 CFR Part 73**
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.69(g)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(4)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(i)	**10 CFR Part 21**	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(1)(i)
☐ 20.2203(a)(2)(ii)	☐ 21.2(c)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(i)
☐ 20.2203(a)(2)(iii)	**10 CFR Part 50**	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)	☐ 73.77(a)(2)(ii)
☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)	
☐ 20.2203(a)(2)(v)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)	

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

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include area code)
Michael Fick, Principal Regulatory Engineer	410-495-6714

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	AB	RV	D243	Y					

14. Supplemental Report Expected		15. Expected Submission Date	Month	Day	Year
☒ No	☐ Yes (If yes, complete 15. Expected Submission Date)				

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

On September 21, 2022, during testing at the offsite testing facility, the as-found lift setting for the pressurizer safety valve (PSV) previously installed in Unit 2 at the 2RV200 location was measured low outside the Technical Specification allowable value. The valve had been installed in March 2021 during the Unit 2 refueling outage. Leakage past the valve seat was initially identified in July 2021 and took a step change in April 2022. This leakage was formally monitored by the site until the planned maintenance outage in September 2022 where the 2RV200 PSV was replaced. The 2RV200 PSV was disassembled and inspected at an offsite facility where unsatisfactory internal components were identified, including the stainless steel spindle runout measurement and the bellows having a visibly bulged nose.

NARRATIVE

PLANT AND SYSTEM IDENTIFICATION

Calvert Cliffs Nuclear Power Plant, Unit 2, is a Combustion Engineering Pressurized Water Reactor with a licensed maximum power level of 2737 megawatts thermal. The Energy Industry Identification System code used in the text is identified as [AB].

A. PLANT OPERATING CONDITIONS PRIOR TO EVENT

Unit: 2
Date: September 21, 2022
Power level: 100
Mode: 1
Unit 2 was in Mode 1 (Power Operation) when the condition was discovered. The degraded valve was replaced during the maintenance outage; however, the condition (setpoint drift on the degraded valve) was not discovered until after the unit had been returned to power operation.

B. DESCRIPTION OF EVENT

Pressurizer Safety Valve (PSV) serial number BV02950 was installed at the 2RV200 location during the 2021 Unit 2 RFO. The new valve had been previously certified by NWS Technologies under the vendor's procedure to meet as-left acceptance criteria to lift within -0% and +1% of the valve's nameplate set-pressure of 2500 psia. Due to expected setpoint drift and to allow margin for the tight tolerance on as-found setpoint testing, Calvert Cliffs SMEs have established that an as-left lift less than the valve's nameplate set-pressure would be considered unacceptable. This policy is more conservative than the industry standard and is established in the vendor's test procedure.

When performing set-pressure testing at NWS, test stand pressure is slowly brought to Calvert Cliff's operating pressure and held until thermal equilibrium is achieved on the valve. Procedural guidance currently instructs NWS test personnel that testing exceeding 15 lifts requires authorization by the Calvert Cliffs System Manager or Component Engineer with documentation on the test data page of the NWS traveler. To meet the as-left tolerances, 20 lifts were required and authorized to certify S/N BV02950 prior to installation in the 2021 RFO.

The PSV BV02950 was the last of the Calvert Cliffs PSVs to have a stainless-steel spindle installed during the 2021 RFO. The stainless-steel spindle's six-point run out was recertified (<0.003 inch) in 2020 when the valve was removed from service for as-found testing. All other Calvert Cliffs PSVs at the time utilized an Inconel spindle. The spindle's material change was driven by the manufacturer, Dresser Industries, to eliminate bent spindles due to Inconel being a much stronger alloy with a higher yield strength than stainless-steel.

Following installation and prior to startup coming out of the 2021 RFO, the site evaluated and removed the steps in Operations Procedure OP-01-2, Start Up from Cold Shutdown, that performed a three-hour Pressurizer soak followed by a two-hour gradual reactor coolant system (RCS) increase to Normal Operating Pressure (NOP). The site had been

NARRATIVE

performing this pre-start up RCS soak and gradual pressure increase coming out of outages since 1996 to allow the Pressurizer and surrounding piping to complete its thermal growth prior to reaching NOP. This was done as a means to reduce leakage past the PSVs while in lower operating modes and prevent PSV seat distortion. This process had been performed to allow for the PSVs to gradually drive temperature change into the valves and allow for proper thermal equalizing of the valves at lower pressures. In 2021, the soak was identified as being based on out-of-date legacy information that no longer applied to the currently installed components and the procedure was revised to eliminate the soak.

While installed, the PSVs experienced the following:

• Manual trip form 38% power following the 2021 RFO on March 21, 2021
• Manual trip from 100% power on November 21, 2021
• Automatic trip from 100% on high Reactor Coolant System (RCS) pressure on January 4, 2022
• 2RV200 simmered during venting of the Unit 2 Quench Tank on March 17, 2022
• Temperature and pressure changes due to Unit 2 power manipulations (reactor power reduced to ~65%) to perform main condenser cleaning on August 5, 2022

Seat leakage past 2RV200 was initially identified in July 2021 due to an increase in the Unit 2 Quench Tank level at a rate of 4.4 gal/day. Following the Unit 2 trip on high RCS pressure in January 2022, RCS pressure was lowered to 400 psi with a temperature of 380°F for RCS instrumentation maintenance. When returning Unit 2 from that trip, a pressurizer soak with a gradual increase in RCS parameters to NOP was not performed. The site continued to observe an elevated tailpipe temperature downstream of 2RV200, indicating the seat leakage past the PSV had worsened. In March 2022, the site developed an Adverse Condition Monitoring Plan (ACMP) with explicit parameters and criteria for taking actions to address continued degradation in seat leakage on 2RV200. In September 2022, ACMP criteria was met, and the site determined a planned maintenance outage was necessary to replace the 2RV200 PSV.

On September 21, 2022, during testing at the offsite testing facility the site discovered that the as-found lift setting for 2RV200 measured outside the limits specified in Technical Specification Surveillance Requirement (SR) 3.4.10.1. During the as-found testing for PSV Serial Number BV02950 (previously installed at 2RV200 location) the valve opened at 2470 psia (-1.2% from the nominal setpoint of 2500 psia). The low end of the Technical Specification SR As Found Lift Setting for 2RV200 is 2475 psia.

C. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES

March 2021	BV02950 (2RV200) installed during the 2021 Unit 2 refueling outage.
July 2021	BV02950 (2RV200) seat leakage identified.
September 2022	BV02950 (2RV200) removed during the maintenance outage.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER YEAR	SEQUENTIAL NUMBER	REV NO.
Calvert Cliffs Nuclear Power Plant, Unit 2	05000- 318	2022	- 003	- 00

NARRATIVE

September 2022 BV02950 (2RV200) as-found lift tested at offsite vendor facility. As-found lift setting measured lower than Technical Specification allowable value.

D. CAUSE OF EVENT

The method of discovery for this event was self-identified during testing at the offsite testing facility and is documented in the site's Corrective Action Program under IR 04524139.

The most likely causes of the issue have been determined to be due to (1) the lack of thermal soaks and gradual RCS pressurizations to NOP performed during the operating cycle starting with the completion of the 2021 RFO and (2) excessive lifts that were required prior to installation during the 2021 RFO in order to achieve acceptable as-left test results.

E. SAFETY ANALYSIS

The subject event satisfies the criteria in NUREG-1022, Revision 3, for any event or condition that was prohibited by the plant's technical specifications. Therefore, this event is reportable pursuant to 10CFR 50.73(a)(2)(i)(B).

The valve was refurbished at the offsite facility in 2020 and subsequently passed as-left acceptance testing prior to being installed in March 2021 during the Unit 2 refueling outage. Seat leakage was initially identified in July 2021. Seat leakage was monitored and trended until the valve was removed for replacement in September 2022 during the Unit 2 planned maintenance outage. The seat leakage did not exceed Technical Specification limits for RCS allowed leakage. Although an exact duration cannot be determined, it is reasonable to conclude that for some period of time while the valve was installed in the plant, most likely the lift setting was not within the Technical Specification SR defined setpoint limit. The other Unit 2 pressurizer safety valve (Serial Number BM07949) previously installed at 2RV201 location, was also removed during the September 2022 Unit 2 maintenance outage. The as-found lift setting for that PSV was within the Technical Specification SR defined setpoint limit.

With one PSV inoperable, the Technical Specification Condition 3.4.10.A Required Action is to restore the valve to operable status within a 15 minute Completion Time. If this required action cannot be met, or if two PSVs are inoperable, Technical Specification Condition 3.4.10.B requires the plant to be placed in Mode 3 within 6 hours and to reduce all RCS cold leg temperatures to </= 301 F (Unit 2) within 12 hours. The failure to recognize and meet the requirements of Technical Specification Condition 3.4.10.B also should have required entry into Technical Specification LCO 3.0.3. We believe that the subject condition (for one of the PSVs) existed longer than the Technical Specification Completion Times for the associated Required Actions. Therefore, this event is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B).

This event did not result in any actual nuclear safety consequences.

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F. CORRECTIVE ACTIONS

A spare valve with an Inconel spindle was installed during the September 2022 Unit 2 maintenance outage.

Applicable site procedures have been revised to reincorporate the requirement for performing the Pressurizer soak and gradual RCS pressurization to NOP.

The PSV test procedure is being revised to firmly limit the number of lifts allowed per the test procedure when initially establishing the valve lift setpoints.

G. PREVIOUS OCCURRENCES

A review of Calvert Cliffs' events over the past several years was performed. The site has had several instances of PSV setpoint testing (low and high) abnormalities. As noted below, the apparent causes for previous failures were due to different issues. The following LERs were identified from this review:

LER 318/2011-002-Setpoint (high) failure-cause identified as greater than expected setpoint variation, License Amendment Request submitted to expand the allowable setpoint range.

LER 318/2013-002-Setpoint (high) failure-cause identified as inadequate margin, subsequent approval of License Amendment Request to increase allowed lift setting range occurred on December 30, 2015.

LER 317/2014-003 Setpoint (low) failure on two separate valves – identified as the internal lift spring assemblies of a specific manufacturer lot failed to hold PSV set pressure.

LER 318/2017-001 - Setpoint (low) failure-cause identified as setpoint drift in unexpected direction.

LER 317/2018-001-01 - Setpoint (low) failure-cause identified due to damaged internals.

H. COMPONENT FAILURE DATA

Component	IEEE 803 FUNCTION ID	IEEE805 SYSTEM ID
Pressurizer Safety Valve	RV	AB

The Unit 2 pressurizer safety valve manufacturer is Dresser Consolidated, Inc.