



# Exelon Generation®

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10 CFR 50.73

April 20, 2018

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

Calvert Cliffs Nuclear Power Plant, Unit No. 1  
Renewed Facility Operating License No. DPR-53  
NRC Docket No. 50-317

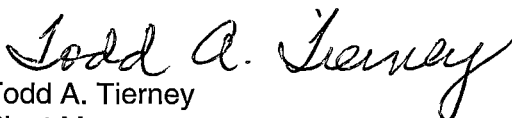
Subject: Licensee Event Report 2018-001, Revision 00  
Pressurizer Safety Valve As-Found Settings Outside Technical Specification  
Limits Due to Damaged Internals

The attached report is being sent to you as required by 10 CFR 50.73.

There are no regulatory commitments contained in this correspondence.

Should you have questions regarding this report, please contact Mr. Larry D. Smith at (410) 495-5219.

Respectfully,

  
Todd A. Tierney  
Plant Manager

TAT/KLG/bjm

Attachment: As stated

cc: NRC Project Manager, Calvert Cliffs  
NRC Regional Administrator, Region I

NRC Resident Inspector, Calvert Cliffs  
S. Gray, MD-DNR

IEZZ  
NRR



**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/>)

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<b>1. Facility Name</b> Calvert Cliffs Nuclear Power Plant, Unit 1	<b>2. Docket Number</b> 05000 317	<b>3. Page</b> 1 OF 6
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**4. Title**  
Pressurizer Safety Valve As-Found Settings Outside Technical Specification Limits Due to Damaged Internals

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
02	25	2018	2018	- 001	- 00	04	20	2018	Facility Name	Docket Number
										05000
										05000

**9. Operating Mode**

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

6	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
10. Power Level	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
0	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(ii)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(iii)
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A)	

**12. Licensee Contact for this LER**

<b>Licensee Contact</b> Kenneth Greene, Principal Engineer	<b>Telephone Number (Include Area Code)</b> 410-495-4385
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**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	AB	RV	D243	Y					

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

**Abstract** (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

During scheduled testing at the offsite testing facility, the as-found lift setting for the pressurizer safety valve previously installed in Unit 1 at the 1RV200 location was measured outside the Technical Specification allowable values (valve lifted low). The valve had been installed during the 2016 Unit 1 refueling outage and was removed during the 2018 Unit 1 refueling outage for scheduled testing and maintenance. As scheduled, a spare valve was installed in its place during the 2018 refueling outage. The failed valve was disassembled and inspected at the offsite facility. The apparent cause of the pressurizer safety valve failure is due to a bulge in the valve's bellow nose which resulted in increased contact with valve disc causing the valve to lift below the Technical Specification allowable values. The valve will have damaged parts replaced, be rebuilt, tested, and re-certified for installation in the plant during the next Unit 1 refueling outage.



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

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
CCNPP, Unit 1	05000 317	2018	- 001	- 00

**NARRATIVE**

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

**I. DESCRIPTION OF EVENT:**

**A. PRE-EVENT PLANT CONDITIONS:**

Unit 1 was in Mode 6 (Refueling) when the condition was discovered. The valve was not installed in the system when the condition was discovered.

**B. EVENT:**

On February 25, 2018, during scheduled testing at the offsite testing facility, pressurizer [PZR] safety valve (PSV) [RV], previously installed at the 1RV200 location, failed it's as found lift setting test. The failed PSV (PSV Serial Number BN 04373) opened at a value of 2442 psia which is below the low end Technical Specification Surveillance Requirement (SR) 3.4.10.1. The failed PSV had been installed at the 1RV200 location during the 2016 Unit 1 refueling outage and was removed during the 2018 Unit 1 refueling outage for scheduled testing and maintenance.

**C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:**

Unit 1 PSV 1RV200 (BN 04373) was determined to be inoperable. The inoperable condition for the valve provides the bases for this report.

**D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:**

- March 2016            BN 04373 (1RV200) installed during the 2016 Unit 1 refueling outage.
- February 2018        BN 04373 (1RV200) removed during the 2018 Unit 1 refueling outage.
- February 25, 2018    BN 04373 (1RV200) as-found lift tested at offsite vendor facility. As-found lift setting measured lower than Technical Specification allowable value. The valve was disassembled, inspected, and a bulge in the bellows nose was determined to be the cause of the failed as-found lift-setting. Analysis for the cause of this condition is ongoing.

**E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:**

There were no other systems or secondary functions affected. This event is applicable to Calvert Cliffs, Unit 1 only.



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**F. METHOD OF DISCOVERY:**

The condition was self-revealing during scheduled testing at the offsite testing facility.

**G. MAJOR OPERATOR ACTION:**

No operator action was required for the subject valve. The valve was not installed in the plant when the condition was identified.

**H. SAFETY SYSTEM RESPONSES:**

No safety system responses were expected. None occurred.

**II. CAUSE OF EVENT:**

The event is documented in station condition report number IR 04108119.

The apparent cause of the PSV failure was determined to be bulging of the bellows nose which resulted in increased contact between the bellows nose and the disc causing BN 04373 to lift below the lower Technical Specification as-found lift setting limit. Following a second failed lift, the valve was disassembled to determine the cause for the low lift, which led to the discovery of the bulge in the bellows nose. BN 04373 will have all damaged parts replaced, be rebuilt, tested, and re-certified for installation in the plant.

**III. ANALYSIS OF EVENT:**

Each unit at Calvert Cliffs has two PSVs (1/2RV200 and 1/2RV201) designed to limit Reactor Coolant System (RCS) [AB] pressure to a maximum of 110 percent of design pressure (design pressure = 2500 psia). The Unit 1 Technical Specification defined setpoints for these valves are as follows:

Valve	As-Found Lift Setting (psia)	As-Left Lift Setting (psia)
1/2RV200	>/= 2475 and </= 2575	>/= 2475 and </= 2525
1/2RV201	>/= 2475 and </= 2600	>/= 2500 and </= 2550

The as-found setpoints are the limits for operability, i.e., if a valve lifts outside of those setpoints it is considered inoperable. Calvert Cliffs owns eight PSVs, four sets of two that are rotated between a specific location. The as-found lift setting for BN 04373 measured in February 2018 was 2442 psia, which is lower than the Technical Specification SR allowed value of 2475 psia.

The valve was refurbished at the offsite facility in 2014 and subsequently passed as-left acceptance testing prior to being installed during the 2016 refueling outage. While installed in the



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**NARRATIVE**

plant (March 2016 through February 2018), there were no setpoint events associated with this valve. The valve was removed from its location for scheduled testing and refurbishment in February 2018 during the Unit 1 refueling outage. 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 its lift setting was not 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  $\leq 365$  degree F (Unit 1) 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 Limiting Condition for Operation 3.0.3. We believe that the subject condition (for the PSV) 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).

There were no actual nuclear safety consequences incurred from this event. For some time, while installed, 1RV200 was susceptible to an early lift. Realizing that if challenged, the valve could have lifted at a pressure different than assumed in the applicable safety analyses, the Calvert Cliffs Updated Final Safety Analysis Report (UFSAR) was reviewed and a probabilistic risk assessment analysis was performed.

The probabilistic risk assessment analysis determined that the estimated increase in core damage frequency was less than  $1E-07$  and the estimated increase in large early release frequency was less than  $1E-08$  per year for the subject condition. The deviations in the relief valve setpoint would have no significant impact as it would still perform the function modeled in the probabilistic risk assessment. This issue would be "GREEN" using the NRC's Significance Determination Process.

The Calvert Cliffs UFSAR was reviewed to evaluate the design basis events impacted by a decreased lift setting for 1RV200. The evaluation determined that the results presented in the UFSAR were bounding for all impacted design basis events. In all cases, overpressure protection of the RCS was maintained. Therefore, the condition of 1RV200 would not have prevented the system from fulfilling its safety function.

Furthermore, 1RV201 (BM 07952) was also lift tested during the 2018 refueling outage and successfully lifted within the Technical Specification limits. No signs of bulging of the bellows nose was noted on this valve.

This event has no impact on the Nuclear Regulatory Commission Reactor Oversight Process Performance Indicators.



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**NARRATIVE**

**IV. CORRECTIVE ACTIONS:**

**A. ACTION TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:**

The degraded valve will be refurbished, tested, and certified for use in the plant. As scheduled, another valve was installed during the 2018 Unit 1 refueling outage. BN 04373 is scheduled to be reinstalled into the 1RV200 location during the Unit 1 2020 refueling outage.

**B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:**

Analysis is ongoing to provide better clarity as to what caused the bellows nose to bulge and will help determine actions to be taken during this valve's refurbishment. The as-left setpoint of the PSV will be set based on recent as-found results and the revised allowed upper Technical Specification range. This provides additional margin to the lower as-found setpoint. Evaluation will also be conducted to determine possible alternatives to address the poor performance history of BN 04373.

A supplemental licensee event report will be submitted if additional information is subsequently developed that would significantly change the corrective actions for this event.

**V. ADDITIONAL INFORMATION:**

**A. FAILED COMPONENTS:**

The subject valve is an American Society of Mechanical Engineers Boiler and Pressure Code approved PSV designed to limit RCS pressure to a maximum of 110 percent of design pressure. The safety valve is a totally enclosed, back pressure compensatory, spring-loaded valve. The valves are manufactured by Dresser Consolidated, Inc. (EPIX Identification number D243).

**B. PREVIOUS LERS ON SIMILAR EVENTS:**

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. From this review it was noted that BN 04373 has now failed each of the last three times it was tested, although the apparent causes for previous times were due to different issues. The failure this time was the first time an issue with a bulging bellows nose was identified as the apparent failure cause. Inspection of BN 04373 valve's internals this outage eliminated past causes for PSVs failures, such as spring related or internal concentricity issues, as potential causes of this failure.

The following Licensee Event Reports (LERs) are identified from this review:

LER 317/2010-002-Setpoint (low [BN 04373] and high) failure on two separate valves-identified as setpoint variations.



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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 [BN 04373]) 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.