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August 22, 2016

L-16-223

10 CFR 50.73

ATTN: Document Control Desk
United States Nuclear Regulatory Commission
Washington, D.C. 20555-0001Subject:
Davis-Besse Nuclear Power Station, Unit 1
Docket Number 50-346, License Number NPF-3
Licensee Event Report 2016-007

Enclosed is Licensee Event Report (LER) 2016-007, "Pressurizer Code Safety Valve Setpoint Test Failures." This LER is being submitted to provide written notification in accordance with 10 CFR 50.73(a)(2)(v)(D) and 10 CFR 50.73(a)(2)(i)(B).

There are no regulatory commitments contained in this letter or its enclosure. The actions described represent intended or planned actions, are captured in the DBNPS Corrective Action Program, and are described for information only. If there are any questions or if additional information is required, please contact Mr. Patrick J. McCloskey, Manager – Site Regulatory Compliance, at (419) 321-7274.

Sincerely,



Brian D. Boles

Enclosure: LER 2016-007-00

cc: NRC Region III Administrator
NRC Resident Inspector
NRR Project Manager
Utility Radiological Safety BoardIE22
NRR



LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of
digits/characters for each block)

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 Infocollections.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.

1. FACILITY NAME

Davis-Besse Nuclear Power Station, Unit 1

2. DOCKET NUMBER

05000 346

3. PAGE

1 OF 4

4. TITLE:

Pressurizer Code Safety Valve Setpoint Test 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
06	21	2016	2016	- 007	- 00	08	22	2016	FACILITY NAME	DOCKET NUMBER
										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)			
1	<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 100	<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)
	<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 checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<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)(ii)
	<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

LICENSEE CONTACT:

Joseph C. Sturdavant, Staff Specialist – Regulatory Compliance

TELEPHONE NUMBER (Include Area Code)

(419) 321-8199

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

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO15. EXPECTED
SUBMISSION
DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

The two pressurizer safety valves (PSVs) at the Davis-Besse Nuclear Power Station (DBNPS) were replaced during an outage in Spring, 2016 with tested spares. The removed PSVs were sent to an offsite vendor for testing and refurbishment. In June, 2016 the test results were received showing both PSVs lifted higher than the allowed one percent tolerance above the 2500 psig setpoint (2525 psig) for As-Found testing. Because both valves had As-Found setpoints above the Technical Specifications (TS) allowed value, a past operability evaluation was performed, which concluded that both valves were inoperable during their time in service.

Based on the as-found lift setting pressures (2559 psig and 2554 psig), there was no adverse effect on transients described in the Updated Safety Analysis Report that can produce a Reactor Coolant System (RCS) overpressurization. The cause of this event was due to setpoint drift and narrow allowable setpoint range. Procedures will be revised to establish more restrictive testing requirements. The PSVs were replaced and a TS change will be submitted to provide for current ASME acceptance test criteria for the PSV setpoint. This event is being reported in accordance with 10 CFR 50.73(a)(2)(v)(D) and 10 CFR 50.73(a)(2)(i)(B).

NRC FORM 366A
(11-2015)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104

EXPIRES: 10/31/2018



LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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Davis-Besse Nuclear Power Station Unit 1	05000 - 346	YEAR 2016	SEQUENTIAL NUMBER - 007	REV NO. - 00

NARRATIVE

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

DESCRIPTION OF OCCURRENCE:

System Description:

The Reactor Coolant System (RCS) [AB] at the Davis-Besse Nuclear Power Station (DBNPS) has two identical Pressurizer Safety Valves (PSV) [AB-RV], each located on a flanged nozzle on the Pressurizer [AB-PZR] top head. The PSVs (valve/equipment numbers RC13A and RC13B) were manufactured by Crosby Valve & Gage Company, Model Number HB-86-BP Type E series valves designed for nuclear service and certified under Section III of the American Society of Mechanical Engineering (ASME) code for application in nuclear power systems. The valves are designed to be self-actuating, spring loaded, with balancing bellows and a balancing piston.

The function of the PSVs is to ensure the RCS pressure does not exceed the Technical Specification (TS) 2.1.2 Safety Limit of 2750 pounds per square inch gauge (psig).

Technical Specifications:

Technical Specification (TS) 3.4.10, "Pressurizer Safety Valves", Limiting Condition for Operation (LCO) 3.4.10 requires two PSVs be OPERABLE with lift settings less than or equal to 2525 psig in Modes 1, 2 and 3. With one PSV inoperable, TS 3.4.10 Action A requires the valve be restored to operable status within 15 minutes. If this required action cannot be met, or if two PSVs are inoperable, TS 3.4.10 Action B requires the plant to be placed in Mode 3 within 6 hours and in Mode 4 within 12 hours.

DESCRIPTION OF EVENT:

On March 26, 2016, the DBNPS shut down for Nineteenth Refueling Outage activities. As part of this outage, the two installed PSVs were removed and replaced with acceptable pre-tested spare valves under the preventive maintenance program. The removed PSVs, which had been previously installed in Spring of 2014 during the Eighteenth Refueling Outage, were sent to an offsite vendor for testing and refurbishment.

On June 21, 2016, with the plant operating in Mode 1 at 100 percent power, following receipt of final test results from the vendor test facility, it was identified that both valves had As-Found lift settings above the limits specified in TS 3.4.10. Because both valves had As-Found setpoints above the TS allowed value (2559 psig for RC13A and 2554 psig for RC13B), a past operability evaluation was performed. The past operability evaluation determined these valves were inoperable while they were installed in the plant during the past operational cycle.

CAUSE OF EVENT:

The direct cause of the as-found test setpoint of the PSVs to be greater than the TS allowable value of less than or equal to 2525 psig was determined to be setpoint drift. This is the same cause identified for a similar failure at the DBNPS in 2011 (reference Previous Similar Events Section below). Setpoint drift cannot be eliminated; however, as described in the Corrective Actions Section below, actions can be taken to minimize or reduce drift.

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NARRATIVE

CAUSE OF EVENT: (continued)

The root cause of this event is that the PSVs as-found allowable range of + 1/- 3 percent does not provide a sufficient margin to accommodate for PSV setpoint variance. This is also similar to the contributing cause identified for the 2011 failure at the DBNPS (reference Previous Similar Events Section below).

ANALYSIS OF EVENT:

While both valves had as-found setpoints that exceeded the TS allowable value, the highest out-of-tolerance setpoint was 34 psig higher than the TS allowed value.

Both PSVs lifting at a value higher than allowed by TS may result in exceeding accident analysis RCS pressure limits. Therefore, the transients described in the Updated Safety Analysis Report (USAR) that can produce an RCS over-pressurization were reviewed with respect to the out-of-tolerance PSV setpoints. This review concluded that both valves would have performed their design function if they would have operated at their respective out-of-tolerance lift pressures.

The PSVs are modeled in the DBNPS Probabilistic Risk Assessment (PRA) in two ways: a PSV fails to close after opening, or one or more PSVs fail to open upon demand. Failure of a PSV to close after opening results in a small loss of cooling accident. Failure of all relief capability (both PSVs and the Power Operated Relief Valve) to open could result in a transient over-pressurization of the RCS, resulting in the inability to inject cooling water. Failure of one or both PSVs to open limits the ability to successfully cool the plant using feed and bleed cooling, since in some cases, the PSVs can be used as the RCS discharge path for this cooling method. A review of the PRA concluded that neither failure mode (failure to re-close, failure to open) are impacted by the identified condition. Thus, there is no impact on PRA and no increase in Core Damage Frequency (CDF). The condition of having the two PSVs lift at pressures slightly above the allowed setpoint does not result in any increase in CDF. Therefore, this issue had very low safety significance. Additionally, this issue did not prevent the PSVs from fulfilling their design safety function.

Reportability Discussion:

NUREG-1022, Event Reporting Guidelines, states that discrepancies found in TS surveillance tests are normally assumed to occur at the time of the test unless there is firm evidence, based on a review of relative information, to indicate the discrepancy occurred earlier. The NUREG provides an example that multiple safety valve testing failures is an indication that the discrepancies may well have arisen over a period of time and did not occur just at the time of discovery. Evaluation of the PSV test history and potential failure modes for the PSV did not identify any information that would allow a conclusion that the valves were operable while the plant was operating in Mode 1, 2 or 3, as required by TS LCO 3.4.10. Therefore, this condition (two PSVs exceeding the TS allowed setpoint) is reportable as a Licensee Event Report (LER) per 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by the plant's TS based on the above guidance from NUREG-1022.

Additionally, because it was concluded that both PSVs were inoperable during a portion of the past operational cycle, this condition is also reportable, in accordance with NUREG-1022 guidance, per 10 CFR 50.73(a)(2)(v)(D) as an event or condition that could have prevented fulfillment of a safety function needed to mitigate the consequences of an accident. As described in the "Analysis of Event" section above, the PSVs

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NARRATIVE

ANALYSIS OF EVENT (Reportability Discussion continued):

would have performed their USAR accident mitigation design safety function if they would have operated at their respective out-of-tolerance lift pressures.

CORRECTIVE ACTIONS:

Completed Actions:

During the Nineteenth Refueling Outage concluding in May 2016, two PSVs were installed in place of the removed valves as part of planned preventive maintenance activities. The installed valves, identical to the removed valves, had As-Left set pressures of approximately 2495 psig for both PSVs.

Scheduled Actions:

As discussed in the cause analysis section above, setpoint drift cannot be eliminated; however, actions can be taken to minimize or reduce drift. Therefore, changes will be made to the PSV testing procedure(s) to provide actions for improving valve repeatability by establishing more restrictive PSV main spring requirements and requiring three (3) consecutive lifts as part of as-left testing.

Extensive industry operating experience research from this event's evaluation, coupled with the previous DBNPS LER 2011-001 discussed below, has shown that a prudent action to address the root cause is to propose a License Amendment Request to change the TS 3.4.10 limit from less than or equal to 2525 psig to less than or equal to 2575 psig to facilitate the ASME acceptance criteria of +/- 3 percent for as-found testing. The industry operating experience review from this event's evaluation indicates the DBNPS is an exception in not having changed the DBNPS TS licensing basis to the current ASME +/- 3 percent as-found test criteria.

PREVIOUS SIMILAR EVENTS

DBNPS LER 2011-001, "Pressurizer Code Safety Valve Setpoint Test Failures," was submitted on March 11, 2011, to document an occurrence where both PSVs removed during the Sixteenth Refueling Outage in Spring of 2010 had exceeded the TS allowed value with the highest out-of-tolerance setpoint of 10 psig higher than the required value. As discussed above in the cause analysis section, the causes were the same or similar to this event. The same [direct] cause of the 2011 test failure was determined to be setpoint drift, and the contributing cause was similar to this event's root cause. Additionally, the operating experience review from the 2016 test failure, suggest other licensees have changed their TS acceptance criteria. The 2011 corrective action focused on PSV testing improvements, such as establishing a strictly adhered to as-left test tolerance requirement, which was shown to be effective in testing performed following the Seventeenth Mid-Cycle Outage and the Eighteenth Refueling Outage.