



FirstEnergy Nuclear Operating Company

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Mark B. Bezilla  
Vice President, Nuclear

419-321-7676

February 14, 2019

L-19-025

10 CFR 50.73

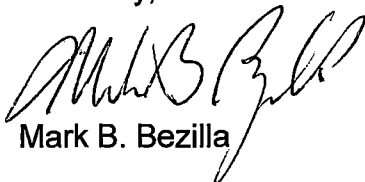
ATTN: Document Control Desk  
United States Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Subject:  
Davis-Besse Nuclear Power Station, Unit 1  
Docket Number 50-346, License Number NPF-3  
Licensee Event Report 2018-001

Enclosed is Licensee Event Report (LER) 2018-001, "Borated Water Storage Tank Level Transmitter Out of Tolerance Due to Reaching End of Expected Life." This event is being reported pursuant to 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 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,



Mark B. Bezilla

GMW

Enclosure: LER 2018-001

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

IEZ2  
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/>)

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [InfoCollects.Resource@nrc.gov](mailto:InfoCollects.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 5

**4. Title:**

Borated Water Storage Tank Level Transmitter Out of Tolerance Due to Reaching End of Expected Life

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
12	16	2018	2018	001	00	02	14	2019	Facility Name	Docket Number
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			<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)
100			<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 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**

Gerald M. Wolf, Supervisor – Regulatory Compliance

**Telephone Number (Include Area Code)**

(419) 321-8001

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

Month	Day	Year

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

On December 16, 2018, with the Davis-Besse Nuclear Power Station operating at approximately 100 percent power, during a scheduled panel shift walkdown it was identified the Safety Features Actuation System (SFAS) Channel 3 Level Transmitter for the Borated Water Storage Tank (BWST) was reading lower than expected. The associated SFAS Bistable was tripped upon discovery in accordance with the Technical Specifications Required Actions. A review of plant computer data identified this transmitter had been reading lower than expected starting more than 7 hours prior to discovery, which resulted in the plant operating in a condition prohibited by the Technical Specifications. The transmitter was recalibrated and returned to service the following day; the transmitter was subsequently replaced on January 3, 2019, after it began to indicate a degrading trend. The cause of the degradation was determined to be the transmitter reaching the end of its expected service life, as the transmitter was installed during original plant construction. The remaining three BWST level transmitters have been or will be replaced.

This issue is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B).

**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		
Davis-Besse Nuclear Power Station Unit 1	05000 - 346	YEAR  2018	SEQUENTIAL NUMBER  - 001	REV NO.  - 00

**NARRATIVE**

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

**DESCRIPTION OF OCCURRENCE:****System Description:**

The Safety Features Actuation System (SFAS) [JE] at the Davis-Besse Nuclear Power Station (DBNPS) is designed to automatically prevent or limit fission product and energy release from the core, to isolate the containment vessel and to initiate the operation of Engineered Safety Features equipment in the event of a loss of coolant accident and main steam line break. The SFAS operates in a distributed manner to initiate the appropriate systems. The SFAS does this by determining the need for actuation in each of four channels monitoring each actuation parameter. Once the need for actuation is determined, the condition is transmitted to automatic actuation logics, which perform the two-out-of-four logic to determine the actuation of each end device. Four plant parameters are used for automatic SFAS actuation. The fifth parameter, the Borated Water Storage Tank (BWST) [BP-T] Level Low-Low, is used to provide a permissive to allow manual transfer from the BWST to the Containment Emergency Sump.

The SFAS consists of four identical redundant instrument (sensing) and logic channels and two identical redundant actuation channels, and each instrument channel includes trip bistable modules with digital isolation devices. The isolated output of the trip bistable module is used to comprise coincidence matrices with the terminating relays within the actuation channel of the SFAS. The trip bistables monitor the station variables and normally feed continuous electrical (fail-safe) signals into two-out-of-four coincidence matrices. Should any of the station variables exceed their trip setpoints, the corresponding bistables in each of the four channels will trip and cease sending output signals. If two of the four channel bistables monitoring the same station variable cease to send output signals, the corresponding normally-energized terminating relays on all channels will trip.

The SFAS is a fail-safe, de-energize to trip, system. The terminating relays of sensing and logic channels 1 and 3 must both be de-energized to activate safety actuation channel 1. Similarly, sensing and logic channels 2 and 4 must both be de-energized to activate safety actuation channel 2. The terminating relays (also known as output relays) [JE-RLY] act on the actuation control devices such as motor controllers and solenoid valves.

The BWST supplies borated water for emergency core cooling via the Decay Heat Removal/Low Pressure Injection (LPI) System [BP] and High Pressure Injection (HPI) System [BJ], and as a source of borated water for the Containment Spray System [BE]. The BWST ensures that an adequate supply of borated water is available to cool and depressurize the containment in the event of a Design Bases Accident (DBA); to cool and cover the core in the event of a Loss of Coolant Accident (LOCA), and to ensure an adequate level exists in the containment sump to support Emergency Core Cooling (ECCS) and Containment Spray Pump operation in the recirculation mode.

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Davis-Besse Nuclear Power Station Unit 1	05000 - 346	2018	- 001	- 00

**NARRATIVE****DESCRIPTION OF OCCURRENCE: (continued)**

The BWST level is monitored by four independent level transmitters. Each of the differential pressure signals generated by these transmitters is monitored by a bistable to provide a trip signal at a low-low level. The BWST allowable value of greater than or equal to 101.6 inches of water and less than or equal to 115.4 inches of water provides the operator with an alarm and a permissive to allow timely alignment of the BWST outlet and containment emergency sump valves to the long term recirculation position. This is to protect the pumps from cavitation for lack of proper net positive suction head and allow transfer of ECCS suction to the containment emergency sump from the BWST during the recirculation mode of operation before the inventory of the BWST is depleted.

**Technical Specification(s):**

Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.5 requires four channels of SFAS instrumentation for each parameter to be operable in each SFAS train. Failure of any instrument renders the affected channel(s) inoperable and reduces the reliability of the affected parameter and affected systems or components. With one or more parameters with one channel inoperable, Condition A requires that channel be placed in trip in one hour. If the required action of Condition A to place the channel in trip in an hour is not met, or one or more parameters with two or more channels rendered inoperable, Condition B requires the unit to be in Mode 3 in 6 hours and Mode 5 within 36 hours. TS Surveillance Requirement 3.3.5.1 requires a Channel Check be performed on all SFAS parameters once every 12 hours.

**DESCRIPTION OF EVENT:**

On December 16, 2018 at 1909 hours, with the DBNPS operating in Mode 1 at approximately 100 percent power, a licensed operator performing a scheduled control room panel shift walkdown identified the SFAS Channel 3 BWST Level Indicator displayed approximately 38 feet while the other three indicators displayed greater than 40 feet as expected. The SFAS Channel 3 BWST Level Transmitter was declared inoperable, and at 1935 hours the BWST Level Lo Bistable for SFAS Channel 3 was tripped in accordance with Required Action A.1 for LCO 3.3.5.

A review of the analog plant computer points associated with the BWST Level indicators on December 16, 2018, identified the computer points alarmed at approximately 34 feet, which is too low to detect a lowering BWST level value during normal operations. Therefore, a review of the past computer point data for SFAS Channel 3 BWST Level Transmitter was performed, which identified the transmitter output experienced a downward shift of more than two feet at approximately 1154 hours on December 16, 2018. The transmitter output value returned to an expected value at approximately 1428 hours, and then again shifted downward by approximately two feet at approximately 1901 hours, with the issue being identified by the licensed operator at 1909 hours.

**CAUSE OF EVENT:**

The SFAS Channel 3 BWST Level Transmitter issue was determined to be caused by the transmitter reaching the end of its expected service life. The transmitter was determined to have been installed approximately 42 years ago during original plant construction.

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CONTINUATION SHEET**

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**NARRATIVE****ANALYSIS OF EVENT**

The BWST level transmitters monitor the BWST level and initiate an SFAS Level 5 signal on BWST level low-low. This output signal provides a passive permissive interlock to allow operators the ability to shift ECCS suction from the BWST to the Emergency Sump by allowing operators to open the Decay Heat Pump Suction From Emergency Sump Valves and close the associated BWST Isolation Valves. The transfer of suction source from the BWST to the Emergency Sump is a manual transfer. The Probabilistic Risk Analysis (PRA) models failure of the SFAS Level 5 permissive signal, as well as failure of the valves to be repositioned (or failure of the human action to manually transfer the suction), which could result in the inability of the plant to shift ECCS suction from the BWST to the Emergency Sump.

The four-channel SFAS is a two-out-of-four logic circuit, such that when any two level instruments sense a BWST level low-low, the permissive interlock will actuate for both trains. With the SFAS Channel 3 BWST Level Transmitter indicating approximately two feet lower than the other three channels, it would have tripped its respective output module sooner than desired on a decreasing BWST level. The remaining three channels, which were reading within expected values during the time period in question, would have ensured the permissive interlock would only have actuated within the required values. By procedure and by training, Operators would monitor, log, and trend BWST level, so they would be aware of the proper time to transfer the suction of the ECCS pumps from the BWST to the Emergency Sump, and there would be minimal increase in the likelihood of failing to perform the required action. Therefore, this condition was of very low safety significance.

**Reportability Discussion:**

Based on the plant computer data for SFAS Channel 3 BWST level, the transmitter was not reliably capable of performing its required TS function for the entire time starting at December 16, 2018, at 1154 hours. The instrument was declared inoperable at 1909 hours when the condition was discovered and Required Action A.1 of LCO 3.3.5 was taken at 1935 hours when the BWST Level Lo Bistable for SFAS Channel 3 was tripped. 10 CFR 50.73(a)(2)(i)(B) requires reporting of any operation or condition which is prohibited by the Technical Specifications unless the listed exceptions are met. For this issue, with the transmitter considered inoperable at 1154 hours, the channel was required to be tripped within one hour, or at 1254 hours per LCO 3.3.5 Condition A. This required action was not performed within the associated completion time because the instrument inoperability was unknown until discovered at 1909 hours during the TS Surveillance Requirement 3.3.5.1 Channel Check, which is performed every 12 hours. LCO 3.3.5 Condition B required the unit be placed in Mode 3 in the following 6 hours, or at 1854 hours. The bistable was tripped at 1935 hours, exceeding the TS completion time (total allowed restoration and shutdown outage time) by 41 minutes. Therefore, this issue is reportable as a Licensee Event Report per 10 CFR 50.73(a)(2)(i)(B). Because only one channel of SFAS BWST level instrumentation was affected by this issue, no loss of safety function occurred.

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**NARRATIVE****CORRECTIVE ACTIONS:****Completed Actions:**

On December 17, 2018, at 2130 hours the SFAS Channel 3 BWST Level Transmitter was calibrated and declared Operable.

On January 3, 2019, after SFAS Channel 3 BWST Level Transmitter output began to indicate a degrading trend, the level transmitter was replaced with an equivalent transmitter and returned to service on January 4, 2019.

SFAS Channel 4 BWST Level Transmitter was replaced and returned to service on January 22, 2019, after displaying erratic indication on January 20.

**Scheduled Actions:**

Maintenance Activities have been scheduled to replace the SFAS Channel 1 and 2 BWST Level Transmitters in June 2019.

**PREVIOUS SIMILAR EVENTS:**

Licensee Event Report (LERs) 2016-001 reported the simultaneous inoperability of two BWST level channels due to the failure to initially recognize that entry conditions for the TS had been met following a loss of power to an SFAS Channel. The corrective actions taken in response to the 2016 event were focused in the area of human performance and would not have prevented this current hardware event.