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July 11, 2016

L-16-177

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 2016-005

Enclosed is Licensee Event Report (LER) 2016-005-00, "Plant Startup with Anticipatory Reactor Trip System in Main Turbine Bypass." This event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications.

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,



Brian D. Boles

GMW

Enclosure: LER 2016-005

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](mailto: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 5

**4. TITLE:**

Plant Startup with Anticipatory Reactor Trip System in Main Turbine Bypass

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED			
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV ND.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER		
05	10	2016	2016	005	00	07	11	2016	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  53			<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 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	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) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR

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

On May 10, 2016, the Davis-Besse Nuclear Power Station (DBNPS) was in Mode 1 and increasing power following refueling outage activities. At 0528 hours, it was identified that all four of the Anticipatory Reactor Trip System (ARTS) channel switches were in the bypass position for the Main Turbine function while at approximately 53 percent power. These switches are required by the Technical Specifications to be in the normal/enabled position when above 45 percent power. The switches were restored to Normal and the applicable Technical Specifications exited at 0552 hours. An Operations Standing Order was issued to require paired periodic walk downs of all Control Room panels to ensure a comprehensive understanding of plant status awareness. Walk downs were also performed to independently identify any additional concerns or omissions in plant startup activities. The root cause of this event is the operators failed to effectively work as a team to ensure a safety system was in an operable condition when required. Corrective actions include implementation of the Operations Section Continuous Improvement Plan and revision of applicable procedures.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications.

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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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Davis-Besse Nuclear Power Station Unit 1	05000 - 346	YEAR 2016	SEQUENTIAL NUMBER - 005	REV NO. - 00

## **NARRATIVE**

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

### **System Description:**

At the Davis-Besse Nuclear Power Station (DBNPS), the purpose of the Anticipatory Reactor Trip System (ARTS) is to initiate a reactor trip on a loss of main feedwater [SI] event or a trip of the Main Turbine [TA] at power in order to reduce the magnitude of pressure and temperature transients on the Reactor Coolant System [AB]. This lowers the probability of the Pressurizer Pilot Operated Relief Valve (PORV) [AB-RV] actuation during these events. The ARTS was added to the Babcock and Wilcox (B&W) designed plants following the Three Mile Island Unit 2 accident, but is not credited to mitigate the consequence of any accident in the Updated Final Safety Analysis Report (UFSAR).

The ARTS consists of four separate redundant protection channels that receive inputs of Main Feedwater (MFW) pump [SI-P] status and Main Turbine status. Each protection channel contains a logic trip module, which transmits trip signals to its own two-out-of-four logic and to the two-out-of-four logic of the logic trip modules in the other three ARTS protective channels. Whenever any two ARTS channels transmit channel trip signals, the logic trip module in each channel actuates to remove power from its associated Control Rod Drive trip breaker [AA-BKR].

### **Technical Specifications:**

Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.16 requires three channels of the ARTS instrumentation Turbine Trip function be Operable when greater than 45 percent Rated Thermal Power. With one required channel inoperable, Condition A requires the channel be restored to Operable status within 72 hours. If the Required Action and associated Completion Time is not met, Condition B requires reactor thermal power to be reduced to less than 45 percent power within 6 hours. TS LCO 3.3.16 also requires three channels of the Trip of Both Main Feed Pump Turbines instrumentation function and four channels of the Output Logic function be operable when in Mode 1.

### **DESCRIPTION OF EVENT:**

On May 9, 2016, the unit entered Mode 1 at 1524 hours following refueling outage activities. One of the projects completed during the outage was replacement of the Control Rod Drive System with a digital system per Engineering Change Package (ECP) 12-0272.

On May 10, 2016, with the unit at approximately 53 percent power, it was identified during review of Control Room Annunciators at 0528 hours that the ARTS test trip bypass annunciator was lit. The status of the ARTS Trip Bypass switches was reviewed and it was identified that all four ARTS channels were in Steam Feed Rupture Control System (SFRCS) [JB] bypass and Main Turbine bypass vice the expected "Normal" condition.

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Davis-Besse Nuclear Power Station Unit 1	05000 - 346	YEAR 2016	SEQUENTIAL NUMBER - 005	REV NO. - 00

## **NARRATIVE**

### **CAUSE OF EVENT:**

Operating Procedure DB-OP-06902, Power Operations, provides operating instructions for Main Turbine startup at 18 percent power through full power operation as well as reactor shutdown. Step 4.6.5 of DB-OP-06902 instructs the operator to verify ARTS is enabled prior to reaching 45 percent power. The direct cause for the ARTS Trip Bypass being left in bypass for SFRCS and Main Turbine during startup is the reactor operator failed to fully read and understand procedure DB-OP-06902 step 4.6.5 prior to verifying ARTS enabled at approximately 40 percent power. The operator did not preview/review the task/procedure before performance.

The root cause of this event is the operators failed to effectively work as a team to ensure a safety system was in an operable condition prior to the mode of applicability for plant startup. The operators were ineffective in their advocacy to understand why ARTS was in bypass and failed to get a critical review of assumptions they made that plant startup procedures would, at some point, restore ARTS.

A contributing cause to this event is some procedures were not developed in accordance with approved processes and did not contain specific guidance for restoration of ARTS after all four channels of all parameters were placed in bypass. This was evident in temporary Test Procedure DB-TP-10405, Digital Control Rod Drive System (DCRDCS) Post Installation Testing for ECP 12-0272 as well as other operating procedures.

### **ANALYSIS OF EVENT:**

With the ARTS channels in bypass, the anticipatory reactor trip signal on a Main Turbine Trip would not have been provided. The reactor trip output function of SFRCS, since it uses the ARTS trip as its means of tripping the reactor, would likewise have been disabled. All of the other features of the SFRCS (e.g., start Auxiliary Feedwater Pumps [AB-P], align valves to isolate and/or feed water to the Steam Generators [AB-SG]) would still have functioned. As stated above, the ARTS, including the SFRCS reactor trip function to ARTS, is not credited to mitigate the consequences of any UFSAR accident.

The Davis-Besse Probabilistic Risk Assessment (PRA) model does not model ARTS or credit it for tripping the reactor or mitigating any accidents or transients. All of the SFRCS functions which are modeled in the PRA were still available (e.g., start Auxiliary Feedwater Pumps, align valves to isolate and/or feed water to the Steam Generators). Other protective systems such as the Reactor Protection System [JC] and the Safety Features Actuation System [JE] were functional, and the Immediate Action for an SFRCS trip indication is for the Control Room Operators to manually trip the reactor.

The switch mispositioning occurred while the plant was at a reduced power level of 53 percent and with minimal decay heat in the core, as it occurred during startup from a refueling outage. The plant was in this condition for approximately 54 minutes. Therefore, the bypass of the ARTS channels while above 45 percent reactor power is qualitatively evaluated as having very low safety significance.

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Davis-Besse Nuclear Power Station Unit 1	05000 - 346	YEAR 2016	SEQUENTIAL NUMBER - 005	REV NO. - 00

## NARRATIVE

### ANALYSIS OF EVENT: (continued)

#### Reportability Discussion:

The unit attained 45 percent power at approximately 0458 hours on May 10, 2016. The discovery that all four channels of ARTS were in SFRCS Bypass and Turbine-Generator Bypass occurred at 0528 hours with the plant at approximately 53 percent power. 10 CFR 50.73(a)(2)(i)(B) requires reporting of any operation or condition which was prohibited by the plant's Technical Specifications. TS Table 3.3.16-1 states that three channels ARTS instrumentation Turbine Trip function are required to be Operable when greater than 45 percent Reactor Power, so LCO 3.3.16 was not met. TS LCO 3.0.4 states that when an LCO is not met, entry into a Mode or other specified condition in the Applicability shall only be made when the listed conditions (a, b, or c) are met. Because these conditions were not met, the unit should not have increased power above 45 percent power with 3 instrumentation channels of ARTS inoperable. Therefore, this issue is reportable as a Licensee Event Report (LER) per 10 CFR 50.73(a)(2)(i)(B). Because the ARTS is not credited to mitigate the consequences of any accident as described in the UFSAR, this issue does not represent a loss of safety function.

#### CORRECTIVE ACTIONS:

##### Completed Actions:

LCO 3.3.16 Condition A and LCO 3.0.3 were entered at the time of discovery. ARTS Channels 1 through 4 bypass switches were restored to Normal for both SFRCS and Main Turbine Trip functions per plant operating procedures, and LCO 3.3.16 and LCO 3.0.3 were exited at 0552 hours on May 10, 2016.

Knowledgeable station personnel were paired in teams to perform walk downs of safety and environmentally significant systems and field conditions in an effort to independently identify concerns or omissions in plant startup activities.

Active Control Room and in-field local alarm panel annunciator windows were reviewed for an understanding of status and the alarming input. The Senior Reactor Operator turnover sheet was updated to accurately reflect these conditions.

An Operations Standing Order was developed and issued on the day of the event to require paired periodic walk downs of all Control Room panels to ensure a comprehensive understanding of plant status awareness. This Standing Order remains in place pending establishment of further corrective actions.

##### Scheduled Actions:

Preventive actions have been developed to address the root cause of this event. However, since it involves crew/team behaviors, it is recognized that these actions may not be fully effective in precluding all future events attributed to less than adequate teamwork. It is expected that implementation of the Operations Section Cycle 20 Continuous Improvement Action Plan will act to minimize subsequent events where challenges in team behaviors may lead to a gap in compliance with technical specifications.

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(11-2015)

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Davis-Besse Nuclear Power Station Unit 1	05000 - 346	YEAR  2016	SEQUENTIAL NUMBER  - 005	REV NO.  - 00

## NARRATIVE

### CORRECTIVE ACTIONS: (continued)

In support of the Operations Continuous Improvement Action Plan, operating crews will document at least one example of the Operator Fundamental Aspects of inquiry (validate assumptions) and advocacy from the Shift Crew Critiques. The Shift Manager will discuss these documented results during the End of Cycle Crew Performance Evaluation Meetings.

The Temporary Test Procedure DB-TP-10405 has been voided, and operating procedures that manipulate/verify the ARTS Trip Bypass switches (such as DB-OP-06902) will be modified to provide more specific guidance for the operation of the switches.

### PREVIOUS SIMILAR EVENTS

There have been no LERs at the DBNPS in the past three years involving the inoperability of the ARTS.