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L-14-186

10 CFR 50.73

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

SUBJECT:
Davis-Besse Nuclear Power Station
Docket Number 50-346, License Number NPF-3
Licensee Event Report 2014-002

Enclosed is Licensee Event Report (LER) 2014-002, "Manual Initiation of the Reactor Protection System due to Disconnected Cooling of a Control Rod Drive." This LER is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A).

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,

Raymond A. Lieb

GMW

Enclosure: LER 2014-002

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

IE22
NRR

NRC FORM 366 (02-2014)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Davis-Besse Nuclear Power Station	05000 346	1 OF 4

4. TITLE

Manual Initiation of the Reactor Protection System due to Disconnected Cooling of a Control Rod Drive

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 05000
05	05	2014	2014 -	002 -	00	07	07	2014	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
3	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
000	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Gerald M. Wolf, Supervisor, Nuclear Compliance	(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		15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete EXPECTED SUBMISSION DATE).*	☒ NO				

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

On May 5, 2014, with the Davis-Besse Nuclear Power Station in Mode 3 and the Reactor Coolant System at normal operating temperature and pressure, workers were replacing a Control Rod Drive (CRD) Position Indication Tube due to incorrect indications identified during startup testing. Because of the tight working conditions, a flexible cooling line was moved aside to replace the Position Indication Tube, which caused inadvertent disengagement of a quick disconnect fitting, resulting in inadvertent isolation of cooling water to another CRD mechanism. When the CRD mechanism reached a procedural temperature limit, the reactor trip breakers were manually opened from the Control Room.

The cause of this event was not completely identifying and assessing all risks and consequences before conducting the tube replacement. The cooling line was reconnected, and the preventive maintenance activity for performing this work will be revised to add a specific precaution regarding the susceptibility of the cooling hose quick disconnects to become disengaged.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in manual actuation of the Reactor Protection System with the reactor not critical.

NARRATIVE

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

System Description:

The Davis-Besse Nuclear Power Station (DBNPS) Reactor Protection System (RPS) [JC] initiates a reactor trip to protect against violating the core fuel design limits and the Reactor Coolant System (RCS) [AB] pressure boundary during anticipated operational occurrences. The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings in terms of parameters directly monitored by the RPS, as well as the Technical Specification (TS) Limiting Conditions for Operation on other reactor system parameters and equipment performance.

The RPS Manual Reactor Trip provides the operator with the capability to trip the reactor from the control room in the absence of any other trip condition. Manual trip is provided by two trip push buttons located in the control room and mounted on either side of the rod control panel. Each push button operates eight electrically independent switch contacts, one for each side of the undervoltage coil for each breaker. This trip is independent of the automatic trip system. Power for the Control Rod Drive Mechanism (CRDM) breaker undervoltage coils and contactor coils comes from the reactor trip modules (RTMs). Opening of the switch contacts opens the lines to the breakers, tripping them. The switch contacts also energize the breaker shunt trip mechanisms. There are two separate push button switches in series, with the output of each of the four RTMs. Pressing either push button will remove power from all four CRDM trip breakers, initiating a reactor trip.

The Control Rod Drive System [AA] consists of 61 CRDMs and the associated equipment needed to provide safe and reliable control of the Control Rod Assemblies used to control the reactivity level in the reactor fuel. The CRDMs are mounted on flanged nozzles on the top of the reactor vessel closure head. Control of the CRDMs is accomplished by operating the CRDMs in eight groups. There are four to twelve CRDMs in each group and all of the CRDMs in a group operate in unison. Groups 1 through 4 are operated in a safety rod mode, Groups 5 through 7 are operated in a regulating rod mode, and Group 8 is assigned to the Axial Power Shaping Rods (APSRs). Two methods of Control Rod and APSR position indication are provided: absolute position indication and relative position indication.

DESCRIPTION OF EVENT:

On May 4, 2014, the DBNPS was in Mode 3 with the Reactor Coolant System at normal operating temperature and pressure performing startup activities from the Eighteenth Refueling Outage. During performance of procedure DB-SC-04270, "Control Rod Drive Program Verification," to ensure each Control Rod (Safety, Regulating, and Axial Power Shaping) is programmed to operate in the specified Core position and Rod Group, it was identified the Zone Reference Light for Control Rod 7-4 (location N12) was not lit with the rod fully inserted per Absolute Position Indication. Actions were initiated to replace the Position Indication Tube [AA-ZI] for rod 7-4.

On May 5, 2014, workers entered Containment to replace the Position Indication Tube. The work location was on the Integrated Head Assembly on top of the Reactor Vessel with the plant at full temperature and pressure, resulting in a tight working area at elevated temperatures and a heat stress stay time of less than one hour. At the work location it was identified a flexible Component Cooling Water hose for an adjacent CRDM had to be moved to provide clearance for the Position Indication Tube replacement. The work supervisor in the field determined there was sufficient slack in the heavy duty flexible hoses to hold them aside to provide the necessary clearance. However, while holding

NARRATIVE

DESCRIPTION OF EVENT: (continued)

the hoses to location L14 (CRDM 4-3), the flared end of the quick disconnect [AA-DISC] was moved with sufficient force to cause the fittings to disengage. While the fittings did not completely separate, they disengaged sufficiently to cause the check valves at each fitting to close to isolate flow to CRDM 4-3 in location L14 without leaking any cooling flow from the hose. The workers were unaware the fittings had disengaged to isolate cooling flow to the CRDM.

At the same time as the work on the Position Indication Tube was going on, Operations began performing procedure DB-SC-03270, "Control Rod Assembly Insertion Time Test." A plant computer point alarmed to notify the Control Room Operators that the temperature of CRDM 4-3 at location L14 had reached 140 degrees F, and the operators began continuous monitoring of the increasing temperature as instructed by the test procedure. Due to the noisy environment, the workers on the Integrated Head Assembly at location N12 (CRDM 7-4) were contacted after several attempts, but they were unable to identify the cause of the high temperature, and could not perform further troubleshooting due to heat stress stay times.

At 1456 hours, CRDM 4-3 at location L14 reached a temperature of 180 degrees F. In accordance with the Control Rod Assembly Insertion Time test procedure, the CRDM was de-energized by manually opening the reactor trip breakers by utilizing the manual reactor trip pushbuttons in the Control Room.

CAUSE OF EVENT:

The direct cause of the CRDM 4-3 high temperature was the inadvertent disengagement of the cooling line quick disconnect fitting while moving the flexible hoses to provide clearance for replacement of the CRDM 7-4 Position Indication Tube. This was due to the Position Indication Tube replacement activity being conducted without completely identifying and assessing all risks and consequences. The work was performed by FENOC workers who had not previously performed the task, with the Integrated Head Assembly on the Reactor Vessel at normal operating temperature and pressure, all CRDM cooling lines connected and in service, while simultaneously performing Control Rod surveillance testing. Replacement of the Position Indication Tubes is typically performed by outside contractors with the unit shut down, the cooling lines disconnected, and the Integrated Head Assembly removed from the Reactor Vessel. The workers were briefed for personnel safety issues including heat stress and personal protective equipment, radiological conditions, foreign material exclusion, and proper work document adherence, and received training on an equipment mock-up prior to actual work performance. However, the potential risk associated with the cooling line quick disconnect fittings was not recognized.

ANALYSIS OF EVENT:

Upon indication of the CRDM 4-3 temperature exceeding 180 degrees F, the manual reactor trip pushbuttons in the Control Room were depressed to open the reactor trip breakers. The partially withdrawn rods from Safety Group 2 fully inserted into the reactor core, and all other Safety Rods (Groups 1, 3, and 4) and Control Rods (Groups 5, 6, and 7) remained fully inserted in the reactor core. All safety equipment performed as designed; therefore, this event was of very low safety significance.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Davis-Besse Unit Number 1	05000 346	2014 -	002 -	00	4 OF 4

NARRATIVE

Reportability Discussion:

The NRC was verbally notified of this event per 10 CFR 50.72(b)(3)(iv)(A) at 2117 hours on May 5, 2014, via Event Number 50086. This issue is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in manual actuation of the RPS with the reactor not critical. No safety functions were lost as a result of this issue, and all TS required actions were met.

CORRECTIVE ACTIONS:

The cooling line to CRDM 4-3 was reconnected upon discovery, and temperatures returned to expected values. Evaluation of CRDM 4-3 by the vendor determined that the maximum temperature of 189 degrees F observed on the CRDM stator did not pose a risk to equipment reliability, so no further hardware actions were required.

The Preventive Maintenance Activity for Position Indication replacement with the Integrated Head Assembly installed on the Reactor Vessel will be revised to add a specific precaution regarding the susceptibility of the cooling hose quick disconnects to become disengaged and how the disconnects should be re-connected.

This event will be presented as a case study in DBNPS Supervisory Continuing Training as a lesson learned, including the consequences, causes, and corrective actions of the event.

PREVIOUS SIMILAR EVENTS:

DBNPS LER 2014-001 documents an event where the Reactor Protection System was manually initiated on May 4, 2014, due to a different issue with the Control Rod Drive System. While the operator's reactions were the same for each Control Rod Drive System issue, the events requiring de-energization of the Reactor Trip Breakers were induced by maintenance activities on unrelated equipment. Due to their close time proximity, no corrective actions had been developed from LER 2014-001 that could have prevented the issue described in this LER (2014-002).