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June 27, 2014

L-14-185

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 2014-001

Enclosed is Licensee Event Report (LER) 2014-001, "Manual Initiation of the Reactor Protection System due to Unexpected Indication of Control Rod Movement." 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 2014-001

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

APPROVED BY OMB NO. 3150-0104 EXPIRES 01/31/2017

# 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 3 |

**4. TITLE**

Manual Initiation of the Reactor Protection System due to Unexpected Indication of Control Rod Movement

| 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 | 04 | 2014 | 2014 | - 001 | - 00 | 06 | 27 | 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 4, 2014, with the Davis-Besse Nuclear Power Station in Mode 3 and the Reactor Coolant System at normal operating temperature and pressure, testing was in progress on the Control Rod Drive (CRD) System. When a Group 8 Axial Power Shaping Rod was withdrawn, indication was received of movement of a Group 4 Control Rod. The Group 4 Control Rod indication was manually driven to zero percent indication and the reactor trip breakers were opened from the Control Room.

The erroneous indication was due to improper connection of a Containment Electrical Penetration for CRD System position indication during the refueling outage. The penetration was rewired to permit startup activities to continue. The Post-Maintenance Test Manual will be updated to add guidance for testing Containment Electrical Penetrations associated with the CRD System.

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). The CRDMs in Groups 1 through 7 are designed so that they will release the Control Rod Assemblies upon loss of power to the CRDM stator. The CRDMs in Group 8 are equipped with an anti-trip device so that they will not release the leadscrews and Control Rod Assemblies upon loss of electrical power to the stators. CRDMs in each of these groups are located in a dispersed pattern; however, there is location symmetry in each quadrant of the reactor. All the CRDMs of a group move the Control Rod Assemblies in unison to provide an even rate of controlling reactivity in the reactor fuel.

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. Activities were in progress to obtain Zero Percent and In Limit Lights for the Group 8 APSRs. While performing this activity, unexpected outward movement was indicated on Control Rod 4-9, which showed the rod moved from approximately zero percent to 2.33 percent when Group 8 was withdrawn to clear the In Limit Light. Also, when Control Rod 8-8 was withdrawn on the Auxiliary Power Supply, Control Rod 4-9 indicated movement from 2.33 percent to 5.96 percent while no movement was observed for Control Rod 8-8. Control Rod 4-9 indication was manually driven back to zero percent indication from the control panel and the reactor trip breakers were opened from the Control Room.

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NARRATIVE

CAUSE OF EVENT:

During the Eighteenth Refueling Outage, a Containment Electrical Penetration [NH-PEN] was replaced that contained wiring for the affected CRDM position indications. When the old penetration was being disconnected, it was discovered the cable designation scheme tags on the wires inside of containment were difficult to read. When the new penetration was installed, new cable scheme tags were placed on the nine existing field cables containing five wires each. The penetration was apparently connected improperly due to some of the cable scheme tags not being replaced correctly during the penetration replacement. The post maintenance testing detailed in the work order for replacement of the Containment Electrical Penetration was not sufficient to detect the improper connections prior to startup testing of the Control Rod Drive System.

ANALYSIS OF EVENT:

Upon indication of the unexpected outward Control Rod movement, the rod that indicated outward movement was manually inserted to zero percent indication from the control panel. The manual reactor trip pushbuttons in the Control Room were depressed to open the reactor trip breakers. All safety equipment performed as designed, and no negative reactivity was added when the reactor trip breakers were opened because all Control Rods were already fully inserted into the reactor core. Therefore this event was of very low safety significance.

Reportability Discussion:

Following a separate event that occurred on May 5, 2014, in which the manual reactor trip pushbuttons in the Control Room were also depressed to open the reactor trip breakers (refer to DBNPS LER 2014-002), this May 4, 2014 event was reviewed for reportability. On May 8, 2014, this intentional manual actuation of the RPS with the reactor not critical was determined to be reportable per 10 CFR 50.72(b)(3)(iv)(A). The NRC was verbally notified of this event per 10 CFR 50.72(b)(3)(iv)(A) at 1746 hours on May 9, 2014, via Event Number 50097. The late notification per 10 CFR 50.72 has been entered into the DBNPS Corrective Action Program. 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:

Because of the plant conditions at the time of discovery, an Engineering Change Package was implemented to rewire the Electrical Penetration from the outside of Containment to create a functionally equivalent circuit for the CRDM position indications.

The Post-Maintenance Test Manual will be updated to add guidance for testing CRDM associated penetrations to include functional testing.

PREVIOUS SIMILAR EVENTS:

There have been no Licensee Event Reports submitted for the DBNPS in the past three years where the RPS was manually initiated due to Control Rod Drive System issues.