energy harbor

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March 3, 2021
L-21-079

10 CFR 50.73

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT:
Beaver Valley Power Station, Unit No. 2
Docket No. 50-412, License No. NPF-73
LER 2021-001-00

Enclosed is Licensee Event Report (LER) 2021-001-00, "Operation Prohibited by Technical Specifications During a Loss of Control Rod Position Indication Event." This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B).

There are no regulatory commitments contained in this submittal. Any actions described in this document 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. Steve Sawtschenko, Manager, Regulatory Compliance and Emergency Response, at 724-682-4284.

Sincerely,

John J. Grabnar
Site Vice President

Enclosure: Beaver Valley Power Station, Unit 2 LER 2021-001-00

IE22
NRR

cc: Mr. D. C. Lew, NRC Region I Administrator
NRC Senior Resident Inspector
Ms. J. Tobin, NRC Project Manager
INPO Records Center (via INPO Industry Reporting and Information System)
Mr. L. Winker (BRP/DEP)

Enclosure
L-21-079

Beaver Valley Power Station, Unit 2 LER 2021-001-00

NRC FORM 366 (08-2020) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

(See Page 3 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/)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2023

1. Facility Name	2. Docket Number	3. Page
Beaver Valley Power Station, Unit 2	05000 412	1 OF 5

4. Title
Operation Prohibited by Technical Specifications During a Loss of Control Rod Position Indication Event

5. Event Date			6. LER Number			7. Report Date			8. Other Facilities Involved	
Month	Day	Year	Year	Sequential Number	Revision No.	Month	Day	Year	Facility Name	Docket Number
01	04	2021	2021	- 001 -	00					05000
									Facility Name	Docket Number
										05000

9. Operating Mode	10. Power Level
1	100

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*

10 CFR Part 20	☐ 20.2203(a)(2)(vi)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(A)	**10 CFR Part 73**
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.69(g)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(4)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(i)	**10 CFR Part 21**	☑ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(1)(i)
☐ 20.2203(a)(2)(ii)	☐ 21.2(c)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(i)
☐ 20.2203(a)(2)(iii)	**10 CFR Part 50**	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)	☐ 73.77(a)(2)(ii)
☐ 20.2203(a)(2)(iv)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)	
☐ 20.2203(a)(2)(v)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)	

☐ **OTHER** (Specify here, in abstract, or NRC 366A).

12. Licensee Contact for this LER

Licensee Contact	Phone Number (Include area code)
Steve Sawtschenko, Manager, Regulatory Compliance and Emergency Response	724-682-4284

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to IRIS		Cause	System	Component	Manufacturer	Reportable to IRIS

14. Supplemental Report Expected		15. Expected Submission Date	Month	Day	Year
☑ No	☐ Yes (If yes, complete 15. Expected Submission Date)				

16. Abstract (Limit to 1560 spaces, i.e., approximately 15 single-spaced typewritten lines)

On January 4, 2021 at 1752 hours, while operating at approximately 100% power, Beaver Valley Power Station, Unit No. 2 (BVPS-2) non-safety 480V Bus 2E de-energized due to the supply breaker having tripped due to a degraded overcurrent device. This resulted in the loss of both trains of Digital Rod Position Indication (DRPI), as well as three of the five movable incore detectors. BVPS-2 declared both trains of DRPI inoperable and entered Technical Specification (TS) Limiting Condition for Operation (LCO) 3.1.7.2 Condition B, more than one DRPI per group inoperable in one or more groups. It was later determined that Condition A also applied but was not entered at the time of the event. This Condition in part would have required a reduction to </= 50% rated thermal power (RTP) within 8 hours, and if not met Condition E would have required the plant to be in Mode 3 within the next 6 hours. Power was restored to the bus and both trains of DRPI were declared OPERABLE after 14 hours 13 minutes. This resulted in operation prohibited by TS reportable under 10 CFR 50.73(a)(2)(i)(B).

The direct cause was the Shift Manager failed to enter and apply the Required Actions for LCO 3.1.7.2 Condition A. The root cause was that changes implemented by station personnel for NRC approved changes to LCO 3.1.7.2 introduced conflicting guidance between the TS and guidance documentation. Corrective actions include revising the TS Bases and the operating procedure to remove the conflicting guidance.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(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/)

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
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Beaver Valley Power Station, Unit 2	05000- 412	2021	- 001	- 00

NARRATIVE

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

BACKGROUND

BVPS-2 uses two trains of Digital Rod Position Indication (DRPI) [JD] to monitor the position of the control rods during power operation. The control rod position can also be measured indirectly by using the movable incore detectors [IG] when DRPI is unavailable.

Both trains of DRPI are required to be operable in Modes 1 and 2 per Technical Specification (TS) Limiting Condition for Operation (LCO) 3.1.7.2, Unit 2 Rod Position Indication. This TS was revised in 2017 to incorporate Technical Specification Task Force traveler TSTF-547 revision 1 via Unit 2 License Amendment 188.

When one DRPI per group is inoperable in one or more groups, entry into TS LCO 3.1.7.2 Condition A is required and either Required Action A.1, OR A.2.1 AND A.2.2, OR A.3 are performed. These Required Actions are: A.1 verify the position of the rod with inoperable DRPI indirectly by using movable incore detectors, once every 8 hours OR A.2.1 AND A.2.2, verify the position indirectly as in A.1 once per 8 hours AND once per 31 EFPD thereafter AND 8 hours after discovery of each unintended rod movement AND 8 hours after each movement of rod with inoperable DRPI > 12 steps AND prior to thermal power exceeding 50% RTP (rated thermal power) AND 8 hours after reaching RTP, AND restore inoperable DRPI to operable status, prior to entering Mode 2 from Mode 3, OR A.3 reduce thermal power to </= 50% RTP within 8 hours.

When more than one DRPI per group is inoperable in one or more groups, TS LCO 3.1.7.2 Condition B is entered and Required Actions B.1 AND B.2 are performed: B.1 place the control rods under manual control, immediately AND B.2 restore inoperable DRPIs to OPERABLE status such that a maximum of one DRPI per group is inoperable, within 24 hours.

Additionally, if the Required Action and associated Completion Time are not met, TS LCO 3.1.7.2 Condition E applies and Required Action E.1 is performed: E.1 be in Mode 3 within 6 hours.

Of the five movable incore detectors which can be used as an alternate means of verifying control rod position, one was out of service prior to the event.

DESCRIPTION OF EVENT

On January 4, 2021 at 1752 hours, while operating at approximately 100% power, BVPS-2 control room operators received multiple unexpected annunciators regarding loss of non-safety 480 Volt Bus 2E. The Control Room Shift Technical Advisor (STA) identified that the DRPI panel appeared de-energized and there was no rod position indication for any control rods. The 2E 480V bus supply breaker had tripped due to a degraded overcurrent device resulting in the loss of both trains of DRPI, as well as three of the five movable incore detectors. The BVPS-2 Shift Manager declared both trains of DRPI inoperable and entered TS LCO 3.1.7.2 Condition B, more than one DRPI per group inoperable in one or more groups. Operators also entered procedure 2OM-53C.4.2.1.7, Rod Position Indication Malfunction, revision 14.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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NARRATIVE

DESCRIPTION OF EVENT (continued)

The 2E 480V bus was megger tested satisfactory at 0512 hours on January 5 and was cross-tied with the other 480V bus at 0730 hours. Both trains of DRPI were verified satisfactory per the operating procedure and declared OPERABLE at 0805 hours, resulting in 14 hours 13 minutes of inoperable time.

On January 13, 2021, after subsequent on-shift review, the applicability of Condition A to the January 4 event came into question. During the CR evaluation, it was determined that Condition A was applicable to the event, and that Condition A should have been entered along with Condition B. Since during the event four out of the five movable incore detectors were unavailable to indirectly verify the control rod position every 8 hours per Required Actions A.1 OR A.2.1, Required Action A.3 to reduce thermal power to </= 50% RTP within 8 hours would have been required. This Required Action to reduce power was not performed and the unit remained at approximately 100% power, which after 8 hours Condition E Required Action E.1 would have required the plant to be in Mode 3 within the next 6 hours (total of 14 hours from the time of the initiating event). Because the DRPI trains were both inoperable for greater than 14 hours, this resulted in a condition prohibited by TS reportable under 10 CFR 50.73(a)(2)(i)(B).

CAUSE OF EVENT

The direct cause of operating in a condition prohibited by TS was the Shift Manager failed to enter and apply the Required Actions for LCO 3.1.7.2 Condition A, even though the Condition applied with both trains of the DRPI system inoperable. The root cause was that changes implemented by station personnel for NRC approved changes to LCO 3.1.7.2 introduced conflicting guidance between the TS, TS Bases, and procedure.

The TS Bases for Condition B do not indicate that rod position verification is needed or that Condition A always applies. The TS Bases for Condition B states, "The 24 hour Completion Time provides sufficient time to troubleshoot and restore the DRPI system to operation while avoiding the plant challenges associated with the shutdown without full rod position indication." The instructions in the procedure that was entered indicated that rod position verification is not required for Condition B. All of this guidance supported the Shift Manager's perceived conservative bias toward maintaining plant stability by not moving the control rods without position indication. The challenges to reactivity control and knowing the position of the control rods after movement contributed to the decision not to apply Condition A.

When the TS was updated in August 2017 to implement Unit 2 License Amendment 188, Required Actions were removed from Condition B including one to indirectly verify the position using the movable incore detectors (identical to Condition A Required Action A.1). TSTF-547 revision 1 states, “under the TS usage rules, every entry into Condition B is accompanied by separate entry into Condition A for the inoperable DRPI. Both Condition A and Condition B contain a Required Action (A.1 and B.3) to verify the position of the rods with inoperable DRPI indirectly by using the movable incore detectors. Therefore, Required Action B.3, is redundant and unnecessary because Required Action A.1 is always applicable.” However, the changes to the TS, TS Bases, and the associated procedure as implemented by the station personnel created an environment that supported a challenge to the normal rules of usage that Condition A is always applicable when Condition B is entered, and this collective guidance led the Shift Manager to conclude that Condition B stood alone and that entry into Condition A was not required.

NARRATIVE

CAUSE OF EVENT (continued)

The TS usage rules were misapplied due to this conflicting guidance. Condition A applies when one DRPI per group is inoperable in one or more groups. Considering all DRPI were inoperable, Condition A should have been entered. The TS usage rules requirement is that senior licensed operators shall enter all TS Conditions that apply, provided the unit is in a Mode stated in the applicability of the LCO. LCO 3.1.7.2 is applicable in Modes 1 and 2, and at the time of the event the unit was in Mode 1. The Shift Manager determined that Condition A only applied to a Condition with one DRPI inoperable and Condition B applied when more than one DRPI was inoperable. The Required Actions of Condition B aligned with the bias against moving control rods without rod indication.

ANALYSIS OF EVENT

Both trains of DRPI were inoperable, as well as four of the five movable incore detectors which would ordinarily be used to verify the position of the control rods with DRPI unavailable. TS LCO 3.1.7.2 Condition A did apply, and since neither Required Actions A.1 nor A.2.1 could be completed, Required Action A.3 would have required a down power to </= 50% RTP within 8 hours. This Required Action was not taken and both trains of DRPI remained inoperable for 14 hours 13 minutes, therefore this was operation prohibited by TS and is reportable under 10 CFR 50.73(a)(2)(i)(B).

Since DRPI is an indication system only and does not provide any core damage mitigating functions, the BVPS-2 Probabilistic Risk Analysis (PRA) does not model the DRPI system or the non-safety 2E 480V bus, or any other appropriate surrogates that can be used to quantitatively estimate the risk increase associated with this event. In the PRA models it is also assumed that external initiating events result in a reactor trip and the control rods are successfully inserted for all fires and seismic events. Therefore, the safety significance of this event was addressed in a qualitative manner to demonstrate that it did not result in more than a minimal increase in radiological risk.

Prior to the loss of the non-safety 2E 480V bus, the control rods were fully withdrawn, and no control rod movement occurred during the period with DRPI out of service based on alternative indications and no movement identified once DRPI was restored. The non-safety 2E 480V bus was isolated to prevent the fault from propagating to any energized systems or safety buses, and the Rod Control System [AA] was immediately placed in manual to ensure that no unplanned rod motion could occur. Actions to restore the DRPI system also commenced immediately following the event. Although the plant did not commence a power reduction and stayed at approximately 100% power during this event, actions were taken to avoid undesirable power distributions that could result from continued operation at > 50% RTP and minimize the risk of this condition. To reduce the likelihood of any plant transients from occurring, no other safety related TS or modeled PRA/on-line risk equipment were intentionally removed from service for surveillances or preventive maintenance activities during this event. Furthermore, all work that could affect related electrical systems, rod position systems, and reactivity monitoring systems, or with the potential to cause plant down powers was stopped, and no discretionary switchyard activities were allowed during the event.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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NARRATIVE

ANALYSIS OF EVENT (continued)

Control and shutdown rod position accuracy is essential during power operation to ensure that the plant is operating within the bounds of the accident analysis assumptions that credit rod insertion upon reactor trip. However, with the plant in steady state full power operation and the rod control system in manual with their fully withdrawn last known position, there was a low probability that any control rod movement would have deviated more than the allowable deviation limit. This ensured that there was a high confidence that the position uncertainty of the corresponding control rod group was within the values used in the safety analysis, and that the design assumptions were not challenged during power operation throughout this event. This was also evident after DRPI was restored and the control rods were verified to be in the same position as that prior to the event occurring. Therefore, there was a low probability of having any unacceptable risk while the DRPI system was unavailable during this event.

Based on the qualitative assessment of the plant conditions and actions taken following the unexpected fault on the BVPS-2 non-safety 2E 480V bus and the consequential loss of the DRPI and flux mapping capabilities, as well as the small probability of simultaneously having a rod significantly out of position and an event sensitive to that rod position, the safety significance associated with the event is considered to be very low.

CORRECTIVE ACTIONS

Completed Actions:
An extent of condition was performed for short duration LCOs with complicated indication schemes.

A Standing Order was issued to provide supplementary guidance to inform Operators to enter TS Condition A whenever Condition B is entered, as an interim action.

Planned Actions:
The TS Bases will be revised to indicate that verification of control rod position is required and that every entry into Condition B is accompanied by a separate entry into Condition A for the inoperable DRPI.

The operating procedure will be revised to ensure that the Required Actions of Conditions A and B are included.

The supplementary guidance will remain open until the document updates are completed.

PREVIOUS SIMILAR EVENTS

Beaver Valley CR-2016-13722, Unit 1 Rod Position Indication Declared Inoperable Due to Continuous Erratic Operation, notes that at Unit 1 the crew faced similar loss of all individual rod position indication and correctly entered the TS Conditions. The Unit 1 TS had not at that time (and still have not) implemented the TSTF change implemented at Unit 2, therefore, the Unit 1 TS still include details in each of the Conditions (A and B) that require verification of rod positions.

Condition Report 2021-00242