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December 21, 2012

L-12-453

10 CFR 50.73

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

SUBJECT:

Beaver Valley Power Station, Unit Nos. 1 and 2 BV-1 Docket No. 50-334, License No. DPR-66 BV-2 Docket No. 50-412, License No. NPF-73 LER 2012-003-00

Enclosed is Licensee Event Report (LER) 2012-003-00, "Mode 3 Entered with Both Trains of Turbine Trip Circuitry Inoperable." 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 discussed in this document that represent intended or planned actions are described for the NRC's information, and are not regulatory commitments.

If there are any questions or if additional information is required, please contact Mr. Darin M. Benyak, Manager, Regulatory Compliance at 724-682-4284.

Sincerely,

Paul A. Harden

Enclosure – LER 2012-003-00

cc: Mr. W. M. Dean, NRC Region I Administrator

Mr. D. I. Spindler, NRC Senior Resident Inspector

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Mr. P. J. Bamford, NRR Project Manager

INPO Records Center (via INPO Consolidated Event System)

Mr. L. E. Ryan (BRP/DEP)

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

CONDITIONS PRIOR TO AND DURING EVENTS

Mode 4, Hot Shutdown, to Mode 3 (approximately 550 degrees and 2235 psig)

There were no systems, structures, or components that were inoperable at the start of these events that contributed to the events other than as described below.

DESCRIPTION OF EVENTS

On October 30, 2012 at approximately 0326 hours, Beaver Valley Power Station Unit 2 (BVPS-2) entered Mode 3 during plant start-up from the sixteenth refueling outage (2R16). During this refueling outage, the DC power supply [EI] breakers (PNL-DC2-02 BKR 8-21 and PNL-DC2-03 BKR 8-21) for the actuation relays for the turbine trip solenoid operated valves (SOVs) [TG] were opened per plant procedure(s) to perform functional testing of the turbine trip circuitry. These power supply breakers remained open during the transition from Mode 4 to Mode 3. With these power supply breakers open, both trains of the turbine trip actuation relays were rendered inoperable. Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.2, Engineered Safety Feature Actuation System (ESFAS) [JE] Instrumentation, Table 3.3.2-1 Function 5.a (Turbine Trip and Feedwater Isolation Automatic Actuation Logic and Actuation Relays), requires two trains of the turbine trip actuation relays to be Operable in Mode 3 except when all main feedwater [SJ] lines are isolated by either closed and deactivated main feedwater isolation valves (MFIVs), or main feedwater regulating valves (MFRVs) and associated bypass valves, or closed manual valves. When Mode 3 was entered, the main feedwater lines were isolated with closed automatic isolation valves. However, the isolation valves were not deactivated.

On October 30, 2012 at approximately 1027 hours, Operations personnel identified that BVPS-2 was operating in Mode 3 with both trains of turbine trip actuation relays inoperable and main feedwater was not isolated in the manner specified by TS. This action resulted in a condition prohibited by TS since LCO 3.3.2 Table 3.3.2-1, Function 5.a was not met. With LCO 3.3.2 not met, an inadvertent entry into TS LCO 3.0.3 occurred as there was no associated action provided for the condition of having two trains of actuation relays inoperable. Additionally, the requirements of LCO 3.0.4 were not met since the plant transitioned from Mode 4 to Mode 3 with Mode 3 required equipment inoperable without meeting the stated exceptions of LCO 3.0.4. At approximately 1045 hours, LCO 3.3.2 was met and LCO 3.0.3 was exited when the MFIVs were deactivated in the closed position.

On November 14, 2012, during an extent of condition review performed as part of the root cause investigation of the October 30, 2012 event, two previous similar events were discovered to have occurred at Beaver Valley Power Station Unit 1 (BVPS-1) within the past three years. For these events, the applicable TS LCOs and associated actions are common between BVPS-1 and BVPS-2.

On May 9, 2012, during the BVPS-1 twenty-first refueling outage (1R21) the DC power supply [EI] breakers (PNL-DC1-2-7 and PNL-DC1-3-7) to the actuation relays for the turbine trip SOVs [TG] were open to conduct functional testing on the turbine trip circuitry. During the transition from Mode 4 to Mode 3 the power supply breakers remained in the open position. With these breakers open, both trains of the turbine trip actuation relays were inoperable. The main feedwater lines were not isolated at the time. The entry into Mode 3, with both trains of turbine trip actuation relays inoperable and feedwater not isolated in the

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manner specified by TS, resulted in a condition prohibited by TS since LCO 3.3.2 was not met. With LCO 3.3.2 not met, an inadvertent entry into TS LCO 3.0.3 occurred as there is no associated action provided for the condition of having two trains of actuation relays inoperable. Additionally, the requirements of LCO 3.0.4 were not met since the plant transitioned from Mode 4 to Mode 3 with Mode 3 required equipment inoperable without meeting the stated exceptions of LCO 3.0.4. Both trains of turbine trip actuation relays were restored to Operable status within approximately 25 hours after entering Mode 3.

On October 31, 2010, BVPS-1 was in the twentieth refueling outage (1R20). Similar to the 1R21 event, PNL-DC1-2-7 and PNL-DC1-3-7 were open during the transition from Mode 4 to Mode 3. With these breakers open, both trains of the turbine trip actuation relays were inoperable. The main feedwater lines were not isolated at the time. The entry into Mode 3, with both trains of turbine trip actuation circuits inoperable and feedwater not isolated in the manner specified by TS, resulted in a condition prohibited by TS since LCO 3.3.2 Table 3.3.2-1, Function 5.a was not met. With LCO 3.3.2 not met, an inadvertent entry into TS LCO 3.0.3 occurred as there is no associated action provided for the condition of having two trains of actuation relays inoperable. Additionally, the requirements of LCO 3.0.4 were not met since the plant transitioned from Mode 4 to Mode 3 with Mode 3 required equipment inoperable without meeting the stated exceptions of LCO 3.0.4. Both trains of turbine trip actuation relays were restored to Operable status within approximately 53 hours after entering Mode 3.

CAUSE OF EVENTS

Each of these events occurred during refueling outages where work activities were in progress that removed power from both trains of turbine trip actuation relays. These conditions were not identified prior to transitioning plant modes during start-up due to less than adequate mode change reviews and weaknesses in work order and clearance processes.

The root cause evaluation of the BVPS-2 October 30, 2012, event determined the direct cause to be approved work activities on the turbine trip circuits that removed power from two circuits, rendering both required trains of the turbine trip actuation relays inoperable. The power to these turbine trip circuits was not restored prior to entry into Mode 3. These circuits are required to be Operable in Mode 3 per ESFAS Instrumentation TS Table 3.3.2-1 Function 5.a unless feedwater is isolated by deactivated automatic valves or closed manual valves. The root cause was determined to be an inaccurate perception of the applicability of TS Table 3.3.2-1 Function 5.a requirements in combination with less than adequate information on TS impact stated in related plant documents. The causes of the BVPS-1 events on May 9, 2012, and October 31, 2010, are similar to the BVPS-2 October 30, 2012 event.

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ANALYSIS OF EVENTS

The primary functions of the turbine trip and feedwater isolation actuation circuitry are to prevent damage to the turbine due to water in the steam lines, and to stop the excessive flow of feedwater into the steam generators. During these events both trains of the turbine trip actuation relays were inoperable after entering Mode 3 for periods of approximately 7 hours (BVPS-2), 25 hours (BVPS-1, 1R21) and 53 hours (BVPS-1, 1R20) respectively. The feedwater isolation function remained Operable.

The safety significance associated with the entry into Mode 3 with both trains of the turbine trip actuation relays inoperable that occurred at BVPS-2 on October 30, 2012, is considered to be very low. The main feedwater system and the turbine generator were not in service, and the main feedwater isolation valves were confirmed to be closed, but not deactivated, during this event. Therefore, the conditions that were present during this event would have prevented the excessive flow of main feedwater into the steam generators, which could cause damage to the turbine due to water in the steam lines and excessive cooldown of the primary system.

The safety significance associated with the entry into Mode 3 with both trains of turbine trip actuation relays inoperable that occurred at BVPS-1 on May 9, 2012, is considered to be very low. The feedwater Isolation signal remained functional throughout the event. In addition, Reactor Coolant System (RCS) [AB] boron concentration of approximately 2575 ppm was maintained which would prevent the possibility of reactor criticality due to lower RCS temperature caused by excessive cooldown of the secondary side. Therefore, the conditions that were present during this event would have prevented the excessive flow of main feedwater into the steam generators, which could cause damage to the turbine due to water in the steam lines and excessive cooldown of the primary system. Even if excessive cooldown occurred, the boron concentration present in the RCS at the time would have prevented criticality.

The safety significance associated with the entry into Mode 3 with both trains of turbine trip actuation relays inoperable that occurred at BVPS-1 on October 31, 2010, is also considered to be very low. The main feedwater system and the turbine generator were not in service, and the main feedwater isolation valves were confirmed to be closed, though not deactivated, during this event. Therefore, the conditions that were present during this event would have prevented the excessive flow of main feedwater into the steam generators, which could cause damage to the turbine due to water in the steam lines and excessive cooldown of the primary system.

Each event resulted in not meeting the requirements of TS as described above and are thus reportable per 10 CFR 50.73(a)(2)(i)(B) as an operation or condition prohibited by the plant's Technical Specifications.

The turbine trip function that was inoperable during these events is not credited to mitigate the consequences of an accident described in BVPS-1 or BVPS-2 Updated Final Safety Analysis Report (UFSAR). Therefore, these events did not result in an event or condition that could have prevented fulfillment of a safety function and are not reportable under 10CFR50.72(b)(3)(v)(D) or 10CFR50.73(a)(2)(v)(D).

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CORRECTIVE ACTIONS

- 1. The applicable maintenance procedures and work management plans, of both units, will be revised to include a reference to TS 3.3.2 Table 3.3.2-1 Function 5.a.
- 2. This event will be recommended for inclusion in Operations training and SOER 10-2 training.
- 3. Notes to reference TS 3.3.2 Table 3.3.2-1 Function 5.a will be added to components that disable the turbine trip function in the BVPS-1 and BVPS-2 clearance tracking program.

Completion of the above and other corrective actions is being tracked through the BVPS corrective action program.

PREVIOUS SIMILAR EVENTS

A review of BVPS LERs from approximately the previous three years determined that the two LERs listed below involve a similar event.

 BVPS-1 LER 2011-002-01, "Failure to Comply with Technical Specifications 3.7.5 Due to the Inoperability of Two or More Trains of the Auxiliary Feedwater System"

The cause was determined to be a lack of knowledge/correct interpretation of the auto-open feature and its impact on operability by the on-shift crew tasked with approving and issuing the clearance for posting.

 BVPS-1 LER 2009-001-00, "Surveillance Test Inadvertently Violates Technical Specification 3.6.1 for Containment Operability."

The causes cited were: (1) less than adequate change management in revising the performance mode of the test, and (2) narrow focus by the procedure preparers, review organizations, and end users on the most obvious TS requirement resulted in a failure to identify a more limiting TS requirement.

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