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10CFR 50.73

March 24, 2009

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

Peach Bottom Atomic Power Station (PBAPS) Unit 3
Facility Operating License No. DPR-56
NRC Docket No. 50-278

Subject: Licensee Event Report (LER) 3-09-02

This LER reports a condition prohibited by Technical Specifications involving the inoperability of the 'A' Wide Range Neutron Monitor (WRNM) during a recent plant startup. In accordance with NEI 99-04, the regulatory commitment contained in this correspondence is to restore compliance with the regulations. The specific methods that are planned to restore and maintain compliance are discussed in the LER. If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Garey L. Stathes
Plant Manager
Peach Bottom Atomic Power Station

GLS/djf/IR 871864 / 873327

Attachment
cc: S. J. Collins, US NRC, Administrator, Region I
F. L. Bower, US NRC, Senior Resident Inspector
R. R. Janati, Commonwealth of Pennsylvania
S. Grey, State of Maryland
P. Steinhauer, PSE&G, Financial Controls and Co-owner Affairs
INPO Records Center

CCN: 09-29

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

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 Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Peach Bottom Atomic Power Station Unit 3	05000278	1 OF 5

4. TITLE

Inoperable 'A' Wide Range Neutron Monitor Results in Condition Prohibited by Technical Specifications

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
01	26	2009	09	- 02 -	00	03	24	2009	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

2

10. POWER LEVEL

0 %

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 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)
☐ 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)
☐ 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

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
PBAPS Unit 3, James Armstrong, Regulatory Assurance Manager	717-456-3351

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
A	IG	MON	G080	Y					

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)*

A condition prohibited by Technical Specifications (TS) occurred when Unit 3 entered Mode 2 operations for plant startup on 1/26/09 at 0900 hours. Specifically, the TS 3.0.4 requirements were not met to allow for an entry into a mode of applicability with the 'A' Wide Range Neutron Monitor inoperable. The cause of the inoperable 'A' WRNM was a result of inadequate human performance regarding a technical decision made during the outage (prior to 1/26/09 startup). The technical decision allowed for entry into Mode 2 after an adjustment was was to the mean square voltage (MSV) component of the WRNM function resulting in the MSV being inaccurate for a small range of neutron flux while in Mode 2. Individuals involved with the event have been counseled regarding the importance of rigorous technical evaluations when making decisions that could affect TS equipment performance. WRNM adjustment procedures are also being upgraded. There were no actual safety consequences associated with this event. There were no previous similar LERs identified.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Peach Bottom Atomic Power Station, Unit 3	05000278	2009	- 01 -	00	2 OF 5

NARRATIVE

Unit Conditions Prior to the Event

Unit 3 entered Mode 2 in preparation for a planned startup from an outage to replace the 3C Main Transformer when this event occurred on 1/26/09. The 'E' Wide Range Neutron Monitor (WRNM) was considered inoperable. The reason for the inoperability of the 'E' WRNM is not known to be related to the reason that the 'A' WRNM became inoperable. There were no other structures, systems or components out of service that contributed to this event.

Description of the Event

As a result of an analysis of a cause evaluation completed on 2/25/09 involving an inoperability of the 'A' WRNM (EIIS: MON), it was identified that a condition prohibited by Technical Specifications (TS) occurred when Unit 3 entered Mode 2 operations for plant startup on 1/26/09 at 0900 hours. Specifically, the TS 3.0.4 requirements were not met to allow for an entry into a mode of applicability for TS equipment that was inoperable. The evaluation had determined that the cause of the inoperable 'A' WRNM was a result of inadequate human performance regarding a technical decision made during the outage (prior to 1/26/09 startup) that affected the operability of the 'A' WRNM. Specifically, the technical decision allowed for entry into Mode 2 after an adjustment was made to the mean square voltage (MSV) component of the WRNM function resulting in the MSV being inaccurate for a small range of neutron flux while in Mode 2.

The formal cause evaluation was based on an Engineering evaluation completed on 2/4/09, which determined that the 'A' WRNM was inoperable during the plant startup on 1/26/09. In the evaluation, Engineering personnel determined that operability of the 'A' WRNM could not be justified over the complete range of neutron flux during Mode 2 startup operations. Although the range of concern was small when compared to the entire range of neutron fluxes experienced while in Mode 2, it was determined that the 'A' WRNM was inoperable during Mode 2.

Technical Specification Limiting Condition for Operation (LCO) 3.3.1.1, Reactor Protection System (RPS) Instrumentation requires that at least three of the four channels of WRNMs be operable for each RPS (EIIS: JC) trip system. There are 2 RPS WRNM trip systems. The 'A', 'C', 'E' and 'G' WRNMs belong to the 'A' RPS trip system. The WRNMs provide trips for a reactivity short period during startup operations. Because the 'E' WRNM was already inoperable and the 'A' WRNM became inoperable as a result of maintenance activities during the unit shutdown, only two WRNMs were operable when the unit was placed in Mode 2 on 1/26/09 at 0900 hours.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Peach Bottom Atomic Power Station, Unit 3	05000278	2009	- 01 -	00	3 OF 5

NARRATIVE

Description of the Event, continued

This report is being submitted pursuant to:

> 10CFR 50.73(a)(2)(i)(B) – Condition Prohibited by TS – This occurrence is reportable under this criterion since the LCO 3.0.4 requirements were not met for allowing entry into a mode of applicability for inoperable equipment.

Unit 3 criticality was achieved on 1/26/09 at approximately 1142 hours. A ½ scram was received at approximately 1200 hours as a result of a short period sensed by the 'A' WRNM. Subsequent analysis determined that the 'A' WRNM was operable after the ½ scram since it had passed its range where it was considered inoperable.

Analysis of the Event

There were no actual safety consequences associated with this event.

The safety objective of the WRNM system (EIIS: IG) is to detect conditions in the reactor core that could potentially threaten the overall integrity of the fuel barrier. In the startup range, the most significant source of reactivity change is due to control rod withdrawal. The WRNM provides mitigation of the neutron flux excursion. The safety analysis evaluates the consequences of control rod withdrawal events during startup that are mitigated only by the WRNM period-short trip function.

There are a total of eight WRNMs in the reactor core. The A and B RPS trip systems have independent WRNM inputs. The A, C, E, and G channels of WRNM input the A RPS trip system. The B, D, F, and H channels of WRNM input the B RPS trip system. The safety analysis assumes that one channel in each trip system is bypassed. Therefore, six channels with three channels in each trip system are required for WRNM operability to ensure that no single instrument failure will preclude a scram from this function on a valid signal.

In Mode 2 (Startup) and Mode 5 (Refueling), the WRNM system provides short-period trips to RPS. The WRNM system provides inputs into the RPS circuitry to ensure a reactor scram occurs in the event that core reactivity increase (shortening period) exceeds a predetermined reference rate. The TS allowable value for WRNM short period is $\geq$ 13 seconds. The WRNM provides diverse protection from the Rod Worth Minimizer (RWM), which monitors and controls the movement of control rods at low power. The RWM prevents the withdrawal of an out-of-sequence Control Rod during startup that could result in an unacceptable neutron flux excursion. The RWM was not affected by this event.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Peach Bottom Atomic Power Station, Unit 3	05000278	2009	- 01 -	00	4 OF 5

NARRATIVE

Analysis of the Event, continued

In MODE 1, the Average Power Range Monitor (APRM) system and the Rod Worth Minimizer (RWM) provide protection against control rod withdrawal error events and the WRNMs are not required. The WRNMs are automatically bypassed when the mode switch is in the Run position (i.e., Mode 1 operations).

The indicated WRNM Flux is generated from a combination of two primary inputs: the counting based neutron flux and the mean square voltage (MSV) based neutron flux. At low neutron flux levels (less than 3.2E8 nV), the counting based flux is more accurate than the MSV based neutron flux, and at high neutron flux levels (greater than 1.0E9 nV) the MSV flux is more accurate. An intermediate neutron flux region exists where both flux measurement methods are accurate. This is called the transition region, and is defined based on the measured MSV neutron flux. The transition region is the flux level from 3.2E8nV to 1.0E9nV. Below the transition region (<3.2E8nV), the WRNM neutron flux is based on the counting based neutron flux. Above the transition region (>1.0E9nV), the WRNM neutron flux is based on the MSV flux. Within the transition region, the WRNM neutron flux is a weighted average of the counting and MSV flux values. The ½ scram experienced on 1/26/09 occurred as a result of the affects of the MSV flux overcoming the MSV flux offset, which was adjusted during the unit shutdown. Just prior to the MSV flux overcoming the MSV flux offset, the reactor period measurement was still calculated from the counting flux component. Consequently, when the transition from the counting flux to the MSV flux occurred, the transition was not smooth, but was seen as a step change in flux. The 'A' WRNM period calculation included this upward step change and indicated a very short period, resulting in a ½ scram ('A' RPS trip).

Because the RWM was operable and the inoperability of the 'A' WRNM only occurred during the transition region, the impact of the event was small. The 'C' and 'G' WRNMs were operable throughout the event as well as the WRNMs associated with the 'B' RPS trip system. The actual time that the unit operated in the transition region (i.e., 'A' WRNM inoperable) was less than 5 minutes.

The WRNM is provided by General Electric Company, NUMAC Chassis, Model # 304A3712G005.

Cause of the Event

The cause of the event was primarily due to inadequate technical human performance associated with a decision made on 1/23/09 to allow an MSV flux offset adjustment made to the 'A' WRNM during the outage to remain in place for the 1/26/09 unit startup (Mode 2).

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REV NO.	
Peach Bottom Atomic Power Station, Unit 3	05000278	2009	- 01 -	00	5 OF 5

NARRATIVE

Cause of the Event, continued

On 1/21/09, during a unit shutdown, the 'A' WRNM was declared inoperable due to inadequate monitor response. The 'A' WRNM was later found to be reading high as a result of electrical noise associated with the MSV neutron flux component of the WRNM. This noise was cancelled during the shutdown by adjusting the MSV flux offset on 1/22/09 to 8.0E9 nV. This was acceptable for shutdown conditions and performed in accordance with a procedure. However, on 1/23/09, inadequate technical input was provided by Engineering and Instrumentation & Controls (I&C) personnel (Utility, non-licensed) to Operations personnel (Utility, licensed) on 1/23/09 to allow this adjustment to remain in place for plant startup. This incorrect decision was based on a misinterpretation of a previous Engineering evaluation performed for a MSV flux offset adjustment. This previous Engineering evaluation was only for troubleshooting conditions when the WRNM was not required to be operable.

A contributing cause to allow this offset to not be resolved prior to plant startup was a weakness with the associated I&C procedure (IC-11-00395). This procedure controls the adjustment of the MSV flux offset value and required the flux offset to be lower than the threshold for entering the transition range (i.e., 3.0E8 nV). If the MSV flux offset was left equal to or higher than this value, I&C supervision was required to be notified. This action to notify I&C supervision was determined to be an inadequate procedural barrier for assuring appropriate MSV flux offset adjustment values.

Corrective Actions

Individuals involved with the event have been counseled regarding the importance of rigorous technical evaluations when making decisions that could affect TS equipment performance.

The lessons learned from this human performance issue will be shared with other station personnel in accordance with the site Corrective Action Program.

IC-11-00395 and the WRNM vendor manual will be upgraded to ensure that the limits of MSV offset flux are well controlled and documented.

The source of the 'A' WRNM electrical noise will be investigated and resolved.

Previous Similar Occurrences

There were no previous LERs identified relating to inoperable WRNMs or inadequate technical human performance associated with operability determinations involving plant instrumentation.