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

Peach Bottom Atomic Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

Subject: Response to Request for Additional Information
License Amendment Request to Delete Reference to Banked Position Withdrawal Sequence (BPWS)

Reference: Letter from P. B. Cowan (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, dated June 8, 2006

In the referenced letter, Exelon Generation Company, LLC (Exelon) requested an amendment to Appendix A, Technical Specifications, of the Renewed Facility Operating Licenses DPR-44 and DPR-56. The proposed change modifies Technical Specifications (TS) 3.1.3, "Control Rod OPERABILTY"; TS 3.1.6, "Rod Pattern Control"; TS 3.3.2.1, "Control Rod Block Instrumentation"; TS 3.10.7, "Control Rod Testing - Operating", and; TS 3.10.8, "SHUTDOWN MARGIN (SDM) Test - Refueling". The proposed change would replace the current references to Banked Position Withdrawal Sequence (BPWS) with references to "the analyzed rod position sequence."

Enclosure 1 is our response to a request for additional information as discussed in a conference call with the U. S. Nuclear Regulatory Commission staff on December 18, 2006. Enclosure 2 contains updated PBAPS, Units 2 and 3 Bases pages associated with this License Amendment Request that reflect re-insertion of a reference to NEDO-21231, "Banked Position Withdrawal Sequence," January 1977, as requested by Question 5.

No new regulatory commitments are established by this submittal.

If any additional information is needed, please contact Tom Loomis at (610) 765-5510.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 5th of February 2007.

Respectfully,

Pamela B. Cowan
Director, Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Enclosures: 1) Response to Request for Additional Information - License Amendment Request to Delete Reference to Banked Position Withdrawal Sequence (BPWS)
2) Revised Bases Pages to Reflect Re-Insertion of Reference to NEDO-21231

cc: S. J. Collins, Administrator, USNRC Region I
J. Shea, Project Manager, USNRC
F. Bowers, USNRC Senior Resident Inspector, PBAPS

ENCLOSURE 1
Response to Request for Additional Information
License Amendment Request to Delete Reference to Banked Position Withdrawal Sequence (BPWS)

Question 1:

Some plants, which exclusively rely upon the RWM for enforcement of the control rod sequence, perform several Technical Specifications surveillance requirements to verify that the RWM is functionally operable prior to startup. For instance, these tests include: 1) Performance of the Rod Worth Minimizer diagnostic test; 2) Selection of out of sequence control rods in each distinct RWM group to verify that the selection error annunciator alarms; and 3) Withdrawal of an out-of-sequence control rod no more than three notches to verify the rod block function. Presently, PBAPS Technical Specifications SR 3.3.2.1.2 requires a channel functional test of the RWM to be performed, within one hour after startup, by only attempting to withdraw a control rod not in compliance with the prescribed sequence and verifying a control rod block occurs. This test may be insufficient in that it is performed after startup and it does not test the RWM overall system functional operability whereas some function of the system could be in a degraded state and the system still perform the single rod block function. Also, the RWM is single channel and, with the removal of the BPWS, makes the TS requirements less restrictive. Therefore, additional requirements should be included in the LAR to provide additional safety. Provide justification of not including the above tests in LAR.

Response:

The subject License Amendment Request (LAR) proposes that, in lieu of exclusive use of BPWS, cycle specific analyses may also be performed to develop startup/shutdown control rod sequences. These sequences will minimize incremental control rod reactivity worth and will be developed in accordance with the "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A-15 (GESTAR-II), and U. S. Supplement, NEDE-24011-P-A-15-US, September 2005, which incorporates NRC-approved methodology, and will be reviewed and approved in accordance with the 10 CFR 50.59 process. New analyzed sequences will not adversely impact the results of the rod drop accident as described in the UFSAR. This change will allow the implementation of startup/shutdown sequences in addition to those allowed by the general requirements of the BPWS and will result in an overall reduction in unnecessary reactivity manipulations and associated operational challenges. The margin to safety will not be reduced by this change. The existing Rod Worth Minimizer (RWM) design, operating procedures and surveillances will not be affected by the proposed change.

This change does not impact TS SR 3.3.2.1.2. Surveillance Test ST-O-62A-210-2(3) is performed to meet the TS requirement that an out-of-sequence rod withdrawal will result in the proper RWM alarm and block functions. As discussed in the current SR 3.3.2.1.2, the TS permit 60 minutes for performing the described testing. The proposed TS change does not alter this basis. Safety will not be reduced as a result of this change. Changes outside those described in the Improved Technical Specifications are not necessary.

Question 2:

The control rod sequence is based upon the control rod drop accident (CRDA) results utilizing plant/cycle specific data. Since this analysis is fuel and reactivity related, which could result in fuel damage from an incorrect rod sequence error, sufficient controls should be in place to assure that cycle-specific rod sequence results are maintained and accessible for implementation and review. Since the RWM will be the only system to detect a rod sequence error, please provide justification on why the cycle-specific results of the rod sequence is not included in the COLR.

Response:

TS 5.6.5 defines the contents of the COLR. The Core Operating Limits Report contains cycle-specific fuel thermal operating limits and cycle specific rod block setpoints. Rod Sequence patterns do not fall within the category of information currently specified by Technical Specifications for incorporation into the COLR. The Exelon Nuclear engineering change process utilized at Peach Bottom Atomic Power Station is used to control the development, approval and documentation of analyzed control rod sequences. This is consistent with existing process controls used in the development of BPWS compliant sequences. All sequences will continue to be documented in an Engineering Design Analysis and issued as a calculation in an Engineering Change Request (ECR) package. Placing the sequences in the COLR provides no advantage over the existing Exelon Nuclear engineering change process. Existing administrative controls will continue to provide a back-up methodology to the Rod Worth Minimizer in assuring compliance with analyzed sequences.

Question 3:

Since the RWM will be the sole monitoring system, review of administrative controls of relevant procedures, related forms and quality control should be conducted to assure the RWM process is effectively controlled. Provide a discussion of the present RWM administrative controls and any anticipated changes to the administrative controls as a result of this LAR.

Response:

No changes to administrative controls associated with the RWM are occurring as a result of this change. The Exelon Nuclear engineering change process utilized at Peach Bottom Atomic Power Station continues to be used to control the development, approval and documentation of analyzed control rod sequences. The sequences will be documented in an Engineering Design Analysis and issued as a calculation in an Engineering Change Request (ECR) package. Rod Worth Minimizer enforcement of startup/shutdown sequences will remain unchanged.

The subject LAR proposes that, in lieu of exclusive use of BPWS, cycle specific analyses may also be performed to develop startup/shutdown control rod sequences. These sequences will minimize incremental control rod reactivity worth in a manner consistent with BPWS, and will be developed in accordance with the "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A-15 (GESTAR-II), and U. S. Supplement, NEDE-24011-P-A-15-US, September, 2005, which incorporates NRC-approved methodology, and will be reviewed and

approved in accordance with the 10 CFR 50.59 process. New analyzed sequences will not adversely impact the results of the rod drop accident as described in the UFSAR. This change will allow the implementation of startup/shutdown sequences in addition to those allowed by the general requirements of the BPWS and will result in an overall reduction in unnecessary reactivity manipulations and associated operational challenges.

Question 4:

The LAR TS submittal replaces the term "Banked Position Withdrawal Sequence (BPWS)" with the term "analyzed rod position sequence" to reflect cycle-specific control rod sequence based on plant specific information. There is insufficient Bases discussion regarding the use of the term "analyzed rod position sequence." Provide a discussion on how this term is determined.

Response:

The term analyzed rod position sequence is intended to indicate that the sequence, regardless of the use of BPWS, will meet the same CRDA technical requirements as BPWS, will be developed using the same NRC approved methods as those used to develop BPWS, and will be implemented in a manner equivalent to those used in the implementation of BPWS compliant sequences. No Bases change is necessary.

Question 5:

In the TS Bases Section A.1, A.2, A.3, and A.4, reference 5 was removed from the last sentence which stated " Even with the postulated additional single failure of an adjacent control rod to insert, sufficient reactivity control remains to reach and maintain MODE 3 conditions (Ref. 5)." It seems that the reference referred to an analysis that demonstrated sufficient reactivity control. Provide a discussion why a new reference or explanation in the bases to support this statement is not needed.

Response:

The reference to the 1977 BPWS analysis will be re-included into the Bases. Enclosure 2 contains updated PBAPS, Units 2 and 3 Bases pages associated with this License Amendment Request that reflect re-insertion of a reference to NEDO-21231, "Banked Position Withdrawal Sequence," January 1977.

ENCLOSURE 2

Revised Bases Pages to Reflect Re-Insertion of Reference to NEDO-21231

Unit 2	Unit 3
B 3.1-17	B 3.1-17
B 3.1-18	B 3.1-18
B 3.1-21	B 3.1-21
B 3.1-35	B 3.1-35
B 3.1-38 (change deleted as shown)	B 3.1-38 (change deleted as shown)

BASES

ACTIONS

A.1, A.2, A.3, and A.4 (continued)

stuck position and the highest worth OPERABLE control rod assumed to be fully withdrawn.

The allowed Completion Time of 72 hours to verify SDM is adequate, considering that with a single control rod stuck in a withdrawn position, the remaining OPERABLE control rods are capable of providing the required scram and shutdown reactivity. Failure to reach MODE 4 is only likely if an additional control rod adjacent to the stuck control rod also fails to insert during a required scram. Even with the postulated additional single failure of an adjacent control rod to insert, sufficient reactivity control remains to reach and maintain MODE 3 conditions (Ref. 5).

B.1

and 6

With two or more withdrawn control rods stuck, the plant must be brought to MODE 3 within 12 hours. The occurrence of more than one control rod stuck at a withdrawn position increases the probability that the reactor cannot be shut down if required. Insertion of all insertable control rods eliminates the possibility of an additional failure of a control rod to insert. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

C.1 and C.2

With one or more control rods inoperable for reasons other than being stuck in the withdrawn position, (including a control rod which is stuck in the fully inserted position) operation may continue, provided the control rods are fully inserted within 3 hours and disarmed (electrically or hydraulically) within 4 hours. Inserting a control rod ensures the shutdown and scram capabilities are not adversely affected. The control rod is disarmed to prevent inadvertent withdrawal during subsequent operations. The control rods can be hydraulically disarmed by closing the drive water and exhaust water isolation valves. The control rods can be electrically disarmed by disconnecting power from all four directional control valve solenoids. Required Action C.1 is modified by a Note, which allows the RWM to be bypassed if required to allow insertion of the inoperable

(continued)

BASES

ACTIONS

C.1 and C.2 (continued)

control rods and continued operation. LCO 3.3.2.1 provides additional requirements when the RWM is bypassed to ensure compliance with the CRDA analysis.

The allowed Completion Times are reasonable, considering the small number of allowed inoperable control rods, and provide time to insert and disarm the control rods in an orderly manner and without challenging plant systems.

D.1 and D.2

Out of sequence control rods may increase the potential reactivity worth of a dropped control rod during a CRDA. At ≤ 10% RTP, the generic banked position withdrawal sequence (BPWS) analysis (Ref. 5) requires inserted control rods not in compliance with BPWS to be separated by at least two OPERABLE control rods in all directions, including the diagonal. Therefore, if two or more inoperable control rods are not in compliance with BPWS and not separated by at least two OPERABLE control rods, action must be taken to restore compliance with BPWS or restore the control rods to OPERABLE status. Condition D is modified by a Note indicating that the Condition is not applicable when > 10% RTP, since the BPWS is not required to be followed under these conditions, as described in the Bases for LCO 3.1.6. The allowed Completion Time of 4 hours is acceptable, considering the low probability of a CRDA occurring.

E.1

If any Required Action and associated Completion Time of Condition A, C, or D are not met, or there are nine or more inoperable control rods, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 12 hours. This ensures all insertable control rods are inserted and places the reactor in a condition that does not require the active function (i.e., scram) of the control rods. The number of control rods permitted to be inoperable when operating above 10% RTP (e.g., no CRDA considerations) could be more than the value specified, but the occurrence of a large number of

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.3.5 (continued)

to the "full out" position during the performance of SR 3.1.3.2. This Frequency is acceptable, considering the low probability that a control rod will become uncoupled when it is not being moved and operating experience related to uncoupling events.

REFERENCES

1. UFSAR, Sections 1.5.1.1 and 1.5.2.2.

2. UFSAR, Section 14.6.2.

3. UFSAR, Appendix K, Section VI.

4. UFSAR, Chapter 14.

5. NEDO-21231, "Banked Position Withdrawal Sequence," Section 7.2, January 1977.

6. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel", latest approved revision.

BASES

APPLICABLE SAFETY ANALYSES (continued)

Control rod patterns analyzed in Reference 1 follow the banked position withdrawal sequence (BPWS). The BPWS is applicable from the condition of all control rods fully inserted to 10% RTP (Ref. 2). For the BPWS, the control rods are required to be moved in groups, with all control rods assigned to a specific group required to be within specified banked positions (e.g., between notches 08 and 12). The banked positions are established to minimize the maximum incremental control rod worth without being overly restrictive during normal plant operation. Generic analysis of the BPWS (Ref. 1) has demonstrated that the 280 cal/gm fuel damage limit will not be violated during a CRDA while following the BPWS mode of operation. The generic BPWS analysis (Ref. 8) also evaluates the effect of fully inserted, inoperable control rods not in compliance with the sequence, to allow a limited number (i.e., eight) and distribution of fully inserted, inoperable control rods.

Rod pattern control satisfies Criterion 3 of the NRC Policy Statement.

LCO

Compliance with the prescribed control rod sequences minimizes the potential consequences of a CRDA by limiting the initial conditions to those consistent with the BPWS. This LCO only applies to OPERABLE control rods. For inoperable control rods required to be inserted, separate requirements are specified in LCO 3.1.3, "Control Rod OPERABILITY," consistent with the allowances for inoperable control rods in the BPWS.

APPLICABILITY

In MODES 1 and 2, when THERMAL POWER is ≤ 10% RTP, the CRDA is a Design Basis Accident and, therefore, compliance with the assumptions of the safety analysis is required. When THERMAL POWER is > 10% RTP, there is no credible control rod configuration that results in a control rod worth that could exceed the 280 cal/gm fuel damage limit during a CRDA (Ref. 2). In MODES 3, 4, and 5, since the reactor is shut down and only a single control rod can be withdrawn from a core cell containing fuel assemblies, adequate SDM ensures that the consequences of a CRDA are acceptable, since the reactor will remain subcritical with a single control rod withdrawn.

(continued)

BASES

REFERENCES (continued)

6. NEDO-21778-A, "Transient Pressure Rises Affected Fracture Toughness Requirements for Boiling Water Reactors," December 1978.

7. ASME, Boiler and Pressure Vessel Code.

8. NEDO-21231, "Banked Position Withdrawal Sequence," January 1977.

STET (DO NOT DELETE REFERENCE 6)

BASES

ACTIONS

A.1, A.2, A.3, and A.4 (continued)

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The allowed Completion Time of 72 hours to verify SDM is adequate, considering that with a single control rod stuck in a withdrawn position, the remaining OPERABLE control rods are capable of providing the required scram and shutdown reactivity. Failure to reach MODE 4 is only likely if an additional control rod adjacent to the stuck control rod also fails to insert during a required scram. Even with the postulated additional single failure of an adjacent control rod to insert, sufficient reactivity control remains to reach and maintain MODE 3 conditions (Ref. 5).

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BASES

ACTIONS

C.1 and C.2 (continued)

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and 6

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the analyzed rod position sequence

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SURVEILLANCE REQUIREMENTS

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6. NEDE-24011-PA, "General Electric Standard Application for Reactor Fuel", latest approved revision.

BASES

APPLICABLE SAFETY ANALYSES (continued)

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(continued)

BASES

REFERENCES (continued)

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7. ASME, Boiler and Pressure Vessel Code.

8. NEDO-21231, "Banked Position Withdrawal Sequence," January 1977.

STET (DO NOT DELETE THE REFERENCE 8)