UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 30, 2011

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENTS RE: LIQUID NITROGEN STORAGE (TAC NOS. ME4131 AND ME4132)

Dear Mr. Pacilio:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment Nos. 282 and 285 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated June 25, 2010,[1] as supplemented by letters dated August 16, 2010, December 16, 2010, January 26, 2011, and March 25, 2011.[2]

The amendments issued with this letter revise TS Surveillance Requirement (SR) 3.6.1.3, "Primary Containment Isolation Valves," and SR 3.6.1.5.1, "Reactor Building-to-Suppression Chamber Vacuum Breakers," to modify the required level for the liquid nitrogen storage tank.

All work is complete on TAC Nos. ME4131 and ME4132. Accordingly, these TAC Nos. will be closed. A copy of our Safety Evaluation is enclosed and a Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

John D. Hughey

John D. Hughey, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278
Enclosures:
1. Amendment No. 282 to Renewed DPR-44
2. Amendment No. 285 to Renewed DPR-56
3. Safety Evaluation
cc: Distribution via ListServ

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1 Agencywide Documents Access and Management System (ADAMS) Accession No. ML101790114.
2 ADAMS Accession Nos. ML102310079, ML103410398, ML110280103, and ML110880117, respectively.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

PSEG NUCLEAR LLC

DOCKET NO. 50-277

PEACH BOTTOM ATOMIC POWER STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 282
License No. DPR-44

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Exelon Generation Company, LLC (Exelon Generation Company), and PSEG Nuclear LLC (the licensees), dated June 25, 2010, as supplemented by letters dated August 16, 2010, December 16, 2010, January 26, 2011, and March 25, 2011, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-44 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 282, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

3. Implementation Requirements:

This license amendment is effective as of the date of issuance, and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications
and Facility Operating License

Date of Issuance: September 30, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 282

RENEWED FACILITY OPERATING LICENSE NO. DPR-44

DOCKET NO. 50-277

Replace the following page of the Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove	Insert
Page 3	Page 3

Replace the following pages of the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3.6-12	3.6-12
3.6-19	3.6-19

(5) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not to separate, such byproduct and special nuclear material as may be produced by operation of the facility, and such Class B and Class C low-level radioactive waste as may be produced by the operation of Limerick Generating Station, Units 1 and 2.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Section 50.54 of Part 50, and Section 70.32 of Part 70; all applicable provisions of the Act and the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:

(1) Maximum Power Level

Exelon Generation Company is authorized to operate the Peach Bottom Atomic Power Station, Unit 2, at steady state reactor core power levels not in excess of 3514 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 282 , are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

(3) Physical Protection

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822), and the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans[1], submitted by letter dated May 17, 2006, is entitled: "Peach Bottom Atomic Power Station Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Storage Installation Security Program, Revision 3." The set contains Safeguards Information protected under 10 CFR 73.21.

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 281.

(4) Fire Protection

The Exelon Generation Company shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report for the facility, and as approved in the NRC Safety Evaluation Report (SER) dated May 23, 1979, and Supplements dated August 14, September 15, October 10 and November 24, 1980, and in the NRC SERs dated September 16, 1993, and August 24, 1994, subject to the following provision:

[1] The Training and Qualification Plan and Safeguards Contingency Plan are Appendices to the Security Plan.

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. Purge/Vent flowpath open for an accumulated time greater than 90 hours for the calendar year while in MODE 1 or 2 with Reactor Pressure greater than 100 psig.	E.1	Isolate the penetration.	4 hours
	OR		
	E.2.1	Be in MODE 3.	12 hours
		AND	
	E.2.2	Be in MODE 4.	36 hours
F. Required Action and associated Completion Time of Condition A, B, C, or D not met in MODE 1, 2, or 3.	F.1	Be in MODE 3.	12 hours
	AND		
	F.2	Be in MODE 4.	36 hours
G. Required Action and associated Completion Time of Condition A, B, C, or D not met for PCIV(s) required to be OPERABLE during MODE 4 or 5.	G.1	Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	OR		
	G.2	Initiate action to restore valve(s) to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.1.3.1	Verify nitrogen inventory is equivalent to $\geq$ 22 inches water column in the liquid nitrogen storage tank.	In accordance with the Surveillance Frequency Control Program.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition C not met.	D.1 Be in MODE 3.	12 hours
E. Two lines with one or more reactor building-to-suppression chamber vacuum breakers inoperable for opening.	E.1 Restore all vacuum breakers in one line to OPERABLE status.	1 hour
F. Required Action and Associated Completion Time of Conditions A, B, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.1.5.1	Verify nitrogen inventory is equivalent to $\geq$ 22 inches water column in the liquid nitrogen storage tank.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.1.5.2	Verify Safety Grade Instrument Gas (SGIG) System header pressure $\geq$ 80 psig.	In accordance with the Surveillance Frequency Control Program.

(continued)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EXELON GENERATION COMPANY, LLC

PSEG NUCLEAR LLC

DOCKET NO. 50-278

PEACH BOTTOM ATOMIC POWER STATION, UNIT 3

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 285
Renewed License No. DPR-56

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Exelon Generation Company, LLC (Exelon Generation Company), and PSEG Nuclear LLC (the licensees), dated June 25, 2010, as supplemented by letters dated August 16, 2010, December 16, 2010, January 26, 2011, and March 25, 2011, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-56 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 285 , are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

3. Implementation Requirements:

This license amendment is effective as of the date of issuance, and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Harold K. Chernoff, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications
and Facility Operating License

Date of Issuance: September 30, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 285

RENEWED FACILITY OPERATING LICENSE NO. DPR-56

DOCKET NO. 50-278

Replace the following page of the Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove	Insert
Page 3	Page 3

Replace the following pages of the Appendix A, Technical Specifications, with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3.6-12	3.6-12
3.6-19	3.6-19

(5) Exelon Generation Company, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not to separate, such byproduct and special nuclear material as may be produced by operation of the facility, and such Class B and Class C low-level radioactive waste as may be produced by the operation of Limerick Generating Station, Units 1 and 2.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Section 50.54 of Part 50, and Section 70.32 of Part 70; all applicable provisions of the Act and the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:

(1) Maximum Power Level

Exelon Generation Company is authorized to operate the Peach Bottom Atomic Power Station, Unit No. 3, at steady state reactor core power levels not in excess of 3514 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 285 , are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.[1]

(3) Physical Protection

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822), and the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans[2], submitted by letter dated May 17, 2006, is entitled: "Peach Bottom Atomic Power Station Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Storage Installation Security Program, Revision 3." The set contains Safeguards Information protected under 10 CFR 73.21.

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 283.

[1]Licensed power level was revised by Amendment No. 250, dated November 22, 2002, and will be implemented following the 14th refueling outage currently scheduled for Fall 2003.

[2]The training and Qualification Plan and Safeguards Contingency Plan and Appendices to the Security Plan.

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. Purge/Vent flowpath open for an accumulated time greater than 90 hours for the calendar year while in MODE 1 or 2 with Reactor Pressure greater than 100 psig.	E.1	Isolate the penetration.	4 hours
	OR		
	E.2.1	Be in MODE 3.	12 hours
		AND	
	E.2.2	Be in Mode 4.	36 hours
F. Required Action and associated Completion Time of Condition A, B, C, or D not met in MODE 1, 2, or 3.	F.1	Be in MODE 3.	12 hours
	AND		
	F.2	Be in MODE 4.	36 hours
G. Required Action and associated Completion Time of Condition A, B, C, or D not met for PCIV(s) required to be OPERABLE during MODE 4 or 5.	G.1	Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately
	OR		
	G.2	Initiate action to restore valve(s) to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.1.3.1	Verify nitrogen inventory is equivalent to $\geq$ 22 inches water column in the liquid nitrogen storage tank.	In accordance with the Surveillance Frequency Control Program.

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition C not met.	D.1 Be in MODE 3.	12 hours
E. Two lines with one or more reactor building-to-suppression chamber vacuum breakers inoperable for opening.	E.1 Restore all vacuum breakers in one line to OPERABLE status.	1 hour
F. Required Action and Associated Completion Time of Conditions A, B, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.1.5.1	Verify nitrogen inventory is equivalent to ≥ 22 inches water column in the liquid nitrogen storage tank.	In accordance with the Surveillance Frequency Control Program.
SR 3.6.1.5.2	Verify Safety Grade Instrument Gas (SGIG) System header pressure ≥ 80 psig.	In accordance with the Surveillance Frequency Control Program.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 282 TO RENEWED FACILITY

OPERATING LICENSE NO. DPR-44 AND AMENDMENT NO.285 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-56

EXELON GENERATION COMPANY, LLC

PSEG NUCLEAR, LLC

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-277 AND 50-278

1.0 INTRODUCTION

By letter dated June 25, 2010,[1] Exelon Generation Company, LLC (EGC) submitted a request to revise the Technical Specifications (TS) for the Peach Bottom Atomic Power Station, Units 2 and 3. The proposed change would revise Surveillance Requirement (SR) 3.6.1.3.1 associated with TS 3.6.1.3, "Primary Containment Isolation Valves," and SR 3.6.1.5.1 associated with TS 3.6.1.5, "Reactor Building-to-Suppression Chamber Vacuum Breakers," to modify the required level for the liquid nitrogen storage tank. The license amendment request (LAR) proposes a revision to the current TSs to address non-conservative TS SRs associated with the minimum amount of nitrogen required in the containment atmospheric dilution (CAD) liquid nitrogen storage tank to support the intended safety function of the safety grade instrument gas (SGIG) system.

The licensee provided supplemental information by letters dated August 16, 2010, December 16, 2010, January 26, 2011, and March 25, 2011.[2] The supplements clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 30, 2010 (75 FR 74094).

The NRC staff has completed its review and finds that the requested TS modifications are acceptable, as discussed in this safety evaluation.

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1 Agencywide Documents Access and Management System (ADAMS) Accession No. ML101790114.
2 ADAMS Accession Nos. ML102310079, ML103410398, ML110280103, and ML110880117, respectively.

2.0 REGULATORY EVALUATION

Title 10 of *the Code of Federal Regulations* (10 CFR) Section 50.36(c)(3), "Surveillance Requirements," specify requirements relating to testing, calibration or inspection that assure that the limiting conditions for operation (LCOs) will be met. The LAR dated June 25, 2010, proposes to revise the TS SR 3.6.1.3.1 and TS SR 3.6.1.5.1 requirements related to the required level in the liquid nitrogen storage tank. The licensee states that the current TS SR value of $\geq$ 16 inches water column is non-conservative. The licensee has established administrative controls to maintain the liquid nitrogen level at a higher value to assure that the associated LCO requirements are maintained. The licensee stated that the administrative controls have been established in accordance with NRC Administrative Letter 98-10, "Dispositioning of Technical Specifications that are Insufficient to Assure Plant Safety."[3]

10 CFR 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," in part, requires a licensee to have design control measures to verify or check the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Section 5.2.3.9.3 of the PBAPS Updated Final Safety Analysis Report (UFSAR)[4] describes that the SGIG system supplies nitrogen from both the vapor space on the 6,000-gallon CAD tank, or from the outlet of the CAD system's electric vaporizers. PBAPS Unit 2 and 3 share the same SGIG system major components. The nitrogen is independently hard-piped to individual safety-related valve instrument actuators for: 1) the containment atmospheric control (CAC) system purge and vent valves; 2) the CAD valves; 3) the suppression chamber-to-secondary containment vacuum breaker air-operated valves; and 4) the containment emergency atmospheric control purge and vent valve. The SGIG system also provides nitrogen to inflatable boots seals on the valve body seats on selected containment isolation valves.

The SGIG system also provides a safety-related supply of nitrogen gas to select valve operators in the instrument air (IA) system, allowing the valves to function during a design basis loss-of-coolant-accident (LOCA), coincident with a loss of offsite power (LOOP), where normal IA may be lost. The SGIG system, by design, immediately delivers nitrogen gas to the IA controllers for selected safety-related valves upon loss of IA. The licensee credits the valves supplied by the SGIG system to mitigate a LOCA in one unit and to support transition to safe shutdown in the other unit.

Per Section 5.2.3.9.1 of the PBAPS UFSAR, the primary means of combustible gas (hydrogen) control used at PBAPS is containment inerting and controlling sources of oxygen. Operation of the CAD system is not assumed to mitigate UFSAR Chapter 14 design-basis accidents. However, per Section 5.2.3.9.3 of the PBAPS UFSAR, the CAD system is assumed to operate, instead of the normal nitrogen inerting system, following a beyond-design basis LOCA to maintain the oxygen concentration within the containment at less than 5 volume percent.

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3 ADAMS Accession No. ML031110108.

4 PBAPS Updated Final Safety Analysis Report, Revision 23, April 2011.

Therefore, in order to satisfy the requirements of 10 CFR 50.36, the SGIG system must maintain a sufficient quantity of nitrogen in order to perform the remaining two safety functions: provide nitrogen to the isolation valves' boot seals, and to the suppression chamber-to-secondary containment vacuum breaker air-operated valves.

10 CFR 50.44, "Combustible Gas Control for Nuclear Power Reactors," requires a licensee to maintain control of combustible gases that may accumulate in the containment atmosphere during accidents. The NRC staff revised 10 CFR 50.44 on September 16, 2003, (68 FR 54141) based upon combustible gas behavior during severe accidents. The studies confirmed that the postulated hydrogen release from a design-basis LOCA was not risk significant, because an insufficient amount of hydrogen is generated to cause a containment failure. Studies show that the risk associated with hydrogen combustion was from beyond design-basis accidents. As a result of the study, the NRC staff eliminated requirements from 10 CFR 50.44 for maintaining hydrogen control equipment associated with a design-basis LOCA.

10 CFR 50 App A General Design Criteria (GDC) 41, "Containment atmosphere cleanup," describes systems to control fission products, hydrogen, oxygen, and other substances that may be released into the reactor containment as necessary to reduce the concentration and quality of fission products and control the concentration of hydrogen, oxygen, and other substances in the containment atmosphere following postulated accidents to assure that containment integrity is maintained.

Design and construction of PBAPS Units 2 and 3 commenced prior to the codification of the current General Design Criteria (GDCs); thus, the current GDCs are not part of the original design basis of the plants. However, Appendix H of the UFSAR for PBAPS Units 2 and 3 contains an evaluation of the design bases of the nuclear facility as measured against the General Design Criteria for Nuclear Power Plant Construction Permits that were proposed to be added to 10 CFR Part 50 as Appendix A in July 1967. The licensee concluded that PBAPS Units 2 and 3 conforms to the intent of the proposed General Design Criteria for Nuclear Power Plants, issued by the Atomic Energy Commission in July 1967. In addition, Section 5.2.3.9.1 of the PBAPS UFSAR states that the PBAPS CAD system design is installed in accordance with 10 CFR 50.44 and conforms with the criteria of GDC 41, but is no longer credited in the UFSAR Chapter 14 accident analyses.

Regulatory Guide (RG) 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident," Revision 3, March 2007,[5] provides detailed guidance that would be acceptable for implementing 10 CFR 50.44. For all applicants for and holders of a water cooled reactor construction permit or operating license under 10 CFR Part 50, all containments must have an inerted atmosphere or limit combustible gas concentrations in containment during and following an accident that release an equivalent amount of combustible gas as would be generated from a 100% fuel clad coolant reaction, uniformly distributed, to less than 10% (by volume) and must maintain containment structural integrity. The combustible gas control systems, the atmosphere mixing systems, and the provisions for measuring and sampling required by Section 50.44 are risk-significant, as they have the ability to mitigate the risk associated with combustible gas generation caused by significant beyond-design-basis

5 ADAMS Accession No. ML070290080.

accidents. Regulatory Guide, 1.7 Section C, provides recommendations for dispositioning of those systems.

Generic Letter (GL) 84-09, "Recombiner Capability Requirements of 10 CFR 50.44(c)(3)(ii)," May 8, 1984,[6] provides guidance on whether purge/repressurization of containment with nitrogen is required for hydrogen control.

3.0 TECHNICAL EVALUATION

3.1 Proposed TS SR Changes

Presently, the PBAPS Unit 2 and 3 TS SR 3.6.1.3.1 states the following:

> Verify Containment Atmospheric Dilution (CAD) System liquid nitrogen storage tank level is $\geq$ 16 inches water column.

The proposed TS SR 3.6.1.3.1 states:

> Verify nitrogen inventory is equivalent to $\geq$ 22 inches water column in the liquid nitrogen storage tank.

Presently, PBAPS Unit 2 and 3 TS SR 3.6.1.5.1 states the following:

> Verify Containment Atmospheric Dilution (CAD) System nitrogen storage tank level is $\geq$ 16 inches water column.

The proposed TS SR 3.6.1.5.1 states:

> Verify nitrogen inventory is equivalent to $\geq$ 22 inches water column in the liquid nitrogen storage tank.

3.2 Evaluation

Based upon actual plant operating data, the licensee identified a non-conservative TS SR pertaining to the minimum volume of nitrogen required in the CAD tank in order to support the safety-related function of the SGIG system. In response to the discovery, the licensee initiated administrative controls to maintain the liquid nitrogen level in the CAD tank ≥ 22 inches of water column, under the guidance of NRC Administrative Letter 98-10. By letter dated June 25, 2010, the licensee proposed to change TS SR 3.6.1.3.1 and TS SR 3.6.1.5.1 to reflect an increase in the minimum required level from ≥ 16 inches to ≥ 22 inches water column of liquid nitrogen in the CAD tank, representing an increase from 58,000 standard cubic feet (scf) to 124,000 scf, respectively. The change is necessary to ensure an adequate nitrogen supply is available to support the safety function of the SGIG system for 7 days.

The licensee provided Calculation PM-0375,[7] which documents the minimum amount of nitrogen needed to mitigate a LOCA on one unit and transition to safe shutdown on the other

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6 ADAMS Accession No. ML031150659.

unit. Calculation PM-0375 also contains the calculation for the SGIG system nitrogen demand as well as the volumetric capacity calculations for the storage tank. The calculation computes the amount of nitrogen to cycle select SGIG system valves and to inflate boot seals on selected containment isolation valves. The calculation also accounts for the inventory in the SGIG system piping, for system piping pressure decay make-up, for estimated system leakage, and for postulated failure, (for example, failing open of the system pressure control valve (PCV) causing the system relief valve to lift). The proposed TS SRs verify that the level in the liquid nitrogen storage tank is sufficient to meet the system's calculated demand to support 7-day post LOCA mitigation in one unit and sufficient quantity to bring the other unit to safe shutdown.

The licensee's submittal dated June 25, 2010, proposed that a TS required level of 22 inches water column in the CAD tank, corresponding to 124,000 scf, will assure that the SGIG system has an adequate amount of nitrogen required to perform its function for the 7-day post LOCA safety function and accommodate 80,422 scf of system leakage. During the acceptance review process, the NRC staff requested that the licensee provide the correlation for the CAD tank level of 22 inches water column to a required volume of 124,000 scf. The licensee provided supplements dated August 16, 2010, and December 6, 2010, to support the tank level-to-volume correlation.

Calculation PM-0375 provides correlation tables from the tank manufacturer that depict the volume of nitrogen in scf compared to a liquid level. However, the tank manufacturer supplied correlation tables expressly stated that the correlation tables are "for reference only." 10 CFR 50 Appendix B requires a licensee to establish design control measures which shall provide for verifying or checking the adequacy of design by the performance of design reviews, the use of alternate or simplified calculation methods, or by the performance of a suitable testing program. Therefore, the NRC staff requested that the licensee provide adequate justification that the vendor-supplied correlation table data used meets the requirements of 10 CFR 50, Appendix B, Criterion III, Design Control.

The licensee provided a supplement dated December 6, 2010, that presented an independent verification of the correlation data provided by the vendor. The licensee stated, "[t]his analysis was independently verified by a qualified individual and will be maintained as a quality record in accordance with QAP [Quality Assurance Program] requirements." The licensee determined that the vendor-supplied correlation data chart, presented in Calculation PM-0375, was similar or conservative with respect to the independent verification analysis. The NRC staff has reviewed the licensee's calculation, and found the licensee's methodology is acceptable within general engineering principles and industry standards. The licensee demonstrated that the tank vendor's results were conservative when compared to the calculation. The NRC staff found that one variable, the gravitational constant (g_c), was missing from one of the formulas in the licensee's calculation. However, the error was administrative, and did not affect the calculation results. The licensee corrected the equation as noted in the supplement dated, January 26, 2011. Therefore, the NRC staff finds that the licensee's validation of the tank vendor's data satisfies the requirements of 10 CFR 50 Appendix B, Criterion III.

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7 Calculation PM-0375, Revision 4, "To Establish Limiting Demand for N_2 for the CAD System and the SGIG System for Dual Unit Operation," ADAMS Accession No. ML102570084.

Previously, the licensee estimated that the SGIG system required only 9,981 scf as a margin to account for system leakage. However, in Calculation PM-0375, the licensee determined that 80,422 scf is required based on actual historical plant data. The NRC staff examined Calculation PM-0375 and questioned the method the licensee used to determine system leakage. Specifically, since the plant's non-safety-related IA system normally supplies the compressed gas to the selected safety-related valve operators, the SGIG system may not be in its emergency configuration during the performance of the leakage test. The licensee provided a supplement dated January 26, 2011, to addresses the NRC staff's concern that explained that the SGIG system nitrogen piping is independent of the normal IA system. The licensee further explained that both units always maintain the SGIG system lined up to supply nitrogen to the 18 safety-related valve stations. The SGIG system maintains a constant nitrogen pressure up to the check valves that tie directly into the IA supply lines supporting the safety-related valve operators. Except for a very short run of tubing between the final check valve and the valve operator, the vast majority of the SGIG system piping and components are pressurized. Therefore, the licensee concludes that the as-found leakage data is representative of the SGIG system in its emergency configuration, and the estimated leakage accurately represents total system leakage.

The NRC staff performed a physical plant walkdown of the SGIG system and components at PBAPS to verify the system alignment. The NRC staff observed the SGIG tank, admission valves, and system piping out to a representative sample of the several valves supplied by the SGIG system. The NRC staff concurs with the licensee's assessment that the alignment of the SGIG system piping and components is representative of the accident response configuration. Therefore, the estimated leakage used in Calculation PM-375 represents the leakage for a significant majority of the SGIG system. In addition, the licensee includes a large margin in the leakage calculation. This provides a reasonable amount of nitrogen to account for expected, additional leakage from the remaining minor portions at the endpoints of the SGIG system when it is put into service during an actual event.

The NRC staff identified that the licensee's actual consumption data showed an excessive amount of nitrogen is required to account for system leakage. The data showed a 7-day leakage rate of 74,917 scf; whereas, previous engineering calculations estimate a leakage of only 9,981 scf over 7-days. The dramatic increase in leakage rate could indicate a continually degrading system. The NRC staff requested that the licensee justify how their proposed surveillance requirement (i.e., verifying a tank level of at least 22 inches water column) will assure that future leakage rates will not increase to a point where 22 inches water column would no longer sustain the SGIG system for the 7-day period following a LOCA.

The licensee stated in its January 26, 2011, supplement that past operational data indicates that the leakage rate is stable. In addition, PBAPS station personnel monitor the CAD tank level status, maintaining a level high enough to support both the SGIG and CAD systems.

The licensee further states:

> Additionally, Peach Bottom has implemented recurring administrative controls to trend SGIG system leakage. Once each refueling cycle for each Peach Bottom unit, a recurring activity has been established for the System Manager to verify leakage using the methodology established in the subject LAR submittal.

The NRC staff's review of the licensee's response finds that the additional administrative controls to trend SGIG system leakage provides a practical means to detect any major change in the SGIG system leakage rate. Thus, the NRC staff finds that the licensee's actions to monitor the leakage rate will provide reasonable assurance that the leakage will not increase to a point where the leakage would affect the ability of SGIG system to support a 7-day mission time.

The NRC staff questioned the bases for determining the minimum amount of nitrogen needed to support an operational demand for mitigating a LOCA in one unit for 7 days and sufficient quantity to bring the other unit to safe shutdown. Specifically, the licensee references a 10-second stroke time in Calculation PM-0375 for the suppression chamber-to-secondary containment vacuum breaker air-operated valves from information in the PBAPS UFSAR. However, Calculation PM-0375 uses an 8-second stoke time, stating that 8 seconds provides a more conservative estimate for total nitrogen demand. The NRC staff questioned why a lesser time, 8 seconds as opposed to a 10-second stroke time, would provide a more conservative estimate for total nitrogen demand. In a supplement dated March 25, 2011, the licensee explained that Calculation PM-386 (Reference 21 of Calculation PM-0375), calculates a flow rate by dividing the required stroke volume by a given stroke time of 8 seconds. Calculation PM-0375 reverses this method to show required nitrogen volume, by using a stroke time of 8 seconds multiplied by the flow rate to calculate the volume necessary to stroke the valve. The response explains the methodology used by the licensee follows the standard engineering principle of time multiplied by a rate yields a total quantity (volume); therefore, the NRC staff finds using an 8-second stroke time provides a conservative estimate for nitrogen required to stroke the valves.

During the review of Calculation PM-0375, the NRC staff identified inconsistencies regarding valve functions, boot seal configurations, valve stroking, and nitrogen demand. In the March 25, 2011, supplement, the licensee provided a table listing all of the valves for each unit that require SGIG system nitrogen to maintain their boot seals. The licensee stated that all SGIG system supplied valves with boot seals on both units are initially open or assumed opened for calculation conservatism. The majority of valves go closed and remain closed for the duration of the event. Hence, the valves require only one inflation of the boot seal to ensure leak tightness. Of the ten valves supported by the SGIG system on the unit experiencing a LOCA, operators only cycle one valve to mitigate the accident. The licensee conservatively assumes that the operators will have to stroke the suppression chamber-to-secondary containment vacuum breaker air-operated valves ten times during an accident, respectively; the associated valve's boot seal will require inflation ten times. The remaining nine valves will close and remain closed, requiring only one inflation of their boot seal. In total, the licensee calculates SGIG system valves on the safe shutdown unit require 0.67 scf of nitrogen to support inflation of the boot seals, and the unit experiencing a LOCA requires 1.38 scf to inflate and maintain their

boot seals. Therefore, the licensee calculates the total amount of nitrogen required for both units to inflate SGIG system valve boot seals is 2.05 scf.

During a detailed examination of the SGIG system drawings and procedures, the NRC staff noted that a number of inconsistencies between information in Calculation PM-0375 and existing plant configuration. In the March 25, 2011, supplement, the licensee addressed the inconsistencies with a table listing all valves supported by the SGIG system. The licensee acknowledged that the number of valves, 18 per unit, listed in the table conflicted with the number, 17 valves per unit, stated in Calculation PM-0375. The licensee explained that the containment emergency ventilation outboard isolation valve(s), one per unit, were added to the plant after revision 0 of Calculation PM-0375. The licensee stated that the operators would only stroke the containment emergency ventilation valve(s) during events involving beyond current design-basis accidents. Therefore, the licensee's position is that the addition of these valve(s) to the list of valves supported by the SGIG system does not affect the total amount of nitrogen calculated to support the SGIG system's safety function. The licensee stated that the SGIG system supplies sufficient nitrogen to stroke closed all of the SGIG system valves one time on the non-accident unit to support transitioning to safe shutdown conditions. On the unit experiencing a LOCA, the licensee stated that the SGIG system supplies sufficient nitrogen in order to stroke the suppression chamber-to-secondary containment vacuum breaker air-operated valves ten times, and all other supported valves one time.

The NRC staff requested that the licensee provide the basis for the number of strokes required by SGIG valves to support their design function. In the March 25, 2011, supplement, the licensee explained that most SGIG system supported valves close by venting their operators; hence, no nitrogen is required. Only the suppression chamber-to-secondary containment vacuum breaker air-operated valves fail open and require nitrogen to close. The licensee states, "For the unit experiencing the Design Basis LOCA it is conservatively assumed that the Reactor Building-to-Suppression Chamber Vacuum Breaker will require stroking ten (10) times, requiring the boot seal to be inflated ten (10) times."

In the PBAPS UFSAR, the licensee indicates that the suppression chamber-to-secondary containment vacuum breaker air-operated valves (vacuum breakers) have both an open and closed safety function. The vacuum breakers open to prevent a negative pressure within containment relative to the reactor building, which could result in a buckling failure and breach of the containment. The vacuum breakers are closed or maintain closed for containment isolation. The NRC staff concludes that the valves failing to the open position on a loss of pneumatic supply affords greater safety, given that there is a second valve in series to provide isolation. The second valve is self-operating and is similar to a simple check valve. The vacuum breakers are expected to operate following an accident only if containment sprays (drywell or suppression chamber) are actuated. If containment spray actuation results in vacuum breaker opening, then additional non-condensable gases are added to the inventory already in containment before the accident; hence, subsequent strokes are unlikely. During a severe accident, operators may vent the containment, and subsequent containment cooling may result in a negative pressure inside containment, requiring cycling of the vacuum breakers. Given the limited conditions requiring opening of the vacuum breakers, the NRC staff concluded it is a reasonable assumption that adequate containment pressure control can be accomplished in fewer than 10 strokes in either scenario discussed above. Also, the amount of nitrogen required to stroke the valves is very small relative to the error in reading tank level and the

margin in the calculation would provide for additional valve strokes if required. Therefore, the NRC staff finds that ten strokes is a conservative assumption for either case.

The licensee stated that the emergency vent system valves are part of the hardened vent line off the suppression chamber. The NRC staff notes that in Calculation PM-0375, there is an allotment of nitrogen to stroke in the containment emergency ventilation outboard isolation valve(s), during a post-LOCA recovery, even though the licensee did not identify the stroking of these valves as a required SGIG system function. The NRC staff requested that the licensee address the function of these valves in the post-accident and safe shutdown mitigations. In the March 25, 2011, supplement, the licensee explained that operators will only use the containment emergency ventilation outboard isolation valve(s), in the mitigation of a TW (i.e. designator for loss of residual heat removal) sequence, which the licensee considers to be a beyond design basis accident. The licensee stated that it does not credit the operation of these valves to mitigate a LOCA, nor is it required to support safe shutdown. Subsequently, the licensee reduced the amount of nitrogen required for stroking the SGIG system valves accordingly.

The NRC staff's position is that stroking of the suppression chamber hardened vent valves is only anticipated during severe accident mitigation. Such an event is beyond the plant's current licensed design basis. Therefore, the NRC staff finds that accounting for an associated pneumatic supply reserve is not required for the licensee to meet their current design bases. However, the NRC staff notes that the nitrogen volume required to cycle the valves in the hardened vent line is also small. Therefore, the extra 5500 scf margin in the pneumatic supply provides reasonable assurance that these valves could be stroked, when needed, during the 7-day duration required for SGIG valves' nitrogen reserve.

In response to Generic Letter (GL) 84-09, the licensee calculated that the containment atmosphere would not reach the five percent combustion limit for oxygen within the initial 30 days after a design basis accident.[8] Therefore, PBAPS does not rely on nitrogen to repressurize containment as a means of combustible gas control. The PBAPS containment is initially inerted with nitrogen and maintained inerted during power operations. Analyses show that adding nitrogen to an already inerted containment is not needed for preventing a combustible gas mixture to mitigate any design basis accident. Therefore, the licensee would only use the CAD system to dilute containment atmosphere in order to mitigate beyond design basis accidents. Therefore, the NRC staff finds the licensee's position remains consistent with the conclusion as stated in the September 16, 2003 (68 FR 54141) change to 10 CFR 50.44, "Combustible Gas Control for Nuclear Power Reactors."

The NRC staff also noted that the PBAPS alarm procedures state that the CAD system tank inventory must be greater than 38.5 inches water column to ensure the operation of the CAD and SGIG systems. However, the low-level alarm for the CAD system tank is set at 36 inches water column. The NRC staff requested that the licensee address whether the alarm set point is adequate to prevent inadvertent use of the nitrogen in the CAD system tank and to describe the controls regarding nitrogen usage. By the supplement dated March 25, 2011, the licensee explained that PBAPS operating procedures direct operators to refill the CAD system tank

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8 Calculation PM-0375, Revision 4, "To Establish Limiting Demand for N_2 for the CAD System and the SGIG System for Dual Unit Operation," page 2 of 24; ADAMS Accession No. ML102570084.

whenever the tank level drops below 42 inches water column. Furthermore, the licensee has established administrative controls, in the daily Technical Specification Surveillance Requirement Logs, to maintain the CAD system tank level greater than 22 inches water column in order to support the SGIG system, and greater than 38.5 inches water column to support CAD system functions. The NRC staff finds the licensee's use of administrative controls to maintain the CAD system tank level greater than 42 inches water column is adequate to ensure the required amount of nitrogen, 22 inches water column, is available to support the SGIG system for 7 days. If the tank level is greater than 38.5 water column, sufficient nitrogen will be available to support operation of the CAD system in the dilution of containment atmosphere in the event of a severe accident.

3.3 Summary

The NRC staff finds that the licensee's calculation of the 22 inches water column of nitrogen to be stored in the nitrogen tank is an acceptable quantity to maintain the function of the SGIG system. The licensee's methodology follows general engineering principles and licensee engineering personnel validated non-qualified vendor information used to correlate tank level to liquid nitrogen volume. The licensee used conservative approximations when determining the amount of nitrogen needed to stroke the valves. In addition, the licensee validated leakage rates with actual plant data. Therefore, the NRC staff concludes that a level ≥ 22 inches water column of nitrogen in the CAD system tank provides reasonable assurance that the minimal amount of nitrogen for the SGIG system is available to mitigate a LOCA event in one unit for a 7-day period, and to bring the other unit to a safe shutdown condition. The NRC staff also finds that the licensee's administrative controls for maintaining additional volume in the CAD liquid nitrogen tank provides reasonable assurance that hardened vent and containment air dilution capability will be maintained for severe accidents beyond the plant's design basis.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The NRC staff has determined that the amendments change requirements with respect to installation or use of a facility's components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (75 FR 74094). The changes discussed in this safety evaluation meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Michael Levine
Stanley Gardocki
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Date: September 30, 2011

September 30, 2011

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENTS RE: LIQUID NITROGEN STORAGE (TAC NOS. ME4131 AND ME4132)

Dear Mr. Pacilio:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment Nos. 282 and 285 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated June 25, 2010,[1] as supplemented by letters dated August 16, 2010, December 16, 2010, January 26, 2011, and March 25, 2011.[2]

The amendments issued with this letter revise TS Surveillance Requirement (SR) 3.6.1.3, "Primary Containment Isolation Valves," and SR 3.6.1.5.1, "Reactor Building-to-Suppression Chamber Vacuum Breakers," to modify the required level for the liquid nitrogen storage tank.

All work is complete on TAC Nos. ME4131 and ME4132. Accordingly, these TAC Nos. will be closed. A copy of our Safety Evaluation is enclosed and a Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,
/ra/
John D. Hughey, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278
Enclosures:
1. Amendment No. 282 to Renewed DPR-44
2. Amendment No. 285 to Renewed DPR-56
3. Safety Evaluation
cc: Distribution via ListServ

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Accession No: ML112570049 *by memo dated **via email

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1 Agencywide Documents Access and Management System (ADAMS) Accession No. ML101790114.
2 ADAMS Accession Nos. ML102310079, ML103410398, ML110280103, and ML110880117, respectively.