



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

July 20, 2010

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

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNIT 2 - ISSUANCE OF  
AMENDMENT RE: ONE-TIME FIVE-YEAR CONTAINMENT TYPE A  
INTEGRATED LEAK RATE TEST INTERVAL EXTENSION (TAC NO. ME2159)

Dear Mr. Pacilio:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 276 to Renewed Facility Operating License No. DPR-44 for the Peach Bottom Atomic Power Station (PBAPS), Unit 2. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 28, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092440053), as supplemented by letters dated February 25, 2010, and May 24, 2010 (ADAMS Accession Nos. ML100560433 and ML101450047).

The amendment issued with this letter modifies TS 5.5.12, "Primary Containment Leakage Rate Testing Program" to reflect a one-time extension of the containment Type A Integrated Leak Rate Test (ILRT) from 10 to 15 years. The one-time extension would require a Type A ILRT to be performed no later than October of 2015.

All work is complete on TAC No. ME2159. Accordingly, this TAC No. 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,

A handwritten signature in black ink that reads "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

Enclosures:

1. Amendment No. 276 to Renewed DPR-44
2. Safety Evaluation

cc: Distribution via ListServ



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. 276  
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 August 28, 2009, as supplemented by letters dated February 25, 2010, and May 24, 2010, 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. 276, 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 60 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 License  
and Technical Specifications

Date of Issuance: June 20, 2010

ATTACHMENT TO LICENSE AMENDMENT NO.276

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 page of the Appendix A, Technical Specifications, with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the area of change.

Remove

Insert

5.0 – 17

5.0 – 17

- (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.

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. 276 , 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<sup>1</sup>, 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.

- (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:

The Exelon Generation Company may make changes to the approved

<sup>1</sup> The Training and Qualification Plan and Safeguards Contingency Plan are Appendices to the Security Plan.

5.5 Programs and Manuals

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5.5.11 Safety Function Determination Program (SFDP) (continued)

1. A required system redundant to system(s) supported by the inoperable support system is also inoperable; or
  2. A required system redundant to system(s) in turn supported by the inoperable supported system is also inoperable; or
  3. A required system redundant to support system(s) for the supported systems (b.1) and (b.2) above is also inoperable.
- c. The SFDP identifies where a loss of safety function exists. If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

5.5.12 Primary Containment Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by the following exceptions to NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J":

- a. Section 10.2: MSIV leakage is excluded from the combined total of  $0.6 L_a$  for the Type B and C tests.
- b. Section 9.2.3: The first Type A test performed after the October 2000 Type A test shall be performed no later than October 2015.

The peak calculated containment internal pressure for the design basis loss of coolant accident,  $P_a$ , is 49.1 psig.

The maximum allowable primary containment leakage rate,  $L_a$ , at  $P_a$ , shall be 0.7% of primary containment air weight per day.

Leakage Rate acceptance criteria are:

- a. Primary Containment leakage rate acceptance criterion is  $\leq 1.0 L_a$ . During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are  $\leq 0.60 L_a$  for the Type B and Type C tests and  $\leq 0.75 L_a$  for Type A tests;

(continued)



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 276 TO RENEWED FACILITY

OPERATING LICENSE NO. DPR-44

EXELON GENERATION COMPANY, LLC

PSEG NUCLEAR, LLC

PEACH BOTTOM ATOMIC POWER STATION, UNIT 2

DOCKET NO. 50-277

1.0 INTRODUCTION

By letter to the Nuclear Regulatory Commission (NRC) dated August 28, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092440053), Exelon Generation Company, LLC, (Exelon) submitted a License Amendment Request (LAR) for Peach Bottom Atomic Power Station (PBAPS), Unit 2. The submittal seeks to revise Technical Specification (TS) 5.5.12, "Primary Containment Leakage Rate Testing Program", to allow a one-time 5-year integrated leak rate test (ILRT) interval extension to the interval established by Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," September 1995. The one-time extension would require a Type A ILRT to be performed no later than October of 2015.

Exelon Generation Company, LLC (the licensee), provided supplemental information by letters dated February 25, 2010, and May 24, 2010 (ADAMS Accession Nos. ML100560433 and ML101450047). The supplements clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on May 18, 2010 (75 FR 27830).

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

## 2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors," Option B, "Performance-Based Requirements," requires that a Type A test be conducted at a periodic interval based on historical performance of the overall containment system.

Pursuant to 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, a Type A test must be conducted: (1) after a containment system has been completed and is ready for operation; and (2) at a periodic interval based on historical performance of the overall containment system. Section V.B.3 of 10 CFR 50, Appendix J, Option B, requires that the regulatory guide or other implementation documents used by a licensee to develop a performance-based leakage-testing program must be included, by general reference, in the plant TSs. Submittals for technical specification revisions must contain justification, including supporting analyses, if licensees choose to deviate from the methods approved by the NRC and endorsed in a regulatory guide.

Furthermore, 10 CFR 50.55a addresses the use of codes and standards as they relate to structures and components being designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed. Specifically, 10 CFR 50.55a(b)(2)(viii) identifies the regulatory conditions that apply to the use of Subsection IWL of Section XI of the ASME Boiler & Pressure Vessel Code (B&PVC) for the examination of concrete containment structures. Additionally, 10 CFR 50.55a(b)(2)(ix) identifies the regulatory conditions that apply to the use of Subsection IWE of the ASME B&PVC for the examination of metal containments and the liners of concrete containments.

PBAPS TS 5.5.12, requires that leakage rate testing of the containment be performed as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guidelines contained in RG 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995. This RG endorses, with certain exceptions, Nuclear Energy Institute (NEI) report NEI 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 26, 1995.

NEI 94-01 specifies an initial test interval of 48 months, but allows an extended interval of 10 years, based upon two consecutive successful Type A tests. However, by the current license amendment request, the licensee is seeking a deviation from the NEI 94-01 requirements by requesting a one-time extension of the Type A test interval from 10 years to 15 years, based on historical performance of its containment, supported by a risk-informed analysis.

A Type A test is a measurement of the containment system overall integrated leakage rate at the design basis loss-of-coolant accident containment peak pressure. NEI 94-01, Revision 0, Paragraph 9.2.3 defines acceptable performance history as completion of two consecutive periodic Type A tests where the calculated performance leakage rate was less than  $1.0 L_a$  (maximum allowable leakage rate at the calculated peak containment internal pressure related to the design basis loss-of-coolant as specified in the TS). The licensee has requested that TS 5.5.12 be amended to include an additional exception to RG 1.163, and its endorsement of NEI 94-01, specifically Section 9.2.3, to allow for a one-time 5-year extension of the 10-year interval. The most recent two Type A tests at PBAPS, Unit 2, have been successful, so the current interval

requirement would normally be 10 years. The requested one-time extension of the test interval to 15 years would require the next Type A test to be performed no later than October, 2015.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Proposed TS Changes

Presently PBAPS, Unit 2, TS 5.5.12 states, in part:

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September, 1995, as modified by the following exception to NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," Section 10.2:

- a. MSIV leakage is excluded from the combined total of 0.6  $L_a$  for the Type B and C tests.

TS 5.5.12 will be revised to reflect one-time 5-year ILRT interval extension to the interval established by Regulatory Guide (RG) 1.163 as follows:

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September, 1995, as modified by the following exceptions to NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J":

- a. Section 10.2: MSIV leakage is excluded from the combined total of 0.6  $L_a$  for the Type B and C tests.
- b. Section 9.2.3: The first Type A test performed after the October 2000 Type A test shall be performed no later than October 2015.

#### 3.2 Current PBAPS ILRT Requirements

PBAPS TS 5.5.12 states the following ILRT testing requirements:

The peak calculated containment internal pressure for the design basis loss of coolant accident,  $P_a$  is 49.1 psig.

The maximum allowable primary containment leakage rate,  $L_a$  at  $P_a$  shall be 0.7% of primary containment air weight per day.

Leakage Rate acceptance criteria are:

- a. Primary Containment leakage rate acceptance criterion is  $\leq 1.0 L_a$ . During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are  $\leq 0.60 L_a$  for the Type B and Type C tests and  $\leq 0.75 L_a$  for Type A tests;

### 3.3 Containment ISI Program and Structural/Leak-Tight Integrity Considerations

The PBAPS, Unit 2, primary containment is a pressure suppression system and houses the reactor vessel, the reactor coolant recirculation systems, and other primary system piping. The primary containment system consists of a drywell, a pressure suppression chamber which stores a large volume of water, connecting vent systems between the drywell and the suppression pool, isolation valves, vacuum breakers, containment cooling systems, and other service equipment. The primary containment is designed for a maximum internal pressure of 62 psig coincident with a maximum temperature of 281°F. The maximum external pressure is 2 psi above the internal pressure. The integrity of the containment penetrations, airlocks, hatches, flanges, and valves within the scope of the program is verified through the Type B and Type C Local Leak Rate Tests (LLRTs), and the overall leak tight integrity of the containment is verified by a Type A ILRT, as required by 10 CFR 50, Appendix J. These tests are performed at the calculated peak containment internal pressure related to the design basis loss-of-coolant accident. Under 10 CFR 50, Appendix J, Option B, PBAPS, Unit 2, currently has an ILRT interval of 10 years. By the current license amendment request, the licensee has requested a one-time 5-year extension of the Type A test interval from 10 years to 15 years. The licensee justifies the proposed change based on historical plant-specific containment leakage testing program results and containment in-service inspection program (CISI) results, supported by a risk-informed analysis.

The leakage rate testing requirements of 10 CFR 50, Appendix J, Option B (Type A ILRT and Type B and Type C LLRTs), and the CISI requirements, mandated by 10 CFR 50.55a, together, help ensure the continued leak-tight and structural integrity of the primary containment during its service life. In Section 3.1 of Attachment 1 of the licensee's submittal, the licensee presented the plant-specific results from the recent two Type A ILRTs for the PBAPS, Unit 2, that were conducted in 1991 and 2000, which were successful tests. The results of these tests indicated as-found leakage rates of 0.2135 and 0.3365 percent weight per day respectively, which were lower than the allowable containment leakage rate of 0.525 percent weight per day. Therefore, the NRC staff finds that these results validate the structural and leakage integrity of the primary containment structure and demonstrate adequate performance of the primary containment structure in ensuring an essentially leak-tight barrier.

The licensee stated that the Type B and C tests at PBAPS, Unit 2, ensure that the containment penetrations, airlocks, hatches, flanges, and valves are within the scope of the program as required by 10 CFR Part 50, Appendix J, Option B, and RG 1.163. The Type B and C test programs consists of local leak rate testing of penetrations with a resilient seal, expansion bellows, double-gasketed manway, hatches and flanges. Drywell airlocks, and containment isolation valves serve as a barrier to the release of the post-accident primary containment atmosphere. In Section 3.3 of the license amendment request, the licensee stated that continued satisfactory results from the Type B and Type C LLRTs and containment inspections support the proposed extension of the Type A test interval. The test interval for Type B and

Type C tests is on a maximum 10-year testing interval. The licensee also stated that if the result of a Type B test exceeds the allowable limit, the penetration will be returned to the short interval (every refueling outage). The licensee further stated that the Type C leak rate testing of containment isolation valves are on maximum 60-months testing interval. If the result of a Type C test exceeds the allowable limit, the penetration will be returned to the short interval (every refueling outage).

The licensee also provided results of the PBSPS, Unit 2, LLRTs for the two most recent refueling outages. The results indicated that the as-left maximum pathway leak rates (MXPLRs) were all below the acceptance criteria of  $0.6L_a$ . The MXPLR for the most recent outage in 2008 was 59,033 standard cubic centimeters per minute (sccm), which was also below the acceptance limit of 105,350 sccm (Section 3.3 of Attachment 1 to the licensee's submittal dated August 28, 2009). In Enclosure 1 and Enclosure 2 of the license amendment request, the licensee provided a comprehensive table that identified all of the penetrations subjected to Type B and C testing and their current test frequencies established under 10 CFR 50, Appendix J, Option B, based on performance. The licensee indicated that the test frequencies are re-evaluated after each refueling outage for potential changes. The licensee also provided the date and refueling outage number of the previous tests, and the due date for the next scheduled test.

The NRC staff finds that the licensee is effectively implementing its Type B and Type C LLRT program under Option B, in a rational and systematic manner that is consistent with industry standards and regulatory guidance, and will continue to do so during the requested ILRT interval extension period.

The licensee stated that PBAPS, Unit 2, has implemented a comprehensive CISI program, in accordance with the requirements of the ASME Code, Section XI, Subsection IWE. For the first CISI interval, which ended November 4, 2008, the examinations at PBAPS, Unit 2, were performed in accordance with the 1992 Edition and the 1992 Addenda of the ASME Code, Section XI. For the current (second) CISI interval, which includes the requested 5-year extension period, the PBAPS, Unit 2, is committed to the 2001 Edition and 2003 Addenda of the ASME Code, Section XI. The licensee provided a detailed summary of the results and corrective actions of the IWE examinations performed since 1998. The licensee stated that during these IWE inspections, various indications were identified that were either repaired, or documented and evaluated as acceptable by the Responsible Individual/Responsible Engineer, without compromising the containment structural and leak tight integrity.

The licensee stated that there have been no conditions at PBAPS, Unit 2, where existence of or potential for degraded conditions in inaccessible areas of the containment structure and metallic liner were identified and evaluated, based on conditions found in inaccessible areas, as required by 10 CFR 50.55a(b)(2)(vi) and 10 CFR 50.55a(b)(2)(ix)(A). Further, the licensee's risk analysis used the Calvert Cliff Nuclear Power Plant's (Calvert Cliff) methodology to estimate the likelihood and risk implications of corrosion-induced leakage of the steel liners being undetected in inaccessible areas during the extended test interval. The increase in large early release frequency (LERF), associated with corrosion events, was estimated to be insignificant, and is discussed in Section 3.4, "Risk Assessment," of this safety evaluation.

The licensee stated that it conducts periodic inspections that meet RG 1.54, "Service Level I, II and III Protective Coatings Applied to Nuclear Power Plants," Revision 1, July 2000, quality assurance requirements, of Service Level 1 coatings inside primary containment in accordance with a 10 CFR Part 50.65, "Maintenance Rule," condition monitoring program as required by the plant licensing basis and plant procedures. The licensee performs engineering reviews and evaluations of the results of coating condition examinations performed by examiners qualified in accordance with ASTM D 4537, 1991 Edition. The inspection requirements of the containment coatings program will not be changed as a result of the requested ILRT interval extension.

In summary, the NRC staff finds that the licensee has effectively implemented adequate LLRT, CISI and safety-related coatings inspection programs to periodically examine, monitor and manage age-related and environmental degradation of the PBAPS, Unit 2, containment structure. The results of the past ILRTs, LLRTs and the CISI program demonstrate that the structural and leak-tight integrity of the containment structures is sound and adequately managed. The containment structures will continue to be periodically monitored by LLRT and CISI, and the safety-related coatings inspection programs during the requested 5-year extension period for the ILRT interval. The NRC staff finds that there is reasonable assurance that the containment structural and leak-tight integrity will continue to be maintained without undue risk to safety during the requested 5-year extension period for the ILRT interval.

### 3.4 Risk Assessment

The licensee has performed a risk impact assessment of extending the Type A test interval to 15 years. The risk assessment was provided in the license amendment request dated, August 28, 2009. In performing the risk assessment, the licensee considered the guidelines of NEI 94-01, Revision 0; the methodology used in Electric Power Research Institute (EPRI) Topical Report (TR) 104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing Intervals;" the NEI interim guidance for performing risk impact assessments in support of one-time extensions for containment ILRT surveillance intervals; the risk assessment template in EPRI TR-1009325, Revision 2-A, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals;" the methodology used for Calvert Cliffs to assess the risk from undetected leaks due to corrosion; RG 1.174, Revision 1, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis;" and RG 1.200, Revision 1, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities." The licensee also performed an alternate quantification using the EPRI expert elicitation methodology, however, the NRC staff's evaluation and conclusion do not rely on this alternate assessment.

The basis for the current 10-year test interval is provided in Section 11.0 of NEI 94-01, Revision 0, and was established in 1995 during the development of the performance-based Option B to Appendix J of 10 CFR 50. Section 11.0 of NEI 94-01 states that NUREG-1493, "Performance-Based Containment Leak-Test Program," provided the technical basis to revise leakage rate testing requirements contained in Option B to Appendix J of 10 CFR 50. The basis consisted of qualitative and quantitative assessments of the risk impact (in terms of increased public dose) associated with a range of extended leakage rate test intervals. To supplement this basis, industry undertook a similar study. The results of that study are documented in EPRI research project report TR-104285.

The EPRI study used an analytical approach similar to that presented in NUREG-1493 for evaluating the incremental risk associated with increasing the interval for Type A tests. The 10 CFR 50, Appendix J, Option A, requirements that were in effect for PBAPS, Unit 2, early in the plant's life required a Type A test frequency of three tests in 10 years. The EPRI study estimated that relaxing the test frequency from three tests in 10 years to one test in 10 years would increase the average time that a leak, that was detectable only by a Type A test, goes undetected from 18 to 60 months. Since Type A tests only detect about 3 percent of leaks (the rest are identified during local leak rate tests based on industry leakage rate data gathered from 1987 to 1993) this results in a 10 percent increase in the overall probability of leakage. The risk contribution of pre-existing leakage for the pressurized-water reactor and boiling-water reactor representative plants in the EPRI study confirmed the NUREG-1493 conclusion that a reduction in the frequency of Type A tests from three tests in 10 years to one test in 20 years leads to an imperceptible increase in risk that is on the order of 0.2 percent and a fraction of one person-reontgen equivalent man (rem) per year in increased public dose.

The licensee quantified the risk from sequences that have the potential to result in large releases if a pre-existing leak were present. Since the 10 CFR 50, Appendix J, Option B, rulemaking was completed in 1995, the staff has issued RG 1.174 on the use of probabilistic risk assessment (PRA) in evaluating risk-informed changes to a plant's licensing basis. The licensee has proposed using RG 1.174 guidance to assess the acceptability of extending the Type A test interval beyond that established during the 10 CFR 50, Appendix J, Option B, rulemaking.

RG 1.174 states that a PRA used in risk-informed regulation should be performed in a manner that is consistent with accepted practices. In Regulatory Issue Summary 2007-06 (RIS 2007-06), "Regulatory Guide 1.200 Implementation," the NRC clarified that for all risk-informed applications received after December 2007, the NRC staff will use Revision 1 of RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," to determine whether the PRA used to support a submittal is consistent with accepted practices. Revision 2 of RG 1.200 will be used for all risk-informed applications received after March 2010. Because this LAR was submitted before March 2010, it was evaluated using Revision 1 of RG 1.200.

In the Final Safety Evaluation for NEI 94-01, Revision 2, and EPRI TR-1009325, Revision 2 (ADAMS Accession No. ML081140105), the NRC staff states that Capability Category I of the ASME PRA Standard shall be applied as the standard for assessing PRA quality for ILRT extension applications since approximate values of core damage frequency (CDF) and LERF and their contribution among release categories are sufficient to support the evaluation of changes to ILRT frequencies.

In accordance with this guidance, Exelon Generation Company's August 28, 2009, license amendment request, and February 25, 2010, response to the U.S. Nuclear Regulatory Commission (NRC) staff request for additional information (RAI), addresses the technical adequacy of the PRA which forms the basis for the subject risk assessment. As described therein, the application used the most recent Peach Bottom PRA model available, the PB205C update completed in 2006. In 2004, the applicant conducted a gap assessment (for their 2002 PRA model) with respect to the ASME PRA Standard RA-S-2002 and draft RG 1.200 available at the time. This gap assessment was revisited and updated after the 2006 model update using

ASME PRA standard Addendum A, and again in 2008 for the 2006 model update PB205C with respect to ASME PRA standard Addendum B and RG 1.200, Revision 1. The license amendment request provided a summary of all the remaining supporting requirements that do not meet capability category II of the ASME PRA standard, and an assessment of the impact of these findings on the ILRT extension application. The licensee's assessment concluded that Capability Category I is met for many of the identified gaps. The NRC has determined that meeting Capability Category I is sufficient for ILRT applications. The assessment determined that other gaps related to documentation only, or that the gaps have no impact or no significant impact on the ILRT application. The NRC staff reviewed this information and concurs with the licensee's assessments. Given that the licensee performed a gap assessment of the PRA against RG 1.200, Revision 1, and the ASME PRA Standard, and given that the licensee evaluated all of the gaps for importance to the ILRT interval extension and determined that any unresolved issues would not impact the conclusions of the ILRT risk assessment, the NRC staff concludes that the PBAPS, Unit 2, PRA model update PB205C, is of sufficient technical quality to support the evaluation of changes to ILRT frequencies.

RG 1.174 provides risk-acceptance guidelines for assessing the increases in CDF and LERF for risk-informed license amendment requests. The licensee has estimated the change in LERF for the proposed change based on the cumulative change from the original frequency of three tests in a 10-year interval. In addition, for those plants, such as PBAPS, Unit 2, which rely on containment over-pressure for net positive suction head for the emergency core cooling system injection for certain accident sequences, an ILRT interval extension may result in an increase in CDF too. Hence, the change in CDF must also be estimated, as noted in EPRI Report No. 1009325, Revision 2, and the NRC Safety Evaluation of the EPRI report. In its February 25, 2010, and May 24, 2010, responses to NRC staff RAIs, the licensee has estimated the change in CDF. RG 1.174 also discusses defense-in-depth. The licensee estimated the change in the conditional containment failure probability for the proposed change and judged it to be insignificant and reflecting sufficient defense-in-depth.

The licensee comparisons of risk are based on a change in test frequency from three tests in 10 years (the test frequency under 10 CFR 50, Appendix J, Option A) to one test in 15 years. This bounds the impact of extending the test frequency from one test in 10 years to one test in 15 years. The following conclusions can be drawn from the licensee analysis associated with extending the Type A test frequency:

1. Given the change from a three in 10-year test frequency to a one in 15-year test frequency, the increase in the total integrated plant risk is estimated to be less than 0.1 person-rem per year, and about one percent of the total population dose. This increase is small, as defined in NRC's June 25, 2008, final safety evaluation for NEI 94-01, Revision 2, and EPRI Report number 1009325, Revision 2.
2. The increase in LERF resulting from a change in the Type A test frequency from the original three in 10 years to one in 15 years is estimated to be about  $9.7 \times 10^{-7}$  per year based on the plant-specific internal events PRA, using a multiplier to account for external events, and an assessment (bounding in part) for sequences that rely on containment pressure credit, and including the effects of age-related corrosion. The increase in CDF resulting from a change in the Type A test frequency from the original three in 10 years to one in 15 years is

estimated to be about  $4.1 \times 10^{-7}$  per year based on an assessment (bounding in part) for sequences that rely on containment pressure credit, accounting for both internal and external events.

There is some likelihood that the flaws in the containment estimated as part of the Class 3b frequency would be detected as part of the IWE/IWL visual examination of the containment surfaces (as identified in American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Subsections IWE/IWL). Visual inspections are expected to be effective in detecting large flaws in the visible regions of containment, and this would reduce the impact of the extended test interval on LERF. The licensee's risk analysis considered the potential impact of age-related corrosion/degradation in inaccessible areas of the containment shell on the proposed change, and the calculated increases in LERF reported above includes the impact of age-related corrosion. In response to an NRC staff RAI, the licensee considered instances of liner corrosion discovered over the past 10 years, and found that the sensitivity calculation in the application (resulting in an increase in LERF of  $1.1 \times 10^{-8}$  per year) bounds the effect of including all known corrosion events.

Pursuant to RG 1.174, when the calculated increase in LERF is in the range of  $10^{-7}$  per year to  $10^{-6}$  per year, applications are considered if the total LERF is less than  $10^{-5}$  per year. Based on information provided by the licensee, the total LERF for internal and external events, including the requested change, is estimated to be about  $3.7 \times 10^{-6}$  per year, which meets the total LERF criteria. The NRC staff concludes that increasing the Type A interval to 15 years results in only a small change in LERF and a very small change in CDF, and is consistent with the acceptance guidelines of RG 1.174.

3. RG 1.174 also encourages the use of risk analysis techniques to help ensure and show that the proposed change is consistent with the defense-in-depth philosophy. Consistency with the defense-in-depth philosophy is maintained if a reasonable balance is preserved between prevention of core damage, prevention of containment failure, and consequence mitigation. The licensee estimates the change in the conditional containment failure probability to be an increase of approximately one percentage point for the cumulative change of going from a test frequency of three in 10 years to one in 15 years. The NRC staff finds that the defense-in-depth philosophy is maintained based on the small magnitude of the change in the conditional containment failure probability for the proposed amendment.

Based on these conclusions, the NRC staff finds that the increase in projected risk due to the proposed change is within the acceptance guidelines, while maintaining the defense-in-depth philosophy of RG 1.174 and, therefore, is acceptable.

### 3.5 Historical Testing Results

The licensee provided the results of the last two consecutive ILRT performances as being 0.2135 and 0.3365 containment atmosphere weight percent per day (wt%/day) respectively for 1991 and 2000. With implementation of the Alternative Source Term (AST) dose methodology in 2008 (ADAMS Accession No. ML082320406), the allowable total primary containment leakage ( $L_a$ ) was increased from 0.5 wt%/day to 0.7 wt%/day. The requirement for two consecutive successful ILRT tests was met and the current test maximum allowed interval of 10 years was acceptable. The TS acceptance criteria for the as-found minimum pathway combined Type B (resilient seals, gaskets, or sealant compounds, expansion bellows, and electrical penetrations fitted with flexible metal seal assemblies) and Type C (containment isolation valves) tested isolation components (main steam isolation valves excluded as they have separate limits) is 0.6 times  $L_a$  as-found minimum pathway results. The licensee provided the following Type B and C testing results:

Type B and Type C Combined Leakage Rate Totals

Refueling Outage (year)	Minimum Pathway Leakage (sccm)
1991	20,054
2000	20,244
2002	21,379
2004	18,937
2006	28,108
2008	20,281

Notes:  $0.6L_a$  prior to AST (2008) = 75,256 sccm  
 $0.6L_a$  after AST implementation = 105,350 sccm  
sccm = standard cubic centimeters per minute

There is no apparent trend in potential leakage via the penetration pathways and this data would suggest that extending the ILRT interval until October 2015 would have a negligible impact on the potential for primary containment leakage to exceed the allowable leakage rate and thus dose limits. With AST implementation and the increased allowable leakage rate, substantial margin exists to accommodate increases above historical levels of component degradation.

The Type B and Type C testing schedules are expected to be minimally impacted by the requested ILRT extensions and will continue to be performed and results totaled each refueling outage. Penetration leakage is expected to be the major contributor of any potential containment leakage and the Type B and Type C tests will continue to allow monitoring of potential penetration leakage at the existing allowed intervals for these tests.

### 3.6 Technical Evaluation Conclusions

Based on the NRC staff's review of the licensee's submittal dated August 28, 2009, the staff finds that the structural and leak-tight integrity of the PBAPS, Unit 2, primary containment structure is sound and adequately managed. Further, since the licensee has adequate LLRT and CISI programs in place, that will continue to examine, monitor and manage potential

degradations of the pressure-retaining components of the containment, there is reasonable assurance that the containment structural and leak-tight integrity will continue to be maintained if the ILRT interval is extended to 15 years. The NRC staff also finds that the increase in projected risk due to the proposed change maintains the defense-in-depth philosophy of RG 1.174 and associated acceptance guidelines and, therefore, is acceptable. Therefore, the NRC staff finds it acceptable to grant the requested one-time extension of the ILRT interval to 15 years for PBAPS, Unit 2. TS 5.5.12.b is added to reflect the one-time ILRT interval extension and TS 5.5.12.a is modified to reflect that there is now more than one exception being taken to NEI 94-01, Revision 0.

#### 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's comments and NRC staff response are documented in ADAMS Accession No. ML093210018.

#### 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 or a change to SRs. 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 27830). 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: Jerome O. Bettle  
Tina Ghosh  
Dan Hoang  
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Date: July 20, 2010

July 20, 2010

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

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNIT 2 - ISSUANCE OF  
AMENDMENT RE: ONE-TIME FIVE-YEAR CONTAINMENT TYPE A  
INTEGRATED LEAK RATE TEST INTERVAL EXTENSION (TAC NO. ME2159)

Dear Mr. Pacilio:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 276 to Renewed Facility Operating License No. DPR-44 for the Peach Bottom Atomic Power Station (PBAPS), Unit 2. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 28, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092440053), as supplemented by letters dated February 25, 2010, and May 24, 2010 (ADAMS Accession Nos. ML100560433 and ML101450047).

The amendment issued with this letter modifies TS 5.5.12, "Primary Containment Leakage Rate Testing Program" to reflect a one-time extension of the containment Type A Integrated Leak Rate Test (ILRT) from 10 to 15 years. The one-time extension would require a Type A ILRT to be performed no later than October of 2015.

All work is complete on TAC No. ME2159. Accordingly, this TAC No. 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

Enclosures:

- 1. Amendment No. 276 to Renewed DPR-44
- 2. Safety Evaluation

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\*by memo dated

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