



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

May 31, 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: STORAGE OF LOW-LEVEL RADIOACTIVE WASTE PRODUCED AT LIMERICK GENERATING STATION (TAC NOS. ME3092 AND ME3093)

Dear Mr. Pacilio:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment Nos. 280 and 282 to Renewed Facility Operating License (FOL) Nos. DPR-44 and DPR-56 for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The amendments consist of changes to Section 2.B.(5) of the FOLs in response to your application dated January 6, 2010, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100200009), as supplemented on August 20, 2010, October 14, 2010, December 6, 2010, and February 7, 2011 (ADAMS Accession Nos. ML102350035, ML102880108, ML103410085, and ML110390446).

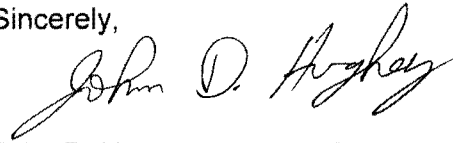
FOL Nos. DPR-44 and DPR-56 allow PBAPS, Units 2 and 3 to possess byproduct and special nuclear material, including low-level radioactive waste (LLRW) that was generated at the facility. The amendments issued with this letter authorize PBAPS, Units 2 and 3, to possess Class B and Class C LLRW as may be produced by the operation of Limerick Generating Station, Units 1 and 2.

M. Pacilio

- 2 -

All work is complete on TAC Nos. ME3092 and ME3093. 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,

A handwritten signature in black ink, appearing to read "John D. Hughey". The signature is fluid and cursive, with the first name "John" being the most prominent.

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. 280 to Renewed DPR-44
2. Amendment No. 282 to Renewed DPR-56
3. 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. 280  
Renewed 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 January 6, 2010, as supplemented by letters dated August 20, 2010, October 14, 2010, December 6, 2010, and February 7, 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, Section 2.B.(5) of the Renewed Facility Operating License No. DPR-44 is hereby amended to read as follows:

- (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.

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 License

Date of Issuance: May 31, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 280

RENEWED FACILITY OPERATING LICENSE NO. DPR-44

DOCKET NO. 50-277

Replace the following page of the Renewed 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

Page 3

Insert

Page 3

- (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. 279, 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.



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. 282  
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 January 6, 2010, as supplemented by letters dated August 20, 2010, October 14, 2010, December 6, 2010, and February 7, 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, Section 2.B.(5) of the Renewed Facility Operating License No. DPR-56 is hereby amended to read as follows:

- (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.

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 License

Date of Issuance: May 31, 2011



ATTACHMENT TO LICENSE AMENDMENT NO. 282  
RENEWED FACILITY OPERATING LICENSE NO. DPR-56  
DOCKET NO. 50-278

Replace the following page of the Renewed 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

Page 3

Insert

Page 3

- (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. 281, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.<sup>1</sup>

- (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>2</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

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

<sup>2</sup>The training and Qualification Plan and Safeguards Contingency Plan and Appendices to the Security Plan.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 280 TO RENEWED FACILITY  
OPERATING LICENSE NO. DPR-44 AND AMENDMENT NO. 282 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 January 6, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100200009), Exelon Generation Company, LLC (EGC) submitted a request to revise paragraph 2.B.(2) of Facility Operating License (FOL) No. DPR-12 for Peach Bottom Atomic Power Station (PBAPS) Unit 1 and paragraph 2.B.(5) of Renewed FOLs Nos. DPR-44 and DPR-56 for PBAPS Unit 2 and Unit 3, respectively. FOL Nos. DPR-44 and DPR-56 allow PBAPS, Units 2 and 3 to possess byproduct and special nuclear material, including low-level radioactive waste (LLRW) that was generated at the facility. The proposed amendments would authorize PBAPS, Units 2 and 3, to possess Class B and Class C LLRW as may be produced by the operation of Limerick Generating Station, Units 1 and 2.

The licensee provided supplemental information by letters dated August 20, 2010, October 14, 2010, December 6, 2010, and February 7, 2011 (ADAMS Accession Nos. ML102350035, ML102880108, ML103410085, and ML110390446). 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 November 30, 2010 (75 FR 74094). The supplement dated August 20, 2010, included a withdrawal of the requested amendment for PBAPS Unit 1 FOL No. DPR-12, recognizing that the PBAPS licensing basis did not include storage of LLRW from Unit 1 in the PBAPS LLRW storage facility.

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

## 2.0 REGULATORY EVALUATION

Storage of LLRW on-site at PBAPS is permitted per paragraph 2.B.(5) of Renewed FOLs Nos. DPR-44 and DPR-56 for Unit 2 and Unit 3, respectively. Paragraph 2.B.(5) references Title 10 of the *Code of Federal Regulations* (10 CFR) Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material" and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material." The portions of these regulations applicable to on-site storage of LLRW are incorporated in the PBAPS Unit 2 and Unit 3 licenses granted pursuant to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." Therefore, the licensee has requested the proposed amendment in accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit." The proposed amendment involves on-site storage of LLRW that was generated at a different site. However, both reactor sites are licensed to the same licensee (Exelon) and disposition under 10 CFR Part 50 of the license amendment request (LAR) is consistent with NRC practice as described in Section 3.2 of Attachment 1 of the licensee's submittal dated January 6, 2010.

The licensee's supplement dated August 20, 2010, confirms that EGC has established financial accounting processes to ensure that all operational costs associated with transportation and storage of the LLRW generated at LGS will be allocated to LGS. In addition, EGC ensures that accounting liability equivalent to the expected disposal cost for the container holding LLRW will remain the responsibility of the station that generated the LLRW. Therefore, all financial liability requirements and eventual decommissioning costs associated with the LLRW containers generated at LGS will be allocated to LGS, even though the container is stored in the PBAPS LLRW storage facility.

The LLRW storage facility is described in Section 9.3.3 of the PBAPS Updated Final Safety Analysis Report (UFSAR) as the radwaste on-site storage facility. The PBAPS LLRW storage facility was originally designed to store Class A, B, and C LLRW on an interim basis in order to offset the postulated lack of permanent disposal capability. Class A, B and C waste is defined in 10 CFR Section 61.55, "Waste Classification." 10 CFR 61.55 lists the radioactivity concentration limits of specific radioactive materials allowed in each LLRW class for near-surface disposal. Class A LLRW contains the lowest radioactive concentration, Class B LLRW contains the next higher radioactive concentration and Class C LLRW has the highest radioactive concentration allowed to be disposed of in a near-surface LLRW disposal facility.

The LAR describes that the LLRW storage facility was built in the mid-1980s inside the PBAPS Owner Controlled Area in a Restricted Area, but outside the PBAPS Security Protected Area. The LAR states that the LLRW storage facility was designed and constructed under NRC regulatory guidance in effect at the time, primarily Generic Letter 81-38, "Storage of Low-Level Radioactive Wastes at Power Reactor Sites" (GL 81-38) issued on November 10, 1981 (ADAMS Accession No. ML031110064). This generic letter was issued based on the NRC expectation that many nuclear power reactor licensees were taking or planning on taking steps to provide for additional on-site storage of low-level radioactive wastes generated on-site due to the anticipated reduction in waste disposal availability in the United States. The NRC provided guidance in GL 81-38 to licensees on acceptable methods of evaluating new, additional on-site storage facilities under 10 CFR 50.59, "Changes, Tests and Experiments."

Subsequent to the issuance of GL 81-38, the NRC issued NUREG 0800, "Standard Review Plan," (SRP), including Chapter 11, Section 11.4, "Solid Waste Management System," (SWMS), Rev. 3, dated March 2007, (ADAMS Accession No. ML070710397). Section 11.4 of the SRP

provides guidance that is applicable to a broad spectrum of activities associated with the design and management of LLRW systems, including design guidance from Branch Technical Position (BTP) 11-3, Revision 3, "Design Guidance for Solid Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants," (SRP dated March 2007, ADAMS Accession No. ML070730202). Section 11.4 of the SRP also incorporates relevant criterion from 10 CFR 50 Appendix A, "General Design Criteria," (GDC). PBAPS Units 2 and 3 were designed and construction was commenced prior to the codification of the current GDC of Appendix A to 10 CFR Part 50. 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 GDC 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.

The applicable regulations for protection of individuals receiving occupational exposure and for members of the public receiving public radiation exposure are contained in 10 CFR Part 20, "Standards for Protection Against Radiation." In addition, 10 CFR 50 Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criteria "As Low As Is Reasonably Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Plant Effluents," establishes design objectives that are incorporated into plant technical specifications. As stated in Section 11.4 of the SRP, the facility design and operation should assure that radiological consequences of design basis events do not exceed a small fraction (10 percent) of 10 CFR Part 100, "Reactor Site Criteria," dose limits which translates to dose limits of 2.5 roentgen equivalent man (rem) whole body and 30 rem thyroid.

The NRC staff reviewed the design basis event dose assessment for the PBAPS LLRW storage facility as documented in Attachment 4 to the subject LAR entitled, Analysis No. PM-750, "Container Drop Accident Analysis." The NRC staff reviewed the assumptions and methodology used to show compliance with the accident dose guidance found in NUREG-0800, SRP, Appendix 11.4-A, "Design Guidance for Temporary Storage of Low-Level Radioactive Waste," Revision 3, March 2007. As stated in the SRP, the facility design and operation should assure that radiological consequences of design basis events do not exceed a small fraction (10 percent) of 10 CFR Part 100 dose limits which translates to dose limits of 2.5 roentgen equivalent man (rem) whole body and 30 rem thyroid.

The NRC staff notes that for accidents involving the dispersion of solid waste activity, the controlling dose would be from inhalation of the airborne activity and should consider all dose significant radionuclides. The licensee assessed the controlling dose for these events by using the NRC accepted dose conversion factors for inhalation as documented in Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion." The licensee evaluated the inhalation dose from all dose-significant radionuclides and used an acceptance limit of 2.5 rem.

The SRP criteria are not a substitute for NRC regulations and compliance with them is not required. Rather, they are criteria that are acceptable to meet NRC regulations. Attachment 3 of the licensee's January 6, 2010, submittal describes and compares the 10 CFR 50.59 evaluation that was performed in 1983 with respect to the criteria contained in Section 11.4 of the SRP. The NRC staff has used selected criteria from Section 11.4 as evaluation criteria to

assess the acceptability of the proposed scope of the LAR which is limited to the storage of LLRW from LGS in the PBAPS LLRW storage facility. Attachment 3, Appendix D, of the licensee's January 6, 2010, submittal states that the facility's Waste Acceptance Criteria (WAC) requires that all radioactive waste shall be packaged and loaded in accordance with applicable U.S. Department of Transportation (DOT) regulations and NRC Regulations as described in 10 CFR Part 71, "Packaging and Transportation of Radioactive Material." NRC regulatory requirements related to LLRW packaging, container design, transportation of LLRW, or the duration of storage of LLRW, are not within the scope of the proposed TS changes in the licensee's amendment request, and are not addressed in this NRC safety evaluation. This limited scope of the amendment request and associated NRC review was acknowledged by the licensee in its supplement dated February 7, 2011.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Proposed FOL Changes

Presently, PBAPS Renewed FOL Nos. DPR-44 and DPR-56, paragraph 2.B.(5), state the following:

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.

The proposed paragraph 2.B.(5) states:

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.

#### 3.2 Evaluation

Attachment 1, Section 4.3.2 of the licensee's January 6, 2010, submittal states that 520 containers of Class B and Class C waste can be stored in 35 cells in the PBAPS LLRW storage facility. Section 4.3.1 of Attachment 1 states that the placement of containers within the PBAPS LLRW storage facility will be controlled in accordance with administrative procedures, and will ensure compliance with the occupational and public dose limits specified in 10 CFR Part 20 and 40 CFR Part 190. As noted in the "Regulatory Evaluation" section of this safety evaluation, Section 11.4 of the SRP provides guidance that is applicable to a broad spectrum of activities associated with the design and management of LLRW systems. The NRC staff has used selected criteria from Section 11.4 as evaluation criteria to assess the acceptability of the proposed scope of the LAR which is limited to the storage of LLRW from LGS in the PBAPS LLRW storage facility.

### 3.2.1 SRP Section 11.4 Applicable Acceptance Criteria

The NRC staff has determined that the acceptance criteria listed below, contained in SRP Section 11.4, is applicable to the proposed LAR.

SRP Section 11.4 Acceptance Criteria No. 1 states:

The SWMS design parameters are based on expected radionuclide distributions and concentrations consistent with reactor operating experience for similar designs, as evaluated under SRP Section 11.1

The licensee's amendment request describes the LLRW classification system for disposal of LLRW, (i.e., Class A, B, C LLRW) as being based on radionuclide concentrations in accordance with 10 CFR 61.55 waste classification criteria. The licensee analyzed an isotopic mix of resin and determined that the largest contributor to the dose rate on a container was Cobalt-60 (Co-60). Additionally, the amendment request describes radiation shielding dose assessments based on Co-60, such as to provide a bounding, conservative dose assessment due to the higher gamma energies of Co-60 compared to other radionuclides present in the isotopic mix.

The NRC staff concludes that the licensee's evaluation utilized appropriate LLRW radionuclide distributions and concentrations in that they are consistent with demonstrated LGS and PBAPS operating experience in accordance with SRP Criteria No. 1.

SRP Section 11.4 Acceptance Criteria No. 3 states:

All liquid and wet wastes will be stabilized in accordance with a Process Control Program (PCP) before offsite shipment, or provisions will be made to verify the absence of free liquid in each container and procedures to reprocess containers in which free liquid is detected in accordance with the requirements of Branch Technical Position (BTP) 11-3 ["Design Guidance for Solid Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants"].

SRP Section 11.4 Acceptance Criteria No. 4 states:

Other forms of wet wastes will be stabilized or dewatered (subject to the licensed disposal facility's waste acceptance criteria) in accordance with a PCP, or provisions will be made to verify the absence of free liquid in each container and procedures to reprocess containers in which excess water is detected in accordance with the requirements of BTP 11-3.

Attachment 3, Appendix D, of the January 6, 2010, submittal states that the facility's WAC requires that LLRW resin is dewatered to not exceed 1% of the waste volume. PBAPS procedure RW-AA-105, "Guidelines for Operating an Interim On Site Low Level Radioactive Waste Storage Facility," also included in Attachment 3 of the January 6, 2010, submittal, requires that waste be processed in accordance with 10 CFR Part 61 requirements. Therefore, the NRC staff concludes that stabilization and dewatering requirements are implemented per

the PCP and in accordance with 10 CFR 61 regulatory requirements, satisfying the criteria above.

SRP Section 11.4 Acceptance Criteria No. 8 states:

SWMS components and piping systems, as well as structures housing SWMS components, are designed in accordance with the provisions of Regulatory Guide 1.143, ["Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants"] as it relates to the seismic design and quality group classification of components, and BTP 11-3 for wastes produced during normal operation and anticipated operational occurrences.

The NRC staff reviewed Regulatory Guide 1.143, and determined that it applies to LLRW collection and processing systems, and does not apply to LLRW Storage Facilities.

The NRC staff determined that the following from Section A of BTP 11-3 is applicable to LLRW storage:

Following packaging, wastes are normally stored for decay of shorter lived radionuclides and to accumulate sufficient wastes for shipment off site. Insofar as the continuous operation of the SWMS is contingent on the availability of storage space for the interim period between waste packaging and shipment off site, the applicant should give consideration to providing ample storage capacity to accommodate wastes during periods when offsite shipments are not possible (e.g., during inclement weather, natural disasters, or labor strikes). Furthermore, in view of the reduced availability of burial site disposal capacity, it may be desirable to provide additional onsite short-term storage capacity to accommodate surges in solid waste volume resulting from interruption or limitations in offsite disposal services. Upon resumption of the disposal services, the stored wastes could then be shipped in an orderly fashion.

Section 4.1 of Attachment 1 to the licensee's January 6, 2010, submittal states that the PBAPS LLRW storage facility was originally designed to store Class A, B, and C LLRW on an interim basis in order to offset the postulated lack of permanent disposal capability. At the time of original construction, approximately 90% of the LLRW projected to be stored in the PBAPS LLRW storage facility was Class A LLRW, with the balance being Class B and C LLRW.

Per Section 8.5.4 of Attachment 3 to the licensee's January 6, 2010, submittal, the capacity of the PBAPS LLRW storage facility is sufficient to store 520 containers. Currently, Class A waste can continue to be disposed at the Energy Solutions-Clive facility, leaving the PBAPS LLRW storage facility with additional storage capacity that was originally intended for storage of Class A waste.

The capacity of the PBAPS LLRW storage facility is sufficient to store 520 containers for an extended period. The LAR proposes to store only Class B and Class C LLRW from LGS in the PBAPS LLRW storage facility. Therefore, the NRC staff concludes that storing the additional Class B and C waste will not constrain the PBAPS LLRW storage capability. The NRC staff



finds that the proposed increased storage capacity is consistent with the objective of BTP 11-3 to provide adequate storage capacity, and that the acceptance criteria above have been satisfied.

SRP Section 11.4 Acceptance Criteria No. 9 states:

The SWMS contains provisions to reduce leakage and facilitate operations and maintenance in accordance with the provisions of Regulatory Guide 1.143 and BTP 11-3, as they relate to wastes produced during normal operation and anticipated operational occurrences.

As discussed above, the NRC staff reviewed Regulatory Guide 1.143 and determined that it does not apply to storage facilities for LLRW. The BTP 11-3 guidance regarding storage is consistent with the NUREG-0800, Chapter 11.4 criteria.

Table 4.5-1 of Attachment 3 to the licensee's January 6, 2010, submittal describes the licensee's container inspection procedures used to identify potential container degradation and leakage. Section 8.1.1.5.1 of Attachment 3 to the submittal also describes the LLRW storage facility sumps installed for collection of potential liquid leakage, and provisions for a mobile processing connection transferring the contaminated liquid to a tank truck or waste processing system.

Attachment 3, Appendix E, Section 4.2 of the licensee's January 6, 2010, submittal states that the facility ventilation system is shut down and that truck bay doors are closed during handling operations. These actions reduce the impact of any anticipated operational occurrence such as a container drop and an associated inadvertent effluent release.

The NRC staff concludes that the licensee has adequate provisions to reduce leakage and facilitate operations and maintenance in that PBAPS container inspection procedures provide an adequate method of identification of container degradation, the LLRW storage facility has building sumps to collect potential leakage, and a radiological protection program and procedures are in place to respond to and manage operational occurrences. Therefore, the NRC staff finds that the acceptance criteria above have been satisfied.

SRP Section 11.4 Acceptance Criteria No. 12 states:

Mixed wastes (characterized by the presence of hazardous chemicals and radioactive materials) will be processed and disposed in accordance with 10 CFR 20.2007, as it relates to compliance with other applicable Federal, State, and local regulations governing any other toxic or hazardous properties of radioactive wastes.

Per Attachment 3, Appendix D, of the licensee's January 6, 2010, submittal, the facility's WAC, Condition 26, prohibits the receipt of mixed waste at the PBAPS LLRW storage facility. Therefore, the NRC staff concludes that mixed waste will not be stored in the LLRW storage facility.

SRP Section 11.4 Acceptance Criteria No. 13 states:

All effluent releases (gaseous and liquid) associated with the operation (normal and anticipated operational occurrences) of the SWMS will comply with 10 CFR Part 20 and Regulatory Guide 1.143, as they relate to the definition of the boundary of the SWMS beginning at the interface from plant systems, including multiunit stations, to the points of controlled liquid and gaseous effluent discharges to the environment or designated onsite storage locations, as defined in the PCP and ODCM [Offsite Dose Calculation Manual].

As discussed above, the NRC staff reviewed Regulatory Guide 1.143 and determined that it does not apply to storage facilities for LLRW.

With regard to gaseous effluent releases, Section 7.4.7 of Attachment 3 to the licensee's January 6, 2010, submittal states that the PBAPS storage facility will continue to be utilized for dry-waste storage-only and no dry-waste segregation, compaction, processing or repackaging will be performed in the facility. Appendix D, Attachment 3, WAC Condition 33, states that the PBAPS storage facility shall only receive aqueous liquids and other applicable waste forms which have been solidified or otherwise stabilized.

Section 8.2 of Attachment 3 to the licensee's January 6, 2010, submittal states that the PBAPS storage facility truck bay is a non-radiation area except during container handling. When waste packages are handled, the truck bay is a restricted, potentially high-radiation area and access is controlled by health physics personnel. The submittal also states that the LLRW storage facility control room and other potentially-occupied areas in the building are designed to be non-radiation areas during waste storage and handling, with dose rates limited to less than 1 mR/hr as an "as low as reasonably achievable (ALARA)" practice for operating personnel. In addition, Attachment 3, Appendix E, Section 4.2 of the licensee's January 6, 2010, submittal states that the facility ventilation system is shut down and that truck bay doors are closed during handling operations. These actions reduce the impact of any anticipated operational occurrence such as a container drop and an associated inadvertent effluent release.

The NRC staff concludes that potential gaseous effluent releases are unlikely from the PBAPS LLRW storage facility. This conclusion is based on the restrictions and licensee controls described above and the requirement that the physical form of LLRW is in solid form. Therefore, the NRC staff finds that the acceptance criteria above have been satisfied.

### 3.2.2 SRP Section 11.4, Appendix A, Generally Applicable Guidance

The NRC staff has determined that the generally accepted guidance listed below, contained in SRP Section 11.4, Appendix A, is applicable to the proposed LAR.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.1 states:

The quantity of radioactive material allowed and the shielding configurations will be dictated by the dose rate criteria for both the site boundary and unrestricted areas or site. The 40 CFR Part 190 limits will restrict the annual dose from direct radiation and effluent releases from all sources of uranium fuel cycle, and

10 CFR 20.1302 limits the exposure rates in unrestricted areas. Offsite doses from onsite storage must be sufficiently low to account for other uranium fuel cycle sources (e.g., an additional dose of less than or equal to 0.01 mSv (1 mrem) per year is not likely to cause the 40 CFR Part 190 limits, as implemented under 10 CFR 20.1301(e) to be exceeded. Onsite dose limits associated with temporary storage will be controlled per 10 CFR Part 20, including the ALARA principle of 10 CFR 20.1101.

Section 8.5.4 of Attachment 3 to the licensee's January 6, 2010, submittal states that the maximum dose rate on an individual container from LGS is approximately 250 R/hr. The maximum dose rate is used to indirectly establish a limit on the total quantity of allowable radioactive material in the LLRW storage facility to meet the 10 CFR 20 dose rate criteria of 2 mrem in an hour at the site boundary and unrestricted areas and the SRP acceptance criteria of 1 mrem per year for a real member of the public in the unrestricted area.

A Co-60 source term is derived based on container loading and placement restrictions to determine an indirect limit on total radioactivity and evaluate the source term. Dose rates for containers on the periphery of the PBAPS LLRW storage facility are limited to 125 R/hr contact, and the interior cells are assumed to be filled with 400 R/hr contact containers. This strategy places the higher dose rate containers in the center area of the LLRW storage facility, and lower radiation level containers in the peripheral areas.

In determining the source term, the licensee analyzed an isotopic mix of resin and determined that the largest contributor to the dose rate on a container was Co-60. The LAR concludes that the use of the radioisotope Co-60 in dose assessments is a conservative assumption since Co-60 has higher energy gamma photons than most other radionuclides. The use of Co-60 is conservative since concrete shielding is less effective for higher energy photons, and therefore dose calculations based on Co-60 will produce a higher dose than the dose from radioisotopes with lower energy photons. The licensee determined the Co-60 source term using the Microshield Version 5.05 computer program to calculate an equivalent amount of Co-60 necessary to produce the limiting 125 R/hr (approximately 200 Curies) and 400 R/hr (approximately 640 Curies) container dose rates.

The licensee's derived Co-60 source term assumed no credit for dose reduction from radiological decay in the Co-60 source term, in spite of Co-60 having a relatively short 5-year half life compared to the longer expected storage period that will result in declining dose rates on each container throughout the storage period.

Using this source term, the licensee performed a direct radiation dose analysis using modeling and shielding assumptions of a full-capacity inventory LLRW storage facility as described in licensee calculation PM-1083, Revision 0 (ADAMS Accession No. ML110310236). The licensee used the Monte Carlo MCNP computer code to perform the dose assessment. The MCNP code tracks random photon emissions that travel through the shield walls and roof and determines the photon fluence at various receptor locations of interest. The photon fluence is then converted to effective dose equivalent using conversion factors obtained from ANSI/ANS-6.1.1 1991, "Neutron and Gamma-Ray Fluence-To-Dose Factors."

For on-site occupational dose protection purposes, the licensee concludes that during storage periods with a full LLRW storage facility, the dose rates are less than 1 mrem per hour outside the facility, less than 1 mrem per hour in the LLRW storage facility main control room, and are likely to be greater than 5 mrem per hour in the truck bay thereby requiring posting as a Radiation Area. During container handling operations, dose rates in the truck bay, and potentially outside the truck bay are likely to exceed 100 mrem/hr and will likely require posting and radiological controls as a High Radiation Area.

For off-site members of the public dose assessment, the licensee's assessment is that with a completely full LLRW storage facility, the maximum potential annual dose to a real off-site individual is 0.4 mrem and the dose at the unrestricted area boundary will not exceed 2 mrem in an hour.

The NRC staff concludes that the licensee's calculational methods are adequate in that the licensee's use of Microshield and Monte Carlo techniques, combined with a conservative source term of the Co-60 radioisotope, and a container loading strategy, provide a conservative estimate of the potential off-site doses to members of the public and on-site occupationally exposed individuals.

The NRC staff concludes that the licensee has adequately assessed the maximum potential annual dose of 0.4 mrem for off-site members of the public. The potential public dose is less than the acceptance criteria of 1 mrem per year, and is a small fraction of the Environmental Protection Agency (EPA) 40 CFR 190 dose limits of 25 mrem per year for all radiation sources in the uranium fuel cycle. This dose is well below the 10 CFR 20 dose limits of 100 mrem per year for members of the public, well below the EPA 40 CFR 190 dose limit of 25 mrem per year for members of the public, and meets the 10 CFR 20.1101(b) criteria for "as low as is reasonably achievable (ALARA)." Therefore, the NRC staff finds that the guidance above is satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.3 states:

If possible, the preferred location of the additional storage facility is inside the plant's protected area. If adequate space in the protected area is not available, the licensee should place the storage facility on the plant site and establish both a physical security program (fence, locked and alarmed gates and doors, and periodic patrols) and a restricted area for radiation protection purposes. The facility should not be in a location that requires transportation of the waste over public roads unless no other feasible alternatives exist. Licensees must conduct any transportation over public roads in accordance with the NRC and DOT regulations (10 CFR Part 71 and 49 CFR Parts 171-180).

The NRC staff reviewed Section 8.1 of Attachment 3 to the licensee's January 6, 2010, submittal and the supplements dated October 14, 2010, and December 6, 2010, regarding the physical description of the PBAPS LLRW storage facility. The facility is located within the plant's Owner Controlled Area, but not within the plant's security protected area. The licensee's supplements describe the Owner Controlled Area as being secured by the PBAPS Security Plan.

The PBAPS LLRW storage facility is located inside a fenced-in, radiological Restricted Area within the Owner Controlled Area and personnel access to the radiological Restricted Area is controlled. Although members of the public are allowed access to the Owner Controlled Area, movement is generally restricted to the parking lots adjacent to the east and north of the PBAPS LLRW storage facility fence lines (Restricted Area), and inadvertent access to other areas is minimized and identified individuals will be removed in accordance with the requirements of the PBAPS Security Plan.

The NRC staff concludes that although the PBAPS LLRW storage facility is not within the plant's protected area, the above guidance regarding the facilities' physical location and access controls is satisfactorily met in that the facility is located inside the plant's Owner Controlled Area in a radiological Restricted Area and is secured under the PBAPS Security Plan.

As described in the Regulatory Evaluation of this safety evaluation, Attachment 3, Appendix D, of the licensee's January 6, 2010, submittal states that the facility's WAC requires that all radioactive waste shall be packaged and loaded in accordance with applicable U.S. DOT regulations and NRC Regulations as described in 10 CFR Part 71. NRC regulatory requirements related to LLRW packaging, container design, transportation of LLRW, or the duration of storage of LLRW, are not within the scope of the proposed TS changes in the licensee's amendment request and are not addressed in this NRC safety evaluation. This limited scope of the amendment request and associated NRC review was acknowledged by the licensee in its supplement dated February 7, 2011. Therefore, the guidance above related to the transportation of LLRW was not reviewed or evaluated by the NRC staff.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.4 states:

Licensees should implement operational safety features to prevent the accidental dropping of containers from cranes and forklifts or the puncturing of containers from forklifts during the movement and transportation of radioactive waste containers. Personnel should receive training in the proper operation of such equipment and instruction on the use of methods to securely hold containers on such equipment (e.g., tie-downs, gates, cages).

Section 8.7 of Attachment 3 to the licensee's January 6, 2010, submittal states that a container drop is considered a very unlikely event given crane features, operator training, and procedural controls. Appendix E, Section 4.2 of Attachment 3 of the submittal also states that a container drop is considered to be highly unlikely due to the design of the container lifting equipment. The licensee notes that the PBAPS LLRW storage facility cranes are equipped with a winch system which permits them to be manually retracted over the truck bay without electrical power or functioning drive motors.

The licensee's response to the NRC Request for Additional Information RAI-09, included in the supplement dated October 14, 2010, states that PBAPS personnel receive a procedurally-required pre-job briefing and a High Radiation Area (HRA)/Locked High Radiation Area (LHRA) briefing prior to the start of a waste handling evolution in the LLRW storage facility. In addition, Section 8.1.4 of Attachment 3 to the licensee's January 6, 2010, submittal states that the crane operator uses a closed circuit television to view the crane manipulation during material handling operations.

The NRC staff concludes that the licensee has provided operational safety features, procedures, and training to prevent accidental dropping of a container during LLRW handling operations. Therefore, the NRC staff finds that the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.6.A states:

Licensees shall monitor potential release pathways of all radionuclides present in the stabilized waste form as described in Appendix A to 10 CFR Part 50. Surveillance programs shall incorporate adequate methods for detecting failure of container integrity and measuring releases to the environment. For outside storage, licensees shall conduct periodic direct radiation and surface contamination monitoring to ensure that levels are below limits specified in 10 CFR 20.1301 and 10 CFR 20.1302, 10 CFR Part 71, and Subpart I (Class 7) of 49 CFR Part 173. All containers should be decontaminated to these or lower levels before storage.

With regard to gaseous effluent releases, Section 7.4.7 of Attachment 3 to the licensee's January 6, 2010, submittal states that the PBAPS storage facility will continue to be utilized for dry-waste storage-only and no dry-waste segregation, compaction, processing or repackaging will be performed in the facility. Appendix D, Attachment 3, WAC Condition 33, states that the PBAPS storage facility shall only receive aqueous liquids and other applicable waste forms which have been solidified or otherwise stabilized.

In addition, Section 8.7 of Attachment 3 to the licensee's January 6, 2010, submittal states that a container drop is considered a very unlikely event given crane features, operator training, and procedural controls. Appendix E, Section 4.2 of Attachment 3 of the submittal also states that a container drop is considered to be highly unlikely due to the design of the container lifting equipment. The licensee notes that the PBAPS LLRW storage facility cranes are equipped with a winch system which permits them to be manually retracted over the truck bay without electrical power or functioning drive motors. The licensee acknowledges in Section 7.4.5 of Attachment 3 to the licensee's January 6, 2010, submittal that should a postulated container drop occur, this could result in some initial airborne particulate. However, this activity is a manned operation, so such an accident would be immediately detected.

Section 7.4.8 of Attachment 3 to the licensee's January 6, 2010, submittal states that the Peach Bottom ODCM incorporates radiological environmental monitoring programs that provide for continuous sampling of airborne radioiodine and particulates with periodic sample collection. In addition, routine direct radiation monitoring and radioactive sampling of waterborne surface and drinking water is also performed. Section 7.4.6.1, Item 3, of Attachment 3 also notes that periodic container inspection is used to detect any container degradation.

Table 4.5-1, page 9 of 68, in Attachment 3 of the licensee's January 6, 2010, submittal states that outside storage is not permitted at the PBAPS LLRW storage facility. Appendix D of Attachment 3 to the licensee's January 6, 2010, submittal describes procedures for inspection, survey and record keeping for incoming LLRW containers,

and routine radiation surveys during the storage period are required per Exelon procedure RW-AA-105, Revision 2, "Guidelines For Operating an Interim On Site Low Level Radioactive Waste Storage Facility" (included in Attachment 3 to the licensee's January 6, 2010, submittal).

The NRC staff concludes that in accordance with 10 CFR 20.1302 requirements for radiation surveys, the licensee has procedures for performing surveys upon receipt of the LLRW, and for performing radiological surveillance during and after handling and storage activities, including on-site and off-site environmental monitoring. The results of the licensee surveys will be used to determine and demonstrate long term compliance with public dose limits in 10 CFR 20.1301.

The NRC staff concludes that potential gaseous effluent releases are unlikely from the PBAPS LLRW storage facility. This conclusion is based on the restrictions and licensee controls described above, including on-site and off-site environmental monitoring, and the requirement that the physical form of LLRW is in solid form. Therefore, the NRC staff finds that effluent monitoring is not necessary for the PBAPS LLRW storage facility, and that the licensee has procedures for container inspection that will be adequate to detect potential container failure.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.6.B states:

Licensees should incorporate provisions for collecting liquid drainage, including provisions for sampling all collected liquids. Routing of the collected liquids should be to radwaste systems if contamination is detected or to normal discharge pathways if the water ingress is from external sources and remains uncontaminated by plant-generated radioactivity.

Section 7.4.6, Item 2, of Attachment 3 to the licensee's January 6, 2010, submittal confirms that a liquid sump collection system is installed in the PBAPS LLRW storage facility. The sump system provides containment for contaminated or potentially contaminated liquids resulting from the operation of the facility or postulated mechanistic events. No significant liquid is expected from the loss of container integrity since the only liquid present would be the residual liquid from dewatered resins. Separate holding tanks are also provided for the storage bay and truck bay areas. External design basis flooding is only expected to affect the truck bay, not the storage bay where the LLRW is stored. High sump level annunciation is also provided in the LLRW storage facility control room.

The NRC staff concludes that the PBAPS LLRW storage facility includes a sump collection system that effectively collects, and holds for sampling, any postulated liquid drainage that may result from the operation of the facility. In addition, external flooding water ingress will remain uncontaminated since only the truck bay area is affected. Therefore, the NRC staff finds that the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.6.C states:

Waste stored in outside areas should be held securely by installed holddown systems. The holddown system should secure all containers during severe environmental conditions, up to and including the design-basis event for the waste storage facility.

As previously noted above, Table 4.5-1, page 9 of 68, in Attachment 3 of the licensee's January 6, 2010, submittal states that outside storage is not permitted at the PBAPS LLRW storage facility.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.6.D states:

Licensees should assure container integrity against corrosion from the external environment, including external weather protection where necessary and practical. Storage containers should be raised off storage pads where water accumulation can be expected to cause external corrosion and possible degradation of container integrity.

Section 8.1.3 of Attachment 3 of the licensee's January 6, 2010, submittal states that the PBAPS LLRW storage facility is equipped with a heating and ventilation system. The system provides electric unit heaters and ventilation via motorized roof exhausters.

Section 4.1.4 of Exelon procedure RW-AA-105, Revision 2, "Guidelines For Operating an Interim On Site Low Level Radioactive Waste Storage Facility" (included in Attachment 3 to the licensee's January 6, 2010, submittal) provides guidance that storage containers should be raised off storage pads, where water accumulation can be expected to cause external corrosion and possible degradation of container integrity. However, no such configuration is noted as being necessary in the PBAPS LLRW storage facility.

Therefore, the NRC staff concludes that LLRW storage is inside a climate-controlled building that provides suitable protection from external weather factors and the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.6.E states:

Licensees should establish total radioactive material inventory limits (in becquerels and curies), based on the design of the storage area, dose limits for members of the public, and safety features or measures being provided (e.g., radiation monitoring).

Per Table 4.5-1, page 9 of 68, in Attachment 3 of the licensee's January 6, 2010, submittal the licensee indirectly established a total radioactive material inventory as described in the guidance above. The licensee's approach is based on the shielding calculations provided in the supplement dated February 7, 2011 (ADAMS Accession No. ML110390446).

Dose based criteria and container loading and placement restrictions provide an equivalent methodology that achieves the same end result (i.e., a method of ensuring that potential



radiation doses are limited to regulatory limits as described above). Therefore, the NRC staff concludes that the licensee's methodology is an acceptable alternative to establishing a specific total radioactive material inventory limit and the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.6.F states:

Licensees should maintain inventory records by waste types, waste contents, radionuclides and radioactive material, dates of storage, shipment, and other relevant data.

Attachment 3, Appendix D, of the licensee's January 6, 2010, submittal describes the facility's WAC. Condition 12 of the WAC requires that operations in the PBAPS LLRW storage facility be performed in accordance with PBAPS station procedures and Exelon corporate procedures. Conditions 18 and 19 of the WAC require that specific LLRW inventory records be maintained in accordance with the procedures referenced in Condition 12. Therefore, the NRC staff concludes that the licensee has established adequate procedures (i.e., a WAC) which require inventory and survey records for maintaining LLRW storage records and the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance III.6.G states:

The facility design should incorporate provisions for a ventilation exhaust system (for storage areas) and an airborne radioactivity monitoring system (building exhaust vents) where there is a potential for airborne radioactivity to be generated or to accumulate.

Section 8.1.3 of Attachment 3 of the licensee's January 6, 2010, submittal states that the storage cell area of PBAPS LLRW storage facility is provided with ventilation via motorized roof exhausters. Attachment 3, Appendix E, Section 4.2 of the licensee's January 6, 2010, submittal states that the facility ventilation system is shut down and that truck bay doors are closed during handling operations, such that a container drop event would not result in a direct effluent release. In addition, Section 7.4.10 of Attachment 3 of the licensee's January 6, 2010, submittal explains that PBAPS periodically samples the LLRW storage facility for indications of airborne radioactivity per the ODCM.

The NRC staff concludes that the licensee has provided adequate provisions for a LLRW storage facility ventilation exhaust system and has adequate provisions for airborne radioactivity monitoring. The PBAPS 10 CFR 50 license requires a radiological protection program that includes surveys and monitoring that are necessary to comply with the regulations and are reasonable under the circumstances. In addition, PBAPS periodically samples the facility for indications of airborne radioactivity. Therefore, the NRC staff finds that the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance V.2 states:

Any storage plans should address container protection and any reprocessing requirements for eventual shipment and burial.

Attachment 3 to the licensee's January 6, 2010, submittal describes methods of providing container protection during storage and provisions for reprocessing if needed. The container protection will be provided by storing containers inside a climate-controlled building and by use of container handling procedures, and container inspection procedures for identification of potential container degradation. Section 8.8 of Attachment 3 to the licensee's January 6, 2010, submittal states that any needed reprocessing, or re-packaging for degraded containers will not be performed in the LLRW storage facility, and instead, would be accomplished by moving the container to the plant's Radwaste Building.

The NRC staff concludes that the licensee has provided adequate container protection measures and reprocessing capabilities for degraded containers in the Radwaste Building and that the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance V.3 states:

Casks, tanks, and liners containing stabilized radioactive waste should be designed with good engineering judgment to preclude or reduce the probability of uncontrolled releases of radioactive materials during handling, transportation, or storage. Licensees must evaluate the accident mitigation and control procedures and their ability to protect the facility from design basis events (e.g., fire, flooding, and tornadoes) unless otherwise justified.

Section 8.4 of Attachment 3 to the licensee's January 6, 2010, submittal describes the design basis event assessments related to the PBAPS LLRW storage facility. The licensee performed assessments of design basis events including fires, tornadoes, floods, seismic activity, and container drops events.

The storage facility has been analyzed for the PBAPS design basis flood and the construction of the building is adequate to withstand tornadoes and resultant missiles. In addition, the LLRW storage facility is designed to adequately limit the impacts of an Operating Basis Earthquake. The resultant doses associated with a container drop accident have been analyzed as described in Attachment 4 to the licensee's January 6, 2010, submittal, and shown to be less than 10% of the 10 CFR 100 dose limits.

The NRC staff reviewed the fire hazards analysis provided in Attachment 3, Appendix E, of the licensee's January 6, 2010, submittal. The licensee's hydrogen gas evaluation (Appendix B of Attachment 3) concludes that the concentration of hydrogen will not exceed 50% of the lower explosive limit for hydrogen and thus meets the guidance provided in Section 4.1.8 of RG 1.189. The installed electrical cable meets the flame spread test requirements of the Institute of Electrical and Electronics Engineers (IEEE) 383 and the fire protection systems were designed in accordance with the appropriate National Fire Protection Association (NFPA) standards. Therefore, the NRC staff finds that the licensee's Fire Hazards Analysis meets the guidance provided in RG 1.189, Section 6.2.3 and in SRP 11.4-A for a waste storage facility and is acceptable.

The NRC staff concludes that the licensee has evaluated the PBAPS LLRW storage facility for the effects of design basis events. These evaluations confirm that the facility is designed to protect stored LLRW from the effects of the postulated events and a container drop accident

and the NRC staff concludes that the above guidance has been satisfied. As previously stated, NRC regulatory requirements related to LLRW container design are not within the scope of the proposed TS changes in the licensee's amendment request and are not addressed in this NRC safety evaluation.

SRP Section 11.4, Appendix A, Generally Applicable Guidance V.4.A states:

All stabilized radwaste should be located in restricted areas where effective material control and accountability can be maintained. While structures are not required to meet seismic criteria, licensees should employ good engineering judgment to ensure that radioactive materials are contained safely, such as by the use of curbs and drains to contain spills of dewatered resins or sludge.

The NRC staff reviewed Section 8.1 of Attachment 3 to the licensee's January 6, 2010, submittal and the supplements dated October 14, 2010, and December 6, 2010, regarding the physical description of the PBAPS LLRW storage facility. The facility is located inside a fenced-in, radiological Restricted Area within the Owner Controlled Area and personnel access is controlled. The plant's Owner Controlled Area is secured by the PBAPS Security Plan.

Section 8.4 of Attachment 3 to the licensee's January 6, 2010, submittal states that the LLRW storage facility is designed to adequately limit the impacts of an Operating Basis Earthquake. Attachment 3, Appendix D, of the licensee's January 6, 2010, submittal states that the facility's WAC requires material control and accountability. In addition, Section 8.1 of Attachment 3 to the submittal also describes the PBAPS LLRW storage facility sumps installed for collection of potential liquid leakage, as well as engineering features to contain spills.

The NRC staff concludes that the PBAPS LLRW storage facility is a robust structure designed to limit the effects of an Operational Basis Earthquake, located in a radiological Restricted Area that is secured by the PBAPS Security Plan, and that these features provide adequate control and access for stored LLRW. In addition, the NRC staff concludes that the PBAPS WAC provides effective measures to ensure material control and accountability, and that engineering features are provided to contain spills. Therefore, the NRC staff concludes that the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance V.4.C states:

There should be provisions for additional reprocessing or repackaging in the event of container failure and/or as required by DOT regulations and license disposal facility criteria for final transportation and disposal. Licensees should develop contamination isolation and decontamination capabilities. When significant handling and personnel exposure can be anticipated, licensees should incorporate ALARA methodology in accordance with Regulatory Guides 8.8 ["Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as is Reasonably Achievable, June 1978"] and 8.10 ["Operating Philosophy For Maintaining Occupational Radiation Exposures as Low as is Reasonably Achievable, May 1977"].

Attachment 3 to the licensee's January 6, 2010, submittal describes methods for reprocessing or repackaging in the event of container failure or loss of container integrity (swelling, breaching, cracking, etc.). In the event of container failure, Section 8.8 of Attachment 3 to the licensee's January 6, 2010, submittal states that PBAPS has the capability to transfer containers to the plant's Radwaste Building and use existing in-plant radioactive waste processing equipment to reprocess (e.g., de-water) or repackage the LLRW into a new container.

Appendix D of Attachment 3 to the licensee's January 6, 2010, submittal describes procedures for inspection, survey and record keeping for incoming LLRW containers, and routine radiation surveys during the storage period are required per Exelon procedure RW-AA-105, Revision 2, "Guidelines For Operating an Interim On Site Low Level Radioactive Waste storage facility" (included in Attachment 3 to the licensee's January 6, 2010, submittal). In addition, Section 8.1 of Attachment 3 to the submittal also describes the PBAPS LLRW storage facility sumps installed for collection of potential liquid leakage, as well as engineering features to contain spills.

The licensee's response to the NRC Request for Additional Information RAI-09, included in the supplement dated October 14, 2010, states that PBAPS personnel receive a procedurally-required pre-job briefing and a HRA/LHRA briefing prior to the start of a waste handling evolution in the LLRW storage facility. Section 8.1.4 of Attachment 3 to the licensee's January 6, 2010, submittal states that the crane operator uses a closed circuit television to view the crane manipulation during material handling operations. In addition, Section 8.2.1 of Attachment 3 describes methods to ensure that operations in the PBAPS LLRW storage facility are ALARA.

The NRC staff concludes that the licensee has provided adequate container protection measures and reprocessing capabilities for degraded containers in the Radwaste Building and PBAPS has radiation survey methods for detecting and controlling contamination, including use of sumps to contain liquid spills. In addition, ALARA methods to minimize occupational dose by the use of closed circuit cameras and shielding techniques are employed when performing operations in the PBAPS LLRW storage facility. Therefore, the NRC staff finds that the above guidance has been satisfied.

SRP Section 11.4, Appendix A, Generally Applicable Guidance V.4.D states:

Licensees should develop and implement procedures for early detection, prevention, and mitigation of accidents (e.g., fires). Storage areas and facility designs should incorporate good engineering features and capabilities for handling accidents and provide safeguard systems, such as fire detectors and suppression systems (e.g., smoke detectors and sprinklers). If water sprinkler systems are used, floors should be sloped to drain into local floor sumps or curbed to prevent water runoff to uncontrolled areas. Licensees should establish personnel training and administrative procedures to ensure both control of radioactive materials and minimum personnel exposures. Fire suppression devices may not be necessary if combustible materials in the area are minimal.

The NRC staff reviewed Attachment 3, Appendix E, of the licensee's January 6, 2010, submittal for the fire hazards analysis and the licensee evaluation of potential hydrogen gas generation provided in Appendix B, Attachment 3 of the submittal against the guidance provided in NUREG 0800 (Standard Review Plan) Sections 11.4-A, Section V.4.D and 9.5.1 (which incorporates

Regulatory Guide (RG) 1.189, "Fire Protection for Nuclear Power Plants") and RG 1.189, Revision 2.

The licensee's hydrogen gas evaluation concludes that the concentration of hydrogen will not exceed 50% of the lower explosive limit for hydrogen and thus meets the guidance provided in Section 4.1.8 of RG 1.189. The installed electrical cable meets the flame spread test requirements of IEEE 383 and the fire protection systems were designed in accordance with the appropriate NFPA standards. Therefore, the NRC staff finds that the licensee's Fire Hazards Analysis meets the guidance provided in RG 1.189, Section 6.2.3 and in SRP 11.4-A for a waste storage facility and is acceptable.

The licensee used conservative assumptions to maximize the calculated dose from the container drop accident. The licensee assumed that High Integrity Containers (HICs) from Peach Bottom have the maximum contact dose rate of 400 rem/hr based on the requirements of the licensee's ODCM. Containers transported from other sites will be required to meet the maximum contact dose rate exterior limit for a transport ready HIC of 250 rem/hr. The licensee evaluated different radionuclide inventories to determine the mix that would result in the maximum inhalation dose. The worst case mix was then scaled up proportionally to meet the maximum design basis 400 rem/hr contact dose rate for a Peach Bottom container. The NRC staff finds that the methods used to determine both the quantity and the radionuclide mix for the bounding container are conservative and therefore acceptable for use in the dose consequence analysis.

The licensee evaluated the container drop accident using a release fraction based on a dry powder spill scenario from NUREG-1320, "Nuclear Fuel Cycle Facility Accident Analysis Handbook," dated May 1988. The licensee asserts that for the worst case dewatered resin, which is expected to be of the consistency of wet sand, as well as for the larger bead resin, released particulate activity would be less likely to become airborne than for a dry powder. In addition, the referenced dry powder spill scenario includes an airborne contribution resulting from shear stress as the powder falls through the air which would not be applicable for a container drop. The NRC staff agrees that the use of a release fraction based on a dry powder spill is conservative and, therefore, is acceptable for use in the dose consequence analysis. In addition, the licensee based the release fraction calculation on a maximum drop height of 46 feet 9 inches, from the highest lift height of the PBAPS LLRW storage facility crane to the lowest working elevation of the facility.

The licensee assumed that all the airborne activity from the container drop accident is instantly released to the environment with no credit for particle settling within the LLRW storage facility or in transit to the exclusion area boundary. The NRC staff notes that the assumption of an instantaneous release to the environment with no credit for settling is conservative. The results of the licensee's evaluation of the PBAPS LLRW storage facility container drop accident are as follows:

Event	Calculated Dose	SRP Limit
Container Drop	0.736 rem	2.5 rem

Based on the review above, the NRC staff concludes that the licensee's assessment of the PBAPS LLRW storage facility container drop accident design basis dose used conservative assumptions and appropriate calculations to conclude that the accident dose will remain below the acceptance criteria stated in the SRP and is therefore acceptable.

SRP Section 11.4, Appendix A, Generally Applicable Guidance V.4.E states:

The facility design should incorporate provisions for a ventilation exhaust system (for storage areas) and an airborne radioactivity monitoring system (building exhaust vents) where there is a potential for airborne radioactivity to be generated or to accumulate.

Section 8.1.3 of Attachment 3 of the licensee's January 6, 2010, submittal states that the storage cell area of PBAPS LLRW storage facility is provided with ventilation via motorized roof exhausters. Attachment 3, Appendix E, Section 4.2 of the licensee's January 6, 2010, submittal states that the facility ventilation system is shut down and that truck bay doors are closed during handling operations, such that a container drop event would not result in a direct effluent release. In addition, Section 7.4.10 of Attachment 3 of the licensee's January 6, 2010, submittal explains that PBAPS periodically samples LLRW storage facility for indications of airborne radioactivity per the ODCM.

The NRC staff concludes that the licensee has provided adequate provisions for a LLRW storage facility ventilation exhaust system and has adequate provisions for airborne radioactivity monitoring in that the PBAPS 10 CFR 50 license requires a radiological protection program that includes surveys and monitoring necessary to comply with the regulations and are reasonable under the circumstances. In addition, PBAPS periodically samples the facility for indications of airborne radioactivity. Therefore, the NRC staff finds that the above guidance has been satisfied.

### 3.3 Summary

The NRC staff finds that the licensee's proposed amendment to authorize PBAPS, Units 2 and 3, to possess Class B and Class C LLRW as may be produced by the operation of LGS, Units 1 and 2, is acceptable. The NRC staff separately concludes that the proposed operation of the PBAPS LLRW storage facility meets the 10 CFR 20 and 40 CFR Part 190 regulations for protection of members of the public and individuals receiving occupational exposure during normal operations and anticipated operational occurrences. The NRC staff has also concluded that proposed methods of storing LLRW will be adequate to meet the requirements of 10 CFR 50 Appendix I. In addition, all financial liability requirements and eventual decommissioning costs associated with the LLRW containers generated at LGS will be allocated to LGS even though the container is stored in the PBAPS LLRW storage facility. Therefore, the NRC staff concludes that storage of LLRW from LGS in the PBAPS LLRW storage facility meets the applicable regulatory requirements and is acceptable.

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments. On December 2, 2010, the NRC staff consulted

with the Commonwealth of Pennsylvania official, Rich Janati, regarding the environmental impact of the proposed action. In response, the Pennsylvania Department of Environmental Protection (PADEP) submitted the following comments regarding EGC's proposed action:

The Pennsylvania Department of Environmental Protection (PADEP) is providing comments regarding a license amendment request by Exelon Generating Company, LLC (EGC), dated January 6, 2010, to store low-level radioactive waste (LLRW) from Limerick Generating Station (LGS) in the Peach Bottom Atomic Power Station (PBAPS) LLRW Storage Facility.

Considering the nature of the waste, the projected number of shipments and the existing capacity of the on-site storage facility for Class B and C wastes at PBAPS, it is our assessment that the transfer and storage of LLRW from LGS to PBAPS would not pose any danger to public health, safety and the environment. However, this practice should not set a precedent for the transfer of spent nuclear fuel from one facility to another.

It is expected that EGC would immediately cease shipments of LLRW from LGS to PBAPS when a disposal facility for Class B and C wastes becomes available. It is also expected that EGC would implement a waste minimization program, consistent with the latest industry guidelines, to reduce the generation of Class B and C wastes at LGS. We are also requesting that EGC report to PADEP, on an annual basis, the amount of LGS waste (by volume and activity) being stored at PBAPS and inform PADEP in advance of any shipments of LLRW from LGS to PBAPS.

The NRC staff evaluated PADEP's comments with regard to the licensee's proposed change to the PBAPS Unit 2 and 3 FOLs. The NRC staff finds PADEP's assessment that the transfer and storage of LLRW from LGS to PBAPS would not pose any danger to public health, safety and the environment consistent with the staff's finding on no significant impact described in the NRC staff's Environmental Assessment issued (76 FR 29277) and the NRC staff's evaluation of the proposed change in Section 3.0 of this safety evaluation.

The remaining comments from PADEP are directed to the licensee, Exelon, and do not change the NRC staff's assessment that there are no significant environmental impacts associated with the proposed action and that the proposed change to the facility FOLs is acceptable. With regard to PADEP's comments concerning the transfer of spent nuclear fuel, the NRC staff notes that the proposed action does not involve any transfer of spent nuclear fuel from LGS to PBAPS.

## 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). Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (76 FR 29277).

## 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: S. Garry  
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Date: May 31, 2011



M. Pacilio

- 2 -

All work is complete on TAC Nos. ME3092 and ME3093. 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. 280 to Renewed DPR-44
2. Amendment No. 282 to Renewed DPR-56
3. Safety Evaluation

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