



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

November 16, 2016

Mr. Bryan C. Hanson  
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: DIESEL GENERATOR FUEL OIL TRANSFER  
SURVEILLANCE REQUIREMENTS (CAC NOS. MF7143 AND MF7144)

Dear Mr. Hanson:

The Commission has issued the enclosed Amendment Nos. 311 and 315 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for the Peach Bottom Atomic Power Station, Units 2 and 3, respectively. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 3, 2015, as supplemented by letters dated June 9, 2016, August 2, 2016, and November 8, 2016.

The amendments revise the TS surveillance requirements associated with the emergency diesel generator (EDG) fuel oil transfer system. Specifically, the amendments allow for the crediting of manual actions, in lieu of automatic actions, without having to declare the EDGs inoperable.

A copy of the safety evaluation is also enclosed. 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 "RBE", is located below the "Sincerely," text.

Richard B. Ennis, Senior 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. 311 to Renewed DPR-44
2. Amendment No. 315 to Renewed DPR-56
3. Safety Evaluation

cc w/enclosures: 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. 311  
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 December 3, 2015, as supplemented by letters dated June 9, 2016, August 2, 2016, and November 8, 2016, 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.

Enclosure 1

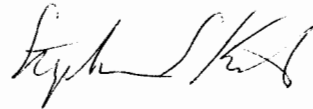
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C(2) of Renewed Facility Operating License No. DPR-44 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 311, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Stephen S. Koenick, Acting Chief  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachments:  
Changes to the Technical Specifications  
and Renewed Facility Operating License

Date of Issuance: November 16, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 311  
PEACH BOTTOM ATOMIC POWER STATION, UNIT 2  
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 a marginal line indicating the area of change.

Remove  
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Insert  
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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 a marginal line indicating the area of change.

Remove  
3.8-9

Insert  
3.8-9

- (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 3951 megawatts thermal.
- (2) Technical Specifications
- The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 311, 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.
- Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 281 and modified by Amendment No. 301.
- (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:

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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.6 -----NOTE----- Procedurally controlled manual actions for manually operating local hand valves and control switches associated with the DG fuel oil transfer system is limited to support transferring fuel between DGs, testing, and sampling activities. -----</p> <p>Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.</p>	<p>In accordance with the Surveillance Frequency Control Program.</p>
<p>SR 3.8.1.7 -----NOTES----- 1. All DG starts may be preceded by an engine prelube period.  2. A single test at the specified Frequency will satisfy this Surveillance for both units. -----</p> <p>Verify each DG starts from standby condition and achieves, in <math>\leq 10</math> seconds, voltage <math>\geq 4160</math> V and frequency <math>\geq 58.8</math> Hz, and after steady state conditions are reached, maintains voltage <math>\geq 4160</math> V and <math>\leq 4400</math> V and frequency <math>\geq 58.8</math> Hz and <math>\leq 61.2</math> Hz.</p>	<p>In accordance with the Surveillance Frequency Control Program.</p>
<p>SR 3.8.1.8 -----NOTE----- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. -----</p> <p>Verify automatic and manual transfer of the unit power supply from the normal offsite circuit to the alternate offsite circuit.</p>	<p>In accordance with the Surveillance Frequency Control Program.</p>



**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. 315  
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 December 3, 2015, as supplemented by letters dated June 9, 2016, August 2, 2016, and November 8, 2016, 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.

Enclosure 2


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

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 315, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Stephen S. Koenick, Acting Chief  
Plant Licensing Branch I-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachments:  
Changes to the Technical Specifications  
and Renewed Facility Operating License

Date of Issuance: November 16, 2016



ATTACHMENT TO LICENSE AMENDMENT NO. 315  
PEACH BOTTOM ATOMIC POWER STATION, UNIT 3  
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 a marginal line indicating the area of change.

Remove  
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Insert  
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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 a marginal line indicating the area of change.

Remove  
3.8-9

Insert  
3.8-9

- (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 3951 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 315, 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.

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 283 and modified by Amendment No. 304.

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

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.6 -----NOTE----- Procedurally controlled manual actions for manually operating local hand valves and control switches associated with the DG fuel oil transfer system is limited to support transferring fuel between DGs, testing, and sampling activities. -----</p> <p>Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.</p>	<p>In accordance with the Surveillance Frequency Control Program.</p>
<p>SR 3.8.1.7 -----NOTES----- 1. All DG starts may be preceded by an engine prelube period.  2. A single test at the specified Frequency will satisfy this Surveillance for both units. -----</p> <p>Verify each DG starts from standby condition and achieves, in <math>\leq 10</math> seconds, voltage <math>\geq 4160</math> V and frequency <math>\geq 58.8</math> Hz, and after steady state conditions are reached, maintains voltage <math>\geq 4160</math> V and <math>\leq 4400</math> V and frequency <math>\geq 58.8</math> Hz and <math>\leq 61.2</math> Hz.</p>	<p>In accordance with the Surveillance Frequency Control Program.</p>
<p>SR 3.8.1.8 -----NOTE----- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. -----</p> <p>Verify automatic and manual transfer of the unit power supply from the normal offsite circuit to the alternate offsite circuit.</p>	<p>In accordance with the Surveillance Frequency Control Program.</p>



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 311 TO  
RENEWED FACILITY OPERATING LICENSE NO. DPR-44 AND  
AMENDMENT NO. 315 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 application dated December 3, 2015, as supplemented by letters dated June 9, 2016, August 2, 2016, and November 8, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML15337A413, ML16162A101, ML16216A076, and ML16314A021, respectively), Exelon Generation Company, LLC (Exelon, the licensee), submitted a license amendment request (LAR) for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3.

The proposed amendments would revise technical specification (TS) surveillance requirement (SR) 3.8.1.6 associated with the emergency diesel generator (EDG) fuel oil transfer system. Specifically, the amendments would allow for the crediting of manual actions, in lieu of automatic actions, without having to declare the EDGs inoperable.

The supplements dated June 9, 2016, August 2, 2016, and November 8, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on February 2, 2016 (81 FR 5498).

2.0 REGULATORY EVALUATION

2.1 System Description

As discussed in the licensee's application dated December 3, 2015, and in the PBAPS Updated Final Safety Analysis Report (UFSAR), Section 8.5, the onsite standby power source for the four

4 kilovolt (kV) emergency buses in each unit consists of four EDGs. Each EDG provides standby power to two 4 kV emergency buses, one associated with Unit 2, and one associated with Unit 3. The continuous rating of each EDG is 2,600 kilowatts (kW). The 2,000 hour rating for each EDG is 3,000 kW. The failure of any one EDG does not impair safe shutdown because each EDG serves an independent, redundant 4 kV emergency bus for each unit. The remaining EDGs and emergency buses have sufficient capability to mitigate the consequences of a design-basis accident, support the shutdown of the other unit, and maintain both units in a safe condition.

Each EDG has a 550 gallon fuel oil day tank and two fuel pumps. One pump is driven by the diesel engine and one is driven by a 125 volt direct current motor supplied from the station batteries. The motor-driven pump does not perform any safety function and is only provided for system reliability in the event the engine-driven pump fails. The day tank supplies fuel to its respective EDG and has a capacity when full to provide 2.5 hours of operation when the EDG is operating at its continuous rating. In addition to the day tank, each EDG has a 39,655 gallon fuel oil storage tank. Upon a low level in the day tank, fuel is automatically transferred from the storage tank to the day tank by a fuel transfer pump that is actuated by a float level switch in the day tank. The four storage tanks, which are located underground, collectively have sufficient capacity to operate all four EDGs for a period of 7 days, while the EDGs are supplying their maximum post-accident loads as specified in UFSAR, Section 8.5.

Post-accident electrical loading and fuel consumption is not equally shared among the EDGs. Therefore, it may be necessary to transfer post-accident loads between EDGs or to transfer fuel oil between storage tanks to achieve 7 days of post-accident operation for all four EDGs. The capability exists to transfer fuel oil between storage tanks. The capability also exists to transfer fuel from the storage tank of one EDG to the day tank of another EDG. Redundancy of pumps and piping precludes the failure of one pump, or the rupture of any pipe, valve, or tank from resulting in the loss of more than one EDG.

## 2.2 Proposed TS Changes

The current licensing basis for PBAPS requires automatic operation for the transfer of EDG fuel oil from the storage tanks to the day tanks. This is consistent with the current wording in SR 3.8.1.6, which reads as follows:

Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.

As discussed in the TS Bases, SR 3.8.1.6 demonstrates that each required fuel oil transfer pump operates and automatically transfers fuel oil from its associated storage tank to its associated day tank. The fuel oil transfer system is required to support continuous operation of the standby power sources. This surveillance provides assurance that the fuel oil transfer pump is operable, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer are operable.

With the current wording, taking the system out of automatic operation and using manual operator actions to transfer fuel oil, would require the licensee to declare the SR not met. This

would, in turn, require the licensee to declare the associated EDG inoperable in accordance with SR 3.0.1, which reads, in part:

Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO.

In accordance with the LAR, Exelon wants to change the licensing basis such that certain procedurally-controlled manual operator actions could be credited without having to declare the EDG inoperable. To do this, it has proposed to revise SR 3.8.16 to add a note as discussed in the supplement dated June 9, 2016. The revised SR would read as follows:

-----NOTE-----  
Procedurally controlled manual actions for manually operating local hand valves and control switches associated with the DG fuel oil transfer system is limited to support transferring fuel between DGs, testing, and sampling activities.  
-----

Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.

## 2.3 Regulatory Requirements

### *General Design Criteria*

The construction permit for PBAPS, Units 2 and 3, was issued by the Atomic Energy Commission (AEC) on January 31, 1968. As discussed in Appendix H to the PBAPS UFSAR, during the construction/licensing process, both units were evaluated against the then-current AEC draft of the 27 General Design Criteria (GDC) issued in November 1965. On July 11, 1967, the AEC published, for public comment in the *Federal Register* (32 FR 10213), a revised and expanded set of 70 draft GDC (hereinafter referred to as the "draft GDC"). Appendix H of the PBAPS UFSAR contains an evaluation of the design basis of PBAPS, Units 2 and 3, against the draft GDC. The licensee concluded that PBAPS, Units 2 and 3, conform to the intent of the draft GDC.

On February 20, 1971, the AEC published in the *Federal Register* (36 FR 3255) a final rule that added Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "General Design Criteria for Nuclear Power Plants" (hereinafter referred to as the "final GDC"). Differences between the draft GDC and final GDC include a consolidation from 70 to 64 criteria. As discussed in the NRC's Staff Requirements Memorandum for SECY-92-223, dated September 18, 1992 (ADAMS Accession No. ML003763736), the Commission decided not to apply the final GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10 CFR Part 50, the Commission stressed that the final GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practice in effect at that time. Each plant licensed before the final GDC were formally adopted was evaluated on a plant-specific basis, determined to be safe, and licensed by the Commission.

The licensees for PBAPS, Units 2 and 3, have made changes to the facility over the life of the plant that may have invoked the final GDC. The extent to which the final GDC have been invoked can be found in specific sections of the UFSAR and in other plant-specific design and licensing basis documentation.

Based on a review of UFSAR Appendix H, the NRC staff identified that draft GDC-39, "Emergency Power for Engineered Safety Features (Category A)," is applicable to the LAR. Draft GDC-39 states that:

Alternate power systems shall be provided and designed with adequate independency, redundancy, capacity, and testability to permit the functioning required of the engineered safety features. As a minimum, the onsite power system and the offsite power system shall each, independently, provide this capacity assuming a failure of a single active component in each power system.

#### *Technical Specification Requirements*

The NRC's regulatory requirements related to the content of the TSs are specified in 10 CFR 50.36, "Technical specifications." Pursuant to 10 CFR 50.36, TSs are required to include items in the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting conditions for operation (LCOs); (3) SRs; (4) design features; and (5) administrative controls. The regulation does not specify the particular requirements to be included in a plant's TSs.

As stated in 10 CFR 50.36(c)(2)(i), LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the LCO can be met. The LCO action requirements establish those remedial actions that must be taken when the requirements of an LCO are not met.

As stated in 10 CFR 50.36(c)(3), SRs are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

On July 22, 1993 (58 FR 39132), the Commission published a "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (Final Policy Statement), which discussed the criteria to determine the items that are required to be included in the TSs as LCOs. The criteria were subsequently incorporated into the regulations by an amendment to 10 CFR 50.36 (60 FR 36953). Specifically, 10 CFR 50.36(c)(2)(ii) requires that a TS LCO must be established for each item meeting one or more of the following criteria:

- Criterion 1: Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.
- Criterion 2: A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis

that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

- Criterion 3: A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.
- Criterion 4: A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

The EDGs are a part of the primary success path and function or actuate to mitigate a design-basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier (i.e., the EDGs satisfy Criterion 3 in the Final Policy Statement).

## 2.4 Guidance Documents

The guidance documents that the NRC staff considered in its review of this LAR are described below.

NUREG-1433, Revision 4, "Standard Technical Specifications - General Electric BWR/4 Plants" (ADAMS Accession Nos. ML12104A192 and ML12104A193), provides guidance on TS format and content for General Electric Boiling Water Reactor/4 (BWR/4) plants.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (Standard Review Plan), Chapter 16.0, Revision 3, "Technical Specifications," dated March 2010 (ADAMS Accession No. ML100351425), provides guidance to the NRC staff for review of a plant's TSs.

NUREG-0800, Standard Review Plan, Chapter 18, Revision 2, "Human Factors Engineering," dated March 2007 (ADAMS Accession No. ML070670253), in part, provides guidance to the NRC staff in reviewing operator actions proposed by a licensee.

NUREG-1764, Revision 1, "Guidance for the Review of Changes to Human Actions," dated September 30, 2007 (ADAMS Accession No. ML072640413), in part, provides guidance to the NRC staff in reviewing changes in human actions, such as those that are credited in nuclear power plant safety analyses.

NUREG-0711, Revision 3, "Human Factors Engineering Program Review Model," dated November 2012 (ADAMS Accession No. ML12324A013), in part, is used by the NRC staff to review the human factors engineering (HFE) programs described in license amendments to verify that the applicant's HFE program incorporates HFE practices and guidelines accepted by the staff.

Information Notice (IN) 97-78, "Crediting of Operator Actions in Place of Automatic Actions and Modifications of Operator Actions, Including Response Times," dated October 23, 1997 (ADAMS



Accession No. ML031050065), in part, alerted licensees to a number of cases for which nuclear plants may have inappropriately credited operator actions in place of automatic actions.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Human Factors Evaluation

##### 3.1.1 Background

###### *Review Criteria*

The NRC's human factors review addresses programs, procedures, training, plant design features, and operator manual actions related to operator performance during normal and accident conditions. The NRC staff conducted a human factors evaluation to confirm that operator performance would not be adversely affected as a result of the proposed changes to the PBAPS TSs.

NUREG-1764 provides the basis for this review. IN 97-78 provides high-level criteria that are typically considered when crediting manual operator actions in lieu of automatic actions. The nine concerns identified in IN 97-78 provide criteria that more specifically apply to this LAR. The guidance in NUREG-0711 was also used in accordance with Chapter 18 of the Standard Review Plan.

###### *Manual versus Automatic Actions*

As discussed above in safety evaluation (SE) Section 2.1, upon a low level in the day tank, fuel is automatically transferred from the respective storage tank to its associated day tank by a fuel transfer pump that is actuated by a float level switch in the day tank. As discussed in the licensee's supplement dated June 9, 2016, each fuel oil transfer pump has a control switch with three positions: "Hand," "Off," and "Auto." The switch is normally in the "Auto" position to allow the automatic transfer of fuel from the storage tank to the day tank.

The licensee's supplement dated June 9, 2016, describes the human-system interface used by operators during manual operation. The supplement specifies a variety of conditions under which the fuel oil transfer pump control switch may be put in the "Off" position (e.g., during EDG testing, fuel oil transfer system testing, and fuel oil storage tank sampling). If the EDGs are needed during a period when the switch is in the "Off" position, the EDGs will still start, regardless of the position of the three-way switch. The licensee's supplement dated June 9, 2016, also states that the switch may remain in "Off" as long as the EDGs are not needed. However, the activity that placed the switch in the "Off" position is procedurally controlled and the procedures will govern the return to the normal "Auto" position.

There will be clear procedural direction that the EDG fuel oil transfer pump control switch needs to be restored to the "Auto" position and valves realigned to allow the automatic transfer of fuel from the storage tank to the day tank if: (1) there is an automatic start of an EDG, (2) the EDG is required to operate, or (3) a control room day tank low level alarm is received.

As discussed above in SE Section 2.2, with the current wording in SR 3.8.1.6, taking the system out of automatic operation and using manual operator actions to transfer fuel oil would require the licensee to declare the SR not met. This would, in turn, require the licensee to declare the associated EDG inoperable in accordance with SR 3.0.1. In accordance with the LAR, Exelon wants to change the licensing basis for PBAPS, Units 2 and 3, such that procedurally-controlled manual operator actions could be credited for EDG fuel oil transfer without having to declare the EDG inoperable. The licensee cited precedent for several other BWR plant TSSs, as well as the BWR/4 Standard Technical Specifications (STS) in NUREG-1433, which allow manual, as well as automatic transfer of fuel oil between tanks.

#### *Description of Operator Actions and Their Safety Significance*

The following provides a basic outline of the operator actions associated with the LAR. More specific details are provided in the licensee's application dated December 3, 2015, and the supplement dated June 9, 2016.

- 1) Control room operators determine, by procedure, that the EDG fuel oil system needs to be realigned to allow for automatic filling of the EDG day tank.
- 2) Control room operators dispatch equipment operators.
- 3) Equipment operators walk to the EDG CARDOX Room (i.e., carbon dioxide fire protection system room) and close a storage tank fill inlet valve and a fuel oil header line valve.
- 4) Equipment operators proceed to the EDG Room, remove grating to gain access to valves, close and lock a day tank transfer valve and open and lock a transfer pump discharge valve, restore the grating, and restore the day tank transfer pump control switch to the automatic setting.

In Exelon's application dated December 3, 2016, the licensee provided the following summary of its analysis of the effect of the above manual operator actions versus the capacity of fuel in the EDG day tanks:

In order to assess the effect of the proposed simple manual actions on the capacity of fuel oil in the EDG day tanks, Engineering performed a worst-case scenario of how much time is acceptable before needing replenishment of the worst-case EDG day tank. It was determined that for the worst-case fuel usage of an EDG day tank, 56 minutes would exist prior to reaching a fuel oil level that would affect EDG operability. Additionally, Operations personnel performed a worst-case scenario of the time that would be required to restore the automatic transfer of fuel oil to the associated EDG day tank. Two separate Equipment Operators were used for this analysis. The worst-case time was 4 minutes and 35 seconds. Therefore, if simple manual actions were required to restore the automatic feature of the EDG day tank fill, more than 50 minutes of time margin would exist to ensure that EDG operability would not be adversely affected.

The manual actions described in this LAR will not prevent the EDG from starting; therefore, the EDG can still perform the functions as specified in the emergency operating procedures. The

operator action is required to ensure that the EDGs can continue to provide their emergency functions beyond the estimated 56 minutes it would otherwise take to drain the day tank under worst-case fuel usage conditions.

In accordance with the generic risk categories established in Appendix A to NUREG-1764, this task sequence is considered "potentially risk-important" due to the fact that actions involve the EDGs. However, it is possible that these manual actions will be necessary during shutdown, further elevating the risk under certain conditions. Therefore, the NRC staff performed a "Level I" review in accordance with the guidance in Chapter 3 of NUREG-1764<sup>1</sup>. A Level I review is the most stringent level of review described in NUREG-1764. The staff's review is documented below in SE Sections 3.1.2 through 3.1.12.

### 3.1.2 Operating Experience Review

The supplement dated June 9, 2016, states that the licensee conducted an operating experience review that looked for industry issues related to improper fuel system lineups and manual operator actions. No issues were identified involving improper manipulations that resulted in EDG inoperability. In addition, as discussed in the application dated December 3, 2015, the licensee credited manual operator action to maintain EDG fuel oil transfer system operability, 1996-2013.<sup>2</sup> Therefore, the licensee has some actual operating experience, although the period of operating under manual control was reported to be quite brief.

In summary, the licensee conducted an operating experience review, which did not identify any issues that could potentially hinder human performance for the proposed manual actions. Therefore, the NRC staff finds that the licensee has adequately addressed operating experience.

### 3.1.3 Functional Requirements Analysis and Function Allocation

The objective of this portion of the review is to verify that the licensee has defined any changes in the plant's safety functions (functional requirements analysis) and provided evidence that the allocation of functions between humans and automatic systems provides an acceptable role for plant personnel.

There are no changes in plant safety functions identified as result of the changes proposed in this LAR. Therefore, the NRC staff finds the changes to be acceptable with respect to the functional requirements analysis.

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<sup>1</sup> Note: The NRC staff's assessment of risk is only for purposes of scoping the staff review and may conflict with the Licensee's assessment of risk importance, and should not be considered as an accurate assessment of risk when compared to other methods, especially those using plant-specific data and NRC-accepted methods of probabilistic risk analysis and human reliability analysis.

<sup>2</sup> As discussed on page 2 of Attachment 1 to the application dated December 3, 2015, the licensee made a TS Bases change in 1996, via 10 CFR 50.59, to allow the use of manual operator actions for maintaining operability of the EDG fuel oil transfer system. After questions from the NRC resident inspectors and further review by the licensee in March 2013, the TS Bases change was viewed as changing the literal intent of TS 3.8.1.6. As such, the TS Bases change was removed.

Although the licensee did not explicitly address function allocation in its submittals, it is clear from the docketed information that the change from an automatic function to a mixed-mode (automatic and manual combination) allocation is appropriate for this application. This determination is based upon the inclusion of mixed-mode allocation in NUREG-1433 and the fact that there is nearly 1 hour for operators to complete a relatively simple action. The proposed action is not dangerous to the operator and does not require a quick, time-constrained action that would not be possible with a manual action. Therefore, the NRC staff finds the changes to be acceptable with respect to function allocation.

#### 3.1.4 Task Analysis

The objective of this portion of the NRC staff review is to verify that the licensee's task analysis identifies the behavioral requirements of the tasks personnel are required to perform.

The supplement dated June 9, 2016, stated that there are no changes to the control room tasks analysis that was performed for the Detailed Control Room Design Review (DCRDR), which was submitted to the NRC in 1986. No additional operator actions were required from the control room. The licensee conducted a functional analysis for performing the task requirements for the DCRDR based on the task requirements found in emergency operating procedures. The licensee considered several relevant factors that may affect task performance as discussed in each of the subsections below.

##### *Potentially Harsh or Inhospitable Environmental Conditions Expected*

The licensee stated in the supplement dated June 9, 2016, that there is no carbon dioxide (CARDOX) injection in the EDG CARDOX Room. This room is named this way because it is the location of the CARDOX storage tank. If CARDOX injection is required to an EDG room, then the EDG is considered unavailable, thus precluding a need for an operator to go into the room to manipulate the switch. The licensee indicates that there are no other environmental concerns that will affect task performance. Therefore, the NRC staff finds this issue acceptable, since the operator manual actions do not require operators to perform actions in harsh environments.

##### *Information Required by Operators to Determine that Action is Needed*

As discussed in the application dated December 3, 2015, there will be clear procedural direction that the EDG fuel oil transfer pump control switch needs to be restored to the "Auto" position and valves realigned to allow the automatic transfer of fuel from the storage tank to the day tank if (1) there is an automatic start of an EDG, (2) the EDG is required to operate, or (3) a control room day tank low level alarm is received. The application also indicated that the procedures will ensure there will be constant communication between the equipment operators and the main control room (MCR) staff and that the equipment operators, responsible for placing the EDG fuel oil transfer pump switch from the "Off" to the "Auto" position and restoring the manual valve positions, will not have any other collateral duties.

The NRC staff finds this issue acceptable since the described control room indication, communication systems, and procedures provide reasonable assurance that operators, both in the control room and those stationed locally in the plant, understand when the proposed actions are necessary.

*Ability to Recover from Error (and Time Needed to do so)*

As discussed in the licensee's application dated December 3, 2015, a time validation of the manual actions was performed using two separate equipment operators. Of the two operators, the longest time to complete all the required steps was 4 minutes and 35 seconds. The time available under worst-case loading of the EDGs and minimum allowable day tank fuel level is approximately 56 minutes. Operators could perform the task several times within the time available if the task is performed incorrectly the first time. The valve alignments are simple, and the likelihood that multiple attempts will be necessary is small. Operators will receive indication of an incorrect alignment from the low day tank level alarm. In addition, the supplement dated June 9, 2016, identified three types of credible errors, as well as means of preventing and mitigating them.

The NRC staff finds that the licensee validation activities demonstrate that there is ample time available to perform the necessary actions, and even perform them multiple times in the unlikely case that an error is made. In addition, the licensee has described reasonable methods for preventing errors. Therefore, the staff finds this issue acceptable.

*Ingress/Egress Paths*

The licensee's application dated December 3, 2015, describes the longest path used by operators in the validation process. This path was used as a bounding condition that demonstrates that the task is possible, even if operators take a sub-optimal route to the valves in the field. As discussed above, of the two operators used for the validation, the longest time to complete all the required steps was 4 minutes and 35 seconds. This indicates that ingress/egress routes are not a concern for these tasks.

The submittal dated June 9, 2016, clarifies that the floor grates which operators must remove are approximately 40 inches by 18 inches. The grates are not bolted and are light enough to be manipulated by a single operator. This is regularly confirmed by monthly testing.

The valves are controlled with "locked valve" locks and are controlled through the equipment control program. The valves are normally locked and must be unlocked to take them out of the normal configuration. The valves remain unlocked until they are restored to the normal alignment.

In addition, the EDG day tank transfer valve and day tank transfer pump discharge valves are also locked in the normal alignment. A key is necessary to take them out of the normal alignment. Keys for this operation are carried by each equipment operator.

The licensee has described the ingress/egress paths in detail in the submittals. They have described potential barriers and have described how the barriers will not prevent successful performance of these actions. Therefore, the NRC staff finds this issue acceptable.

### *Task Analysis Conclusions*

The licensee describes how the emergency operating procedures were used to derive task requirements without a need for an update to the control room task analysis (there are no changes to control room human-system interface or actions performed in the control room). The licensee indicates that: (1) there are no potentially harsh environments, (2) operators will have unambiguous indication when manual actions are necessary, (3) operators have sufficient time and ability to recover from credible (but unlikely) errors, and (4) there is reasonable assurance that the ingress/egress paths will be clear when the manual actions are necessary. Based on these considerations, the NRC the staff finds that the licensee has adequately addressed task analysis.

#### 3.1.5 Staffing

##### *Operator Training/Qualifications*

The supplement dated June 9, 2016, states that there are no changes necessary to operator training or qualification as a result of the changes proposed in the LAR.

The NRC staff finds that the manual actions are simple, have been previously performed, and significant time margin exists to perform the tasks. Therefore, the staff finds that this issue has been adequately addressed.

##### *Additional Support Personnel and/or Equipment Required*

The supplement dated June 9, 2016, states that no additional staff are needed to perform the work processes described in the LAR, nor is there a substantial increase in operator workload.

No special equipment is necessary for this action. Keys are required for unlocking locked valves. The licensee stated that keys are kept in accordance with locked equipment program and/or are carried by equipment operators.

The manual actions are simple, take a few minutes to complete, and are unlikely to add to the workload or necessitate changes to staffing levels. Therefore, the NRC staff finds that this issue has been adequately addressed.

#### 3.1.6 Risk and Human Reliability Analysis

The supplement dated June 9, 2016, specifies a variety of plant activities under which the fuel oil transfer pump control switch may be put in the "Off" position (e.g., when obtaining fuel oil samples from the fuel oil storage tank). The licensee stated that the activities that would require use of simple manual operator actions, to support EDG operability, are expected to have a duration of less than 4 hours. The licensee stated that there are no credible additional consequences for exceeding the 4 hour estimated timeframe since the safety function of the EDGs would still be preserved. The licensee also stated that the likelihood of a design event (e.g., loss of offsite power, loss-of-coolant accident) requiring automatic EDG operation occurring at the same time that credit is being taken for realignment to the automatic status is

minimal. The operator would be aware of exceeding the expected duration of the task as a result of procedural information and pre-job briefs.

The supplement dated June 9, 2016, identified three credible errors (manually operating an incorrect valve, mispositioning the fuel oil transfer pump control switch, and miscommunication regarding the need to return the EDG fuel oil transfer system back to automatic status. These errors are prevented/mitigated by several factors including the use of common human-performance tools (e.g., self-checks, peer-checks, pre-job briefs); the ability of the EDG to start and run for 56 minutes, even if the switch is in the wrong position (operators need less than 5 minutes to realign the system); adequate indication in the control room; and the use of procedural controls instructing operators to realign the system, given an EDG start.

Based on the above considerations, the NRC staff finds that the licensee has adequately addressed risk and human reliability with respect to the LAR.

### 3.1.7 Human-System Interface Design

The objective of this portion of the review is to verify that the licensee has appropriately translated functional and task requirements to the detailed design of alarms, displays, controls, and other aspects of the human-system interface.

The LAR does not involve any physical changes to the structures, systems, or components of the plant. As such, there are no changes to alarms, displays, or controls and no changes to the human-system interface. Therefore, the NRC staff finds that this issue has been adequately addressed.

### 3.1.8 Procedural Guidance for Required Actions

The licensee's application dated December 3, 2015, stated that the actions that will be procedurally in place to ensure manual actions will maintain the EDG operable will include:

- Constant communication with the MCR.
- No other collateral duties by the qualified individual in charge of placing the EDG fuel oil transfer pump switch from the "Off" to the "Auto" position and restoring manual valve positions.
- Briefing of the qualified individual that their actions are credited for maintaining the transfer of fuel oil from the underground storage tank to the day tank to ensure TS operability.
- Clear procedural direction that the EDG fuel oil transfer pump control switch needs to be restored to the "Auto" position and valves realigned to allow the automatic transfer of fuel from the storage tank to the day tank if there is:
  - An automatic start of an EDG
  - Notification by licensed MCR personnel that the EDG is required to operate
  - A receipt of the associated day tank low level alarm

The NRC staff finds that incorporating the above actions in the plant procedures will provide appropriate guidance for successful completion of the required actions. Therefore, the NRC staff finds that this issue has been adequately addressed.

#### 3.1.9 Training

The supplement dated June 9, 2016, states that there are no changes necessary to operator training or to the simulator to support this LAR.

The NRC staff finds that since there are no plant design changes associated with this LAR, the operator manual actions are simple and have previously been performed, and no changes are necessary with respect to training or to the simulator. Therefore, the NRC staff finds that this issue has been adequately addressed.

#### 3.1.10 Human Factors Validation

The LAR describes validation activities performed by the licensee, which provide evidence that the manual actions are feasible and likely to be performed safely. The licensee identifies the time available by analyzing the worst-case loading scenario on the EDG (this considers heaviest potential load on the EDG and identifies the time until the fuel runs out). The analyzed worst-case time until runout was 56 minutes. Two separate equipment operators were used to simulate the necessary manual actions. These operators walked through the steps necessary to perform the task, including navigating through the plant, taking the longest route. They simulated operation of equipment so as not to upset actual plant operation. Both operators successfully simulated the actions in less than 5 minutes. The license provided a detailed description of activities that were completed during that time.

The licensee provided a thorough description of validation activities that account for worst-case conditions. The manual action was validated using two separate operators. Both were able to complete the action with ample time margin allowing for recovery from unlikely errors. Therefore, the NRC staff finds that this issue has been adequately addressed.

#### 3.1.11 Human Performance Monitoring Strategy

The supplement dated August 2, 2016, describes the licensee process used to assure human performance will not degrade over time. The licensee will screen the operator manual actions for inclusion in the human performance monitoring program. Actions within this program are periodically revalidated. The process also considers updates to various documents, crew performance, modifications, and other considerations that may affect operator performance over time.

The NRC staff finds that the above activities provide reasonable assurance that human performance will not degrade over time. Therefore, the NRC staff finds that this issue has been adequately addressed.



### 3.1.12 Human Factors Evaluation Conclusion

Based on the discussion in SE Sections 3.1.2 through 3.1.11, the NRC staff finds that the licensee has adequately addressed the applicable review elements in NUREG-1764, IN 97-78, and Chapter 18 of the SRP. Therefore, the staff concludes that the LAR is acceptable with respect to human factors.

### 3.2 EDG Fuel Oil Day Tank Capacity and Usage

As discussed in the application dated December 3, 2015, the licensee performed an engineering analysis of the worst-case EDG day tank fuel usage. This analysis was performed to evaluate how long each EDG would run using only the available fuel in its respective day tank. This would inform how much time is available before manual actions would be needed to restore the automatic refilling of the day tank from the associated storage tank.

As discussed in SE Section 2.1, the continuous rating of each EDG is 2,600 kilowatts (kW). The 2,000 hour rating for each EDG is 3,000 kW. The licensee's analysis assumed a worst-case EDG loading (for a loss-of coolant event) of 3,229 kW for the first 10 minutes, and 3,000 kW for 10 to 60 minutes. At these loads, the licensee stated that 4.271 gallons per minute would be consumed for the first 10 minutes and 3.868 gallons per minute for 10 to 60 minutes.

PBAPS, Units 2 and 3, SR 3.8.1.4, requires that each EDG day tank contains a minimum of 250 gallons of fuel oil. As discussed in the licensee's application dated December 3, 2015, each day tank has an unusable volume of 27 gallons. Therefore, the licensee assumed that each day tank would have at least 223 gallons of usable fuel. Using the above fuel consumption values, the licensee determined that it would take approximately 56 minutes before the EDG would run out of fuel from the day tank.

The NRC staff finds that the licensee's assumptions regarding the amount of available fuel oil prior to a potential EDG start is conservative since the licensee has assumed the tank is at its minimum TS required volume, and has taken into consideration the 27 gallons of unusable volume. In addition, the staff finds that the licensee's assumptions regarding EDG loading are also conservative. Based on these findings, the staff concludes that the licensee's estimate of 56 minutes of available EDG run time using fuel from the day tank is conservative.

### 3.3 Evaluation of TS Changes

#### *Background*

The NRC staff evaluated the proposed change to SR 3.8.1.6 (i.e., addition of a note to allow certain manual operator actions) to ensure that the revised SR would continue to meet the regulatory requirements of 10 CFR 50.36. As part of this review, the NRC staff reviewed the LAR to evaluate whether the EDGs would be considered operable during the manual operator actions that would be allowed by the revised SR 3.8.1.6. The staff used the guidance in the STS to support this portion of the review.

As stated in 10 CFR 50.36(c)(3), SRs are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCOs will be met.

The PBAPS, Units 2 and 3, TS 1.1, definition for OPERABLE-OPERABILITY reads as follows:

A system, subsystem, division, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, division, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).

SR 3.8.1.6 currently reads as follows:

Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.

As discussed in SE Section 2.2, SR 3.8.1.6 provides assurance that the fuel oil transfer pump is operable, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer are operable. Since the fuel oil transfer system is required to support continuous operation of the EDGs, with the current wording in SR 3.8.1.6, taking the system out of automatic operation and using manual operator actions to transfer fuel oil would require the licensee to declare the SR not met. This would, in turn, require the licensee to declare the associated EDG inoperable.

In accordance with the LAR, Exelon wants to change the licensing basis, for PBAPS Units 2 and 3, such that certain procedurally-controlled manual operator actions could be credited without having to declare the EDG inoperable. To do this, it has proposed to revise SR 3.8.1.6 to add a note as discussed in the supplement dated June 9, 2016. The revised SR would read as follows:

-----NOTE-----  
Procedurally controlled manual actions for manually operating local hand valves and control switches associated with the DG fuel oil transfer system is limited to support transferring fuel between DGs, testing, and sampling activities.  
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Verify the fuel oil transfer system operates to automatically transfer fuel oil from storage tank to the day tank.

#### *Comparison with STS*

For the proposed changes to SR 3.8.1.6 for PBAPS, Units 2 and 3, the applicable STS guidance is in NUREG-1433, Revision 4. The applicable SR in NUREG-1433, SR 3.8.1.6, reads as follows:

Verify the fuel oil transfer system operates to [automatically] transfer fuel oil from storage tank[s] to the day tank [and engine mounted tank].

The square brackets around the word “automatically” in the STS means that the word may be either included or not included. Differences in the wording of the STS allow for differences in particular plant designs. Although the note proposed in the LAR is not contained in the STS, the fact that the word “automatically” is bracketed in the STS acknowledges that manual actions are credited in some fuel oil transfer systems without having to declare the EDGs inoperable. In addition, the Bases for STS 3.8.1.6 state, in part, that the design of fuel transfer system is such that the pumps operate automatically or must be started manually in order to maintain an adequate volume of fuel oil in the day tank following EDG testing. Therefore, the STS acknowledges the possibility of crediting manual actions to start the fuel oil transfer system.

#### *Licensee Justification for the Change*

As discussed in the application dated December 3, 2015, post-accident electrical loading and fuel consumption is not equally shared among the EDGs. Therefore, it may be necessary to transfer post-accident loads between EDGs or to transfer fuel oil between storage tanks to achieve 7 days of post-accident operation for all four EDGs. In order to transfer fuel oil between storage tanks, procedurally-controlled manual operator actions would be used to maintain EDG operability. Additionally, the licensee would like to credit other procedurally-controlled manual operator actions while considering the fuel oil transfer system to be operable (thus supporting EDG operability). As discussed in the supplement dated June 9, 2016, these manual operator actions include: filling the EDG day tank from a different EDG storage tank, performance of inservice testing for the fuel oil transfer system, and performance of fuel oil sampling activities.

The EDGs function to provide a reliable source of onsite standby electric power for the safe shutdown of the reactors. Each EDG starts automatically on a loss-of-coolant accident signal (i.e., low reactor water level or high drywell pressure) from either Unit 2 or Unit 3, or on an emergency bus degraded voltage or undervoltage signal. The manual operator actions that would be allowed by the proposed note in SR 3.8.1.6 would not affect the automatic start signals for the EDGs.

The licensee’s justification for the inclusion of the proposed note for SR 3.8.1.6 is that the EDGs will remain operable based on the fuel oil stored in the day tanks during the time period the manual operator actions are performed, and that the fuel oil transfer system can quickly be restored to automatic mode if the EDGs are required to run. To support the proposed change the licensee performed an engineering analysis of the worst-case EDG day tank fuel usage (discussed in SE Section 3.2) and a validation of the time required to perform the manual actions (discussed in SE Section 3.1.4).

As discussed in SE Section 3.2, the NRC staff concluded that the licensee’s estimate of 56 minutes of available EDG run time (assuming worst-case EDG loading and minimum available day tank fuel volume), using fuel only from the associated day tank, is conservative. Since this analysis was for worst-case conditions, any other EDG would operate for a longer time on the fuel in its corresponding day tank. In addition, as discussed in the licensee’s supplement dated June 9, 2016, if any EDG was running prior to the performance of the manual actions permitted by the proposed note, the EDG day tank that will not have automatic makeup

from its fuel oil transfer pump will have its level raised prior to taking the alignment out of automatic makeup. This will maximize the amount of time the EDG has fuel oil available before requiring realignment for automatic makeup.

As discussed in SE Section 3.1.4, the licensee performed a time validation of the manual actions, required to restore the automatic refilling of the day tank, using two separate equipment operators. Of the two operators, the longest time to complete all the required steps was 4 minutes and 35 seconds. The staff found that the licensee's validation activities demonstrate that there is ample time available to perform the necessary actions.

As discussed in the licensee's supplement dated June 9, 2016, the duration of the manual actions that would be permitted by the proposed note is expected to be less than 4 hours. However, the licensee stated that there are no credible additional consequences for exceeding the 4-hour period since the safety function of the EDGs would still be preserved. Additionally, the likelihood of an event requiring EDG automatic operation occurring at the same time that credit is being taken for realignment to the automatic status is minimal. The licensee further stated that the operator would become aware of exceeding the expected duration of the task as a result of procedural information and pre-job briefs.

As discussed in the licensee's supplement dated June 9, 2016, low level in the EDG day tank is alarmed locally in the associated EDG bay. The licensee indicated that, assuming EDG loading at 3,000 kW, there would be approximately 7 minutes until the SR 3.8.1.4 limit of 250 gallons of fuel oil is reached after receipt of the low level alarm. As such, during the performance of the manual actions permitted by the proposed note, receipt of the low level alarm would alert operators of the need to restore the system to automatic makeup capability well in advance of the 56 minutes assumed in the licensee's analysis.

Based on the above review, the NRC staff concludes that:

- 1) The proposed manual actions will not impact the ability of the EDGs to start automatically, as required to respond to a loss-of-coolant accident signal or an emergency bus degraded voltage or undervoltage signal.
- 2) The licensee's estimate of 56 minutes of available EDG run time (assuming worst-case EDG loading and minimum available day tank fuel volume) using fuel only from the associated day tank is conservative.
- 3) Since the licensee's time validation of the manual actions (required to restore the automatic refilling of the day tank from the associated storage tank) determined that the manual actions could be completed in 4 minutes and 35 seconds, there is reasonable assurance that the manual actions can be completed well in advance of the EDG running out of fuel from its day tank (i.e., based on 56 minutes of available EDG run time).

Based on the above conclusions, the NRC staff further concludes that there is reasonable assurance that the EDGs will be able to perform their specified safety functions while allowing the manual actions specified in the proposed note which would be added to SR 3.8.1.6. Accordingly, the staff concludes, consistent with the PBAPS, Units 2 and 3, TS 1.1, definition for OPERABLE-OPERABILITY, the EDGs may be considered operable during performance of the

specified manual actions. Since the SR will provide assurance that LCO 3.8.1 for the EDGs will be met, the staff also concludes that the proposed change to SR 3.8.1.6 is consistent with 10 CFR 50.36(c)(3).

### 3.4 Technical Evaluation Conclusion

Based on the evaluation discussed in SE Sections 3.1 through 3.3, the NRC staff concludes that the proposed amendments are acceptable.

Attachment 3 to the licensee's supplement dated June 9, 2016, provided revised TS Bases pages to be implemented with the associated TS changes. These pages were provided for information only and will be revised in accordance with the TS Bases Control Program discussed in PBAPS TS 5.5.10, "Technical Specifications (TS) Bases Control Program."

### 4.0 STATE CONSULTATION

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

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change 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 (81 FR 5498). Accordingly, the amendments 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) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: R. Ennis, NRR  
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Date: November 16, 2016

November 16, 2016

Mr. Bryan C. Hanson  
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: DIESEL GENERATOR FUEL OIL TRANSFER  
SURVEILLANCE REQUIREMENTS (CAC NOS. MF7143 AND MF7144)

Dear Mr. Hanson:

The Commission has issued the enclosed Amendment Nos. 311 and 315 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for the Peach Bottom Atomic Power Station, Units 2 and 3, respectively. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 3, 2015, as supplemented by letters dated June 9, 2016, August 2, 2016, and November 8, 2016.

The amendments revise the TS surveillance requirements associated with the emergency diesel generator (EDG) fuel oil transfer system. Specifically, the amendments allow for the crediting of manual actions, in lieu of automatic actions, without having to declare the EDGs inoperable.

A copy of the safety evaluation is also enclosed. A Notice of Issuance will be included in the Commission's Biweekly *Federal Register* Notice.

Sincerely,

/RA/

Richard B. Ennis, Senior 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. 311 to Renewed DPR-44
2. Amendment No. 315 to Renewed DPR-56
3. Safety Evaluation

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PUBLIC	RidsACRS_MailCTR Resource	SEdmonds, NRR
LPL1-2 R/F	RidsRgn1MailCenter Resource	BGreen, NRO
RidsNrrDorlLpl1-2 Resource	RidsNrrDssStsb Resource	PSnyder, NRR
RidsNrrLALRonewicz Resource	RidsNrrDeEeeb Resource	RecordsAmend
RidsNrrPMPeachBottom Resource	RidsNrrDraAphb Resource	

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OFFICE	DORL/LPL1-2/PM	DORL/LPL1-2/LA	DSS/STSB/BC	DE/EEEEB/BC
NAME	REnnis	LRonewicz	AKlein	JZimmerman
DATE	11/16/16	10/24/16	10/31/16	11/03/16
OFFICE	DRA/APHB/BC	OGC	DORL/LPL1-2/BC(A)	DORL/LPL1-2/PM
NAME	SWeerakkody	BHarris	SKoenick	REnnis
DATE	11/04/16	11/10/16	11/16/16	11/16/16

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