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

September 28, 2018

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENT NOS. 320 AND 323 REGARDING THE ADOPTION OF TSTF-500, "DC ELECTRICAL REWRITE – UPDATE TO TSTF-360" (EPID L-2017-LLA-0312)

Dear Mr. Hanson:

The U.S. Nuclear Regulatory Commission (NRC or the Commission) has issued the enclosed Amendment Nos. 320 and 323 to Renewed Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (Peach Bottom), Units 2 and 3, respectively. These amendments consist of changes to the Technical Specifications (TS) and Renewed Facility Operating Licenses in response to your application dated September 29, 2017, as supplemented by letters dated August 1, August 14, and September 14, 2018.

The amendments revise the requirements related to direct current (DC) electrical systems in TS Limiting Conditions for Operation 3.8.4, "DC Sources - Operating"; 3.8.5, "DC Sources - Shutdown"; and 3.8.6, "Battery Cell Parameters." The amendments also add a new requirement, "Battery Monitoring and Maintenance Program," to TS 5.5, "Administrative Controls - Programs and Manuals," and relocate a number of surveillance requirements in TS 3.8.4 and Table 3.8.6-1 to the new TS program. These amendments revise the TS requirements for Peach Bottom, Units 2 and 3, in accordance with the NRC-approved Technical Specifications Task Force (TSTF) Improved Standard Technical Specifications Change Traveler, TSTF-500, Revision 2, "DC Electrical Rewrite – Update to TSTF-360."

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

Jennifer C. Tobin, Project Manager
Plant Licensing Branch 1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosures:
1. Amendment No. 320 to DPR-44
2. Amendment No. 323 to DPR-56
3. Safety Evaluation

cc: 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. 320
Renewed License No. DPR-44

1. The U.S. 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 September 29, 2017, as supplemented by letters dated August 1, August 14, and September 14, 2018, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

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

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 320, 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 by no later than September 30, 2019.

FOR THE NUCLEAR REGULATORY COMMISSION

James G. Danna, Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications
and Facility Operating License

Date of Issuance: September 28, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 320

PEACH BOTTOM ATOMIC POWER STATION, UNIT 2

RENEWED FACILITY OPERATING LICENSE NO. DPR-44

DOCKET NO. 50-277

Replace the following page of Renewed Facility Operating License No. DPR-44 with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove Page	Insert Page
3	3

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

Remove Pages	Insert Pages
3.8-28	3.8-28
3.8-29	3.8-29
---	3.8-29a
3.8-30	3.8-30
3.8-31	3.8-31
---	3.8-31a
3.8-32	3.8-32
3.8-34	3.8-34
3.8-35	3.8-35
3.8-36	3.8-36
3.8-37	3.8-37
3.8-38	3.8-38
---	3.8-38a
3.8-39	3.8-39
---	3.8-39a
3.8-40	3.8-40
---	5.0-18b
---	5.0-18c

(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 4016 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 320, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

(3) Physical Protection

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

Exelon Generation Company shall fully implement and maintain in effect all provisions of the Commission-approved cyber security plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Exelon Generation Company CSP was approved by License Amendment No. 281 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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[1] The Training and Qualification Plan and Safeguards Contingency Plan are Appendices to the Security Plan.

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The following DC electrical power subsystems shall be OPERABLE:

a. Unit 2 Division I and Division II DC electrical power subsystems; and

b. Unit 3 Division I and Division II DC electrical power subsystems.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Unit 3 DC electrical power subsystem inoperable due to performance of SR 3.8.4.7 or SR 3.8.6.6.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems—Operating," when Condition A results in de-energization of a Unit 2 4 kV emergency bus or de-energization of a Unit 3 DC bus. ----------	
	A.1 Restore Unit 3 DC electrical power subsystem to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One Unit 3 DC electrical power subsystem inoperable for reasons other than Condition A.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems—Operating," when Condition B results in de-energization of a Unit 2 4 kV emergency bus. ----------	
	B.1 Restore Unit 3 DC electrical power subsystem to OPERABLE status.	12 hours
C. One battery charger on one subsystem inoperable.	C.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	AND	
	C.2 Verify battery float current ≤ 2 amps.	Once per 12 hours
	AND	
	C.3 Restore battery charger to OPERABLE status.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. One Unit 2 DC electrical power subsystem inoperable for reasons other than Condition C.	D.1	Restore Unit 2 DC electrical power subsystem to OPERABLE status.	2 hours
E. Required Action and Associated Completion Time of Condition A, B, C, or D not met.	E.1	Be in MODE 3.	12 hours
	AND		
	E.2	Be in MODE 4.	36 hours
F. Two or more inoperable DC electrical power subsystems.	F.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------
SR 3.8.4.1 through SR 3.8.4.8 are applicable only to the Unit 2 DC electrical power subsystems. SR 3.8.4.9 is applicable only to the Unit 3 DC electrical power subsystems.

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.4.2	DELETED	
SR 3.8.4.3	DELETED	

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.4	DELETED	
SR 3.8.4.5	DELETED	
SR 3.8.4.6	Verify each required battery charger supplies ≥ 200 amps at greater than or equal to the minimum established float voltage for ≥ 4 hours. <u>OR</u> Verify each battery charger can recharge the battery to the fully charged state within 20 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	In accordance with the Surveillance Frequency Control Program.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.7	----------NOTES---------- 1. The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of SR 3.8.4.7. 2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	In accordance with the Surveillance Frequency Control Program.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.4.8 DELETED	

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 The following DC electrical power subsystems shall be OPERABLE:

a. Unit 2 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown"; and

b. Unit 3 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in the secondary containment.

ACTIONS

----------NOTE----------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One battery charger on one subsystem inoperable. AND The redundant subsystem battery and chargers OPERABLE.	A.1	Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	AND		
	A.2	Verify battery float current ≤ 2 amps.	Once per 12 hours
	AND		
	A.3	Restore battery charger to OPERABLE status.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more required DC electrical power subsystems inoperable for reasons other than Condition A.	B.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
OR	B.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
Required actions and associated completion time of Condition A not met.	B.2.2 Suspend movement of irradiated fuel assemblies in the secondary containment.	Immediately
	AND	
	B.2.3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.4.6 and SR 3.8.4.7. ---------- For required Unit 2 DC electrical power subsystems, the following SRs are applicable: SR 3.8.4.1 SR 3.8.4.6 SR 3.8.4.7	In accordance with applicable SRs
SR 3.8.5.2	----------NOTE---------- When Unit 3 is in MODE 4 or 5, or moving irradiated fuel assemblies in the secondary containment, the Note to Unit 3 SR 3.8.5.1 is applicable. ---------- For required Unit 3 DC electrical power subsystems, the SRs of Unit 3 Specification 3.8.4 are applicable.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

LCO 3.8.6 Battery parameters for the station electrical power subsystem batteries shall be within limits.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each battery.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One battery on one subsystem with one or more battery cells float voltage < 2.07.	A.1	Perform SR 3.8.4.1	2 hours
	AND		
	A.2	Perform SR 3.8.6.1	2 hours
	AND		
	A.3	Restore affected cell float voltage ≥ 2.07 V.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One battery on one subsystem with float current > 2 amps.	B.1 Perform SR 3.8.4.1.	2 hours
	AND	
	B.2 Restore battery float current to ≤ 2 amps.	12 hours
--------NOTE---------- Required Action C.2 shall be completed if electrolyte level was below the top of plates. ----------	----------NOTE---------- Required Actions C.1 and C.2 are only applicable if electrolyte level was below the top of plates. ----------	
C. One battery on one subsystem with one or more cells electrolyte level less than minimum established design limits.	C.1 Restore affected cell electrolyte level to above the top of plates.	8 hours
	AND	
	C.2 Verify no evidence of leakage.	12 hours
	AND	
	C.3 Restore electrolyte level to greater than or equal to minimum established design limits.	31 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One battery with pilot cell electrolyte temperature less than minimum established design limits.	D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
E. One or more batteries in redundant subsystems with battery parameters not within limits.	E.1 Restore battery parameters for batteries in one system to within limits.	2 hours
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met. OR One battery on one subsystem with one or more battery cells with float voltage < 2.07 V and float current > 2 amps.	F.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	----------NOTE---------- Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. ---------- Verify each battery float current is ≤ 2 amps.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.2	Verify each battery pilot cell float voltage is ≥ 2.07.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.3	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	In accordance with the Surveillance Frequency Control Program.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.4	Verify each battery pilot cell temperature is is greater than or equal to minimum established design limits.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.5	Verify each battery cell float voltance is ≥ 2.07 V.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.6	----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	In accordance with the Surveillance Frequency Control Program. AND 12 months when battery shows degradation or has reached 85% of the expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

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5.5 Programs and Manuals

5.5.15 Battery Monitoring and Maintenance Program

This Program provides controls for battery restoration and maintenance. The program shall be in accordance with IEEE Standard (Std) 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," as endorsed by Regulatory Guide 1.129, Revision 2 (RG), with RG exceptions and program provisions as identified below:

a. The program allows the following RG 1.129, Revision 2 exceptions:

1. Battery temperature correction may be performed before or after conducting discharge tests.

2. RG 1.129, Regulatory Position 1, Subsection 2, "References," is not applicable to this program.

3. In lieu of RG 1.129, Regulatory Position 2, Subsection 5.2,"Inspections," the following shall be used: "Where reference is made to the pilot cell, pilot cell selection shall be based on the lowest voltage cell in the battery."

4. In Regulatory Guide 1.129, Regulatory Position 3, Subsection 5.4.1, "State of Charge Indicator," the following statements in paragraph (d) may be omitted: "When it has been recorded that the charging current has stabilized at the charging voltage for three consecutive hourly measurements, the battery is near full charge. These measurements shall be made after the initially high charging current decreases sharply and the battery voltage rises to approach the charger output voltage."

5. In lieu of RG 1.129, Regulatory Position 7, Subsection 7.6,"Restoration," the following may be used: "Following the test, record the float voltage of each cell of the string."

b. The program shall include the following provisions:

5.5 Programs and Manuals

5.5.15 Battery Monitoring and Maintenance Program (continued)

1. Actions to restore battery cells with float voltage < 2.13 V;

2. Actions to determine whether the float voltage of the remaining battery cells is ≥ 2.13 V when the float voltage of a battery cell has been found to be < 2.13 V;

3. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates;

4. Limits on average electrolyte temperature, battery connection resistance, and battery terminal voltage; and

5. A requirement to obtain specific gravity readings of all cells at each discharge test, consistent with manufacturer recommendations.

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. 323
Renewed License No. DPR-56

1. The U.S. 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 September 29, 2017, as supplemented by letters dated August 1, August 14, and September 14, 2018, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

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

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

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

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

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

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 323, 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 immediately as of its date of issuance and shall be implemented by no later than September 30, 2019.

FOR THE NUCLEAR REGULATORY COMMISSION

James G. Danna, Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications
and Facility Operating License

Date of Issuance: September 28, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 323

PEACH BOTTOM ATOMIC POWER STATION, UNIT 3

RENEWED FACILITY OPERATING LICENSE NO. DPR-56

DOCKET NO. 50-278

Replace the following page of Renewed Facility Operating License No. DPR-56 with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove Page	Insert Page
3	3

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

Remove Pages	Insert Pages
3.8-28	3.8-28
3.8-29	3.8-29
---	3.8-29a
3.8-30	3.8-30
3.8-31	3.8-31
---	3.8-31a
3.8-32	3.8-32
3.8-34	3.8-34
3.8-35	3.8-35
3.8-36	3.8-36
3.8-37	3.8-37
3.8-38	3.8-38
---	3.8-38a
3.8-39	3.8-39
---	3.8-39a
3.8-40	3.8-40
---	5.0-18b
---	5.0-18c

(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 4016 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 323, are hereby incorporated in the license. Exelon Generation Company shall operate the facility in accordance with the Technical Specifications.

(3) Physical Protection

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

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

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

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

LCO 3.8.4 The following DC electrical power subsystems shall be OPERABLE:

a. Unit 3 Division I and Division II DC electrical power subsystems; and

b. Unit 2 Division I and Division II DC electrical power subsystems.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Unit 2 DC electrical power subsystem inoperable due to performance of SR 3.8.4.7 or SR 3.8.6.6.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems – Operating," when Condition A results in de-energization of a Unit 3 4 kV emergency bus or de-energization of a Unit 2 DC bus. ----------	
	A.1 Restore Unit 2 DC electrical power subsystem to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One Unit 2 DC electrical power subsystem inoperable for reasons other than Condition A.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems—Operating," when Condition B results in de-energization of a Unit 3 4 kV emergency bus. ----------	
	B.1 Restore Unit 2 DC electrical power subsystem to OPERABLE status.	12 hours
C. One battery charger on one subsystem inoperable.	C.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	AND	
	C.2 Verify battery float current ≤ 2 amps.	Once per 12 hours
	AND	
	C.3 Restore battery charger to OPERABLE status.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. One Unit 3 DC electrical power subsystem inoperable for reasons other than Condition C.	D.1	Restore Unit 3 DC electrical power subsystem to OPERABLE status.	2 hours
E. Required Action and Associated Completion Time of Condition A, B, C, or D not met.	E.1	Be in MODE 3.	12 hours
	AND		
	E.2	Be in MODE 4.	36 hours
F. Two or more inoperable DC electrical power subsystems.	F.1	Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

----------NOTE----------
SR 3.8.4.1 through SR 3.8.4.8 are applicable only to the Unit 3 DC electrical power subsystems. SR 3.8.4.9 is applicable only to the Unit 2 DC electrical power subsystems.

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.4.2	DELETED	
SR 3.8.4.3	DELETED	

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.4	DELETED	
SR 3.8.4.5	DELETED	
SR 3.8.4.6	Verify each required battery charger supplies ≥ 200 amps at greater than or equal to the minimum established float voltage for ≥ 4 hours. OR Verify each battery charger can recharge the battery to the fully charged state within 20 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.	In accordance with the Surveillance Frequency Control Program.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.7	----------NOTES---------- 1. The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of SR 3.8.4.7. 2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for the design duty cycle when subjected to a battery service test.	In accordance with the Surveillance Frequency Control Program.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.4.8 DELETED	

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources – Shutdown

LCO 3.8.5 The following DC electrical power subsystems shall be OPERABLE:

a. Unit 3 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown"; and

b. Unit 2 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown."

APPLICABILITY: MODES 4 and 5,
During movement of irradiated fuel assemblies in the secondary containment.

ACTIONS

----------NOTE----------
LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery charger on one subsystem inoperable. AND The redundant subsystem battery and chargers OPERABLE.	A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	AND	
	A.2 Verify battery float current ≤ 2 amps.	Once per 12 hours
	AND	
	A.3 Restore battery charger to OPERABLE status.	72 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more required DC electrical power subsystems inoperable for reasons other than Condition A.	B.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
OR	B.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
Required actions and associated completion time of Condition A not met.	B.2.2 Suspend movement of irradiated fuel assemblies in the secondary containment.	Immediately
	AND	
	B.2.3 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.4.6 and SR 3.8.4.7. ---------- For required Unit 3 DC electrical power subsystems, the following SRs are applicable: SR 3.8.4.1 SR 3.8.4.6 SR 3.8.4.7	In accordance with applicable SRs
SR 3.8.5.2	----------NOTE---------- When Unit 2 is in MODE 4 or 5, or moving irradiated fuel assemblies in the secondary containment, the Note to Unit 2 SR 3.8.5.1 is applicable. ---------- For required Unit 2 DC electrical power subsystems, the SRs for Unit 2 Specification 3.8.4 are applicable.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

LCO 3.8.6 Battery parameters for the station electrical power subsystem batteries shall be within limits.

APPLICABILITY: When associated DC electrical power subsystems are required to be OPERABLE.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each battery.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One battery on one subsystem with one or more battery cells float voltage < 2.07.	A.1	Perform SR 3.8.4.1	2 hours
	AND		
	A.2	Perform SR 3.8.6.1	2 hours
	AND		
	A.3	Restore affected cell float voltage ≥ 2.07 V.	24 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One battery on one subsystem with float current > 2 amps.	B.1 Perform SR 3.8.4.1.	2 hours
	AND	
	B.2 Restore battery float current to ≤ 2 amps.	12 hours
--------NOTE---------- Required Action C.2 shall be completed if electrolyte level was below the top of plates. ----------	----------NOTE---------- Required Actions C.1 and C.2 are only applicable if electrolyte level was below the top of plates. ----------	
C. One battery on one subsystem with one or more cells electrolyte level less than minimum established design limits.	C.1 Restore affected cell electrolyte level to above the top of plates.	8 hours
	AND	
	C.2 Verify no evidence of leakage.	12 hours
	AND	
	C.3 Restore electrolyte level to greater than or equal to minimum established design limits.	31 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One battery with pilot cell electrolyte temperature less than minimum established design limits.	D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
E. One or more batteries in redundant subsystems with battery parameters not within limits.	E.1 Restore battery parameters for batteries in one system to within limits.	2 hours
F. Required Action and associated Completion Time of Condition A, B, C, D, or E not met. OR One battery on one subsystem with one or more battery cells with float voltage < 2.07 V and float current > 2 amps.	F.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.6.1	----------NOTE---------- Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. ---------- Verify each battery float current is ≤ 2 amps.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.2	Verify each battery pilot cell float voltage is ≥ 2.07.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.3	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	In accordance with the Surveillance Frequency Control Program.

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.4	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.5	Verify each battery cell float voltage is ≥ 2.07 V.	In accordance with the Surveillance Frequency Control Program.
SR 3.8.6.6	----------NOTE---------- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. ---------- Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	In accordance with the Surveillance Frequency Control Program. AND 12 months when battery shows degradation or has reached 85% of the expected life with capacity < 100% of manufacturer's rating AND 24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

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5.5 Programs and Manuals

5.5.15 Battery Monitoring and Maintenance Program

This Program provides controls for battery restoration and maintenance. The program shall be in accordance with IEEE Standard (Std) 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," as endorsed by Regulatory Guide 1.129, Revision 2 (RG), with RG exceptions and program provisions as identified below:

a. The program allows the following RG 1.129, Revision 2 exceptions:

1. Battery temperature correction may be performed before or after conducting discharge tests.

2. RG 1.129, Regulatory Position 1, Subsection 2, "References," is not applicable to this program.

3. In lieu of RG 1.129, Regulatory Position 2, Subsection 5.2,"Inspections," the following shall be used: "Where reference is made to the pilot cell, pilot cell selection shall be based on the lowest voltage cell in the battery."

4. In Regulatory Guide 1.129, Regulatory Position 3, Subsection 5.4.1, "State of Charge Indicator," the following statements in paragraph (d) may be omitted: "When it has been recorded that the charging current has stabilized at the charging voltage for three consecutive hourly measurements, the battery is near full charge. These measurements shall be made after the initially high charging current decreases sharply and the battery voltage rises to approach the charger output voltage."

5. In lieu of RG 1.129, Regulatory Position 7, Subsection 7.6,"Restoration," the following may be used: "Following the test, record the float voltage of each cell of the string."

b. The program shall include the following provisions:

5.5 Programs and Manuals

5.5.15 Battery Monitoring and Maintenance Program (continued)

1. Actions to restore battery cells with float voltage < 2.13 V;

2. Actions to determine whether the float voltage of the remaining battery cells is ≥ 2.13 V when the float voltage of a battery cell has been found to be < 2.13 V;

3. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates;

4. Limits on average electrolyte temperature, battery connection resistance, and battery terminal voltage; and

5. A requirement to obtain specific gravity readings of all cells at each discharge test, consistent with manufacturer recommendations.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 320 AND 323

TO RENEWED FACILITY OPERATING LICENSE NOS. DPR-44 AND 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 September 29, 2017 (Reference 1), as supplemented by letters dated August 1, 2018 (Reference 2); August 14, 2018 (Reference 3); and September 14, 2018 (Reference 4), respectively, Exelon Generation Company, LLC (Exelon or the licensee) requested changes to the Technical Specifications (TS) for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, to adopt U.S. Nuclear Regulatory Commission (NRC or the Commission)-approved Technical Specification Task Force (TSTF) Improved Standard Technical Specifications Change Traveler TSTF-500, Revision 2, "DC Electrical Rewrite – Update to TSTF-360." The license amendment request (LAR) proposes to revise TS requirements related to direct current (DC) electrical power systems in TS Limiting Conditions for operation (LCOs) 3.8.4, "DC Sources - Operating"; LCO 3.8.5, "DC Sources - Shutdown"; and LCO 3.8.6, "Battery Cell Parameters." A new Battery Monitoring and Maintenance Program is being proposed for TS 5.5, "Programs and Manuals."

The supplemental letters dated August 1, August 14, and September 14, 2018, provided additional information that 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* (November 21, 2017; 82 FR 55405). The proposed changes include the following:

- New Condition, Required Action, and Completion Time (CT) for an inoperable battery charger, one battery on one subsystem inoperable, one Unit 2 DC electrical power subsystem inoperable for LCO 3.8.4, "DC Sources – Operating," and LCO 3.8.5, "DC Sources – Shutdown."

- Relocation of a number of surveillance requirements (SRs) in TS 3.8.4 that perform preventative maintenance on the safety-related batteries to a licensee-controlled program.

- Modification of LCO 3.8.6, "Battery Cell Parameters," by relocating Table 3.8.6-1, "Battery Cell Parameter Requirements," to a licensee-controlled program, and that specific conditions and required actions with associated CTs for out-of-limits conditions for battery cell voltage, electrolyte level, and electrolyte temperature be added to TS 3.8.6.

- Specific SR revisions and additions for verification of battery parameters.

- Addition of a new program titled "Battery Monitoring and Maintenance Program" in TS 5.5 of the programs and manuals for the maintenance and monitoring of station batteries and for the relocation of other mentioned TS items.

The Notice of Availability for TSTF-500, Revision 2, was published in the *Federal Register* on September 1, 2011 (76 FR 54510), to announce the availability of the model application and model safety evaluation (SE) (Reference 5) for plant-specific adoption of TSTF-500, Revision 2 (Reference 6), as part of the consolidated line item improvement process. This Notice of Availability was later corrected to clarify that TSTF-500 was available for plant-specific adoption, but not under the consolidated line item improvement process. The clarifying Notice of Availability was published in the *Federal Register* on November 8, 2011 (76 FR 69296).

Provided in TSTF-500, Revision 2, Attachment B, "Revisions to Revision 1 of the ISTS NUREGs," are the changes to Revision 1 of the Improved Standard Technical Specifications (ISTS) NUREGs to incorporate TSTF-500. In TSTF-500, Revision 2, it is stated that the changes in Attachment B should be used for plants that have not adopted TSTF-360. Since PBAPS had not adopted TSTF-360, and the PBAPS TS are based on NUGEG-1433, "Standard Technical Specifications General Electric Plants, BWR/4," the NRC staff used the changes to BWR/4 STS in Attachment B of TSTF-500, Revision 2, as the model for evaluating the proposed PBAPS TS changes.

2.0 REGULATORY EVALUATION

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 Updated Final Safety Analysis Report (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 included a consolidation from 70 to 64 criteria. As discussed in the NRC's Staff Requirements Memorandum for SECY-92-223, dated September 18, 1992 (Reference 7), the Commission decided not to apply the final GDC to plants with construction permits issued prior to May 21, 1971. At the time of the 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 licensee for PBAPS, Units 2 and 3, has 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.

The NRC staff used the following regulatory requirements for the review of the LAR:

- PBAPS UFSAR, Appendix H, "Conformance to AEC (NRC) Criteria," states that PBAPS, Units 2 and 3, conform to the intent of the AEC proposed GDC for Nuclear Power Plants dated July 1967. The proposed GDC 24 and 39 are applicable to PBAPS, Units 2 and 3, electrical power systems.

  Criterion 24, "Emergency Power for Protection Systems," states:

  > In the event of loss of all offsite power, sufficient alternate sources of power shall be provided to permit the required functioning of the protection systems.

  Criterion 39, "Emergency Power for Engineered Safety Features," states:

  > 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.

- The regulation at 10 CFR 50.36, "Technical specifications," establishes the requirements related to the content of the TS. Pursuant to 10 CFR 50.36(c), TS are required to include items in five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings, (2) LCOs, (3) SRs, (4) design features; and (5) administrative controls. The proposed changes to the PBAPS TS relate to the LCOs, SRs, and administrative control categories.

The NRC staff used the following regulatory guidance documents for review of the LAR:

- Regulatory Guide (RG) 1.75, Revision 3, "Criteria for Independence of Electrical Safety Systems," February 2005 (Reference 8), provides guidance with respect to the physical independence requirements of the circuits and electric equipment that comprise or are associated with safety systems.

- RG 1.129, Revision 2, "Maintenance, Testing, and Replacement of Vented Lead-Acid Storage Batteries for Nuclear Power Plants," February 2007 (Reference 9), provides guidance with respect to the maintenance, testing, and replacement of vented lead-acid storage batteries in nuclear power plants. This RG endorses, in part, the Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 450-2002, "IEEE

Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead Acid Batteries for Stationary Applications" (Reference 10).

- TSTF-500, Revision 2, "DC Electrical Rewrite – Update to TSTF-360," dated September 22, 2009.

- TSTF-425, Revision 3, "Relocate Surveillance Frequencies to License Control – RITSTF Initiative 5b," dated March 18, 2009 (Reference 11).

3.0 TECHNICAL EVALUATION

3.1 Design Features of the PBAPS, Units 2 and 3, Class 1E DC Power System

The station Class 1E DC electrical power system provides both motive and control power to selected safety-related equipment and preferred alternate current (AC) vital bus power (via DC to AC power converters (i.e., inverters)). According to the PBAPS UFSAR, the safety objective of the station batteries is to supply all normal and emergency 125 volts (V) DC and 250 V power. The 125/250 V power systems are designed such that no single component failure prevents power being provided to a sufficient number of vital loads for safe shutdown.

There are two independent safety-related 125/250 V systems (Division I and Division II) for each PBAPS unit. In TS LCO 3.8.4, the licensee defines Division I and Division II as subsystems. Each division is of adequate size to provide control and switching power to safeguard systems and apparatus, DC auxiliaries, and motor operated valves for its respective unit. Each safety-related DC system/division is comprised of two 125 V batteries, each with its own charger panel consisting of two 100 percent chargers. In the TS, the terms divisions and subsystems are used to establish the requirements for the safety-related 125/250 V systems. The TS identify two independent divisions (Division I and Division II), and refers to the safety related 125/250 V system in each division as a DC electrical power subsystem. The two 125 V batteries in each system/division are connected in series to make one 125/250 V battery that supplies 250 V power loads. The two 125/250 V batteries for each unit are redundant. There are a total of four safety-related 125/250 V batteries in the station, two for Unit 2 and two for Unit 3. Each 125/250 V battery is in a separate ventilated battery room. Each of the four station batteries in each unit is 58 cells, 125 V supplying control power.

The PBAPS Unit 2 station batteries (2A, 2B, 2C, and 2D) are EnerSys Model GN-23, 58-cell lead-calcium type with a continuous discharge rating of 1,712 ampere-hour (Ah) at the 8-hour rate (terminal voltage of 1.81 volts per cell (Vpc)). The PBAPS Unit 3 station batteries (3A, 3B, 3C, and 3D) are identical to those of Unit 2.

Each of the units has four 125 V, 200 Ampere (A) safety-related battery chargers. Each charger has adequate capacity and capability to restore its battery to full charge within 24 hour from a minimum discharged condition while carrying the normal unit steady state DC load. The chargers are suitable for float charging the lead-calcium battery at 2.25 Vpc, and supplying an equalizing charge at 2.33 Vpc. The 125 V chargers are capable of carrying the normal DC system load and, at the same time, supplying charging current to keep the batteries in a fully charged condition. The chargers are supplied from separate 480 V motor control centers (MCCs). Each of these MCCs is connected to an independent emergency AC bus. The chargers for three Unit 2 and three Unit 3 batteries can be supplied from the other units' emergency AC buses via manual transfer switches (crossties).

In the LAR, the licensee stated that the PBAPS DC system design differs from the design assumed for the standard plant described in the Standard Technical Specifications in TSTF-500, Revision 2, in two ways: (1) DC system inter-unit crossties, and (2) installed spare battery chargers in standby condition.

The DC system inter-unit crossties are related to the 4 kilovolts (kV) emergency buses and emergency diesel generators (EDGs), which receive their DC power control from the 125/250 DC system, as PBAPS does not have a separate EDG DC battery subsystem. Each unit is provided with four 4 kV emergency buses for safety related equipment, with each emergency bus powered by an EDG. The DC control power (which provides control power for the 4 kV load circuit breakers and the feeder breakers to the 4 kV emergency bus) for two of the four 4 kV emergency buses and two of the EDGs in each unit, is provided by the other unit DC electrical power subsystems. Therefore, the Unit 3 (Unit 2) DC electrical power subsystems needed to support required Unit 2 (Unit 3) components are also required to be OPERABLE. The Unit 3 (Unit 2) DC electrical power subsystem OPERABILITY requirements are the same as those required for a Unit 2 (Unit 3) DC electrical power subsystem. The Unit 2 DC system contains a TS LCO Action (3.8.4) for the Unit 3 DC system, and the Unit 3 DC system contains a TS LCO Action (3.8.4) for the Unit 2 DC system. In the LAR, the licensee stated that these LCOs will remain unaffected by the proposed changes to adopt TSTF-500, Revision 2.

In regards to the installed spare battery chargers in standby condition, each battery charger panel includes an operating battery charger and an identical installed standby battery charger that can be manually transferred if the operating battery charger becomes unavailable. For the purpose of adopting TSTF-500, Revision 2, the 72-hour inoperable battery charger LCO will be used when the operating and standby battery chargers both become inoperable.

3.2 Evaluation of Proposed Changes

3.2.1 TS 3.8.4 (DC Sources - Operating) Changes

The current TS 3.8.4 for PBAPS, Units 2 and 3, have slight differences in the LCOs and the TS action statements from those in the ISTS for BWR/4 plants. These differences have been addressed by the licensee and the NRC staff in assessing the conformance of the proposed TS changes to TSTF-500 in Sections 3.2.1.1 and 3.2.2.1. Section 3.2.2.3 classifies installed spare batteries.

The PBAPS Unit 2 TS LCO 3.8.4 requires the following DC electrical power subsystems to be operable: (a) Unit 2 Division I and Division II DC electrical power subsystems, and (b) Unit 3 Division I and Division II DC electrical power subsystems. The PBAPS Unit 2 TS 3.8.4 is applicable in Modes 1, 2, and 3.

The PBAPS Unit 3 TS LCO 3.8.4 requires the following DC electrical power subsystems to be operable: (a) Unit 3 Division I and Division II DC electrical power subsystems, and (b) Unit 2 Division I and Division II DC electrical power subsystems. The PBAPS Unit 3 TS 3.8.4 is applicable in Modes 1, 2, and 3.

The proposed changes to TS 3.8.4 Actions and SRs for PBAPS, Units 2 and 3, are similar. The licensee proposed to revise PBAPS Unit 2 and Unit 3 TS 3.8.4 Conditions, Required Actions, and SRs. The proposed changes would (1) add a new condition to address the operability of the PBAPS, Units 2 and 3, DC battery chargers, (2) modify current SRs that require verification of batteries and chargers design capabilities and battery's terminal voltage, and (3) relocate

current preventive maintenance SRs and a current SR that require verification of a battery capacity.

The licensee initially proposed a TS condition to address one inoperable battery on one subsystem with the required action to restore the battery to operable status within a 2-hour CT, which is the same CT for restoring an inoperable electrical power DC subsystem to operable status. In its letter dated September 14, 2018 (Reference 4), the licensee deleted the proposed TS condition for one inoperable battery to eliminate the duplication with the TS condition for an inoperable DC subsystem, as both conditions have the same CT.

The NRC staff's evaluation below for the proposed changes to PBAPS TS 3.8.4 is applicable to both Units 2 and 3.

3.2.1.1 PBAPS, Units 2 and 3, TS 3.8.4, Current Condition A (Revised), Change (1)

PBAPS Unit 2 TS 3.8.4, Current Condition A (Revised)

Current PBAPS Unit 2 TS 3.8.4 Condition A states:

Condition A	One Unit 3 DC electrical power subsystem inoperable due to performance of SR 3.8.4.7 or SR 3.8.4.8.

Revised PBAPS Unit 2 Condition A would state:

Condition A	One Unit 3 DC electrical power subsystem inoperable due to performance of SR 3.8.4.7 or SR 3.8.6.6.

The Required Action A.1 and associated Note and CT for revised PBAPS Unit 2 TS 3.8.4, Condition A would be unchanged and would state "Restore Unit 3 DC electrical power subsystem to OPERABLE status," "Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems – Operating," when Condition A results in deenergization of a Unit 2, 4 kV emergency bus or deenergization of a Unit 3 DC bus," and "7 days," respectively.

PBAPS Unit 3 TS 3.8.4, Current Condition A (Revised)

Current PBAPS Unit 3 TS 3.8.4, Condition A states:

Condition A	One Unit 2 DC electrical power subsystem inoperable due to performance of SR 3.8.4.7 or SR 3.8.4.8.

Revised PBAPS Unit 3 TS 3.8.4, Condition A would state:

Condition A	One Unit 2 DC electrical power subsystem inoperable due to performance of SR 3.8.4.7 or SR 3.8 6.6.

The Required Action A.1 and associated Note and CT for revised PBAPS Unit 3 TS 3.8.4, Condition A would be unchanged and would state "Restore Unit 2 DC electrical power subsystem to OPERABLE status," "Enter applicable Conditions and Required Actions of LCO 3.8.7, "Distribution Systems – Operating," when Condition B results in deenergization of a Unit 3 4 kV emergency bus or deenergization of a Unit 3 DC bus," and "7 days," respectively.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current Condition A (Revised), Change (1)

Current Condition A is specific to PBAPS. The current Condition A discusses the inoperability of any one of the opposite unit (Units 2 or 3) DC electrical power subsystem due to performance of SRs 3.8.4.7 or 3.8.4.8. The proposed change would renumber SR 3.8.4.8 as SR 3.8.6.6 in revised Condition A.

Current SR 3.8.4.8 (battery capacity test) is performed to demonstrate the operability of the battery. The current SR 3.8.4.8 would be deleted from TS 3.8.4 and its requirements would be relocated to new SR 3.8.6.6 in TS 3.8.6 in accordance with TSTF-500 guidelines. As discussed in Section 3.2.3.16, PBAPS, Units 2 and 3, TS 3.8.6; new SR 3.8.6.6 (relocated – current SR 3.8.4.8); and change (16) of this SE, the battery capacity test in current SR 3.8.4.8 will continue to be performed per the new SR 3.8.6.6. The NRC staff finds that the renumbering of SR 3.8.4.8 to SR 3.8.6.6 in revised Condition A is editorial in nature and does not alter the intent of the current Condition A, and is, therefore, acceptable.

Based on the above, the NRC staff concludes that the proposed revised Condition A provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.1.2 PBAPS, Units 2 and 3, TS 3.8.4, New Condition C (Added), Change (2)

New PBAPS, Units 2 and 3, TS 3.8.4, Condition C would state:

Condition C.	One battery charger on one subsystem inoperable

New PBAPS, Units 2 and 3, TS 3.8.4, Required Actions C.1, C.2, and C.3 would state:

Required Action C.1	Restore battery terminal voltage to greater than or equal to the minimum established float voltage.
	AND
Required Action C.2	Verify battery float current ≤ 2 amps.
	AND
Required Action C.3	Restore battery charger to OPERABLE status.

New CTs for PBAPS, Units 2 and 3, TS 3.8.4, New Required Actions C.1, C.2, and C.3 would state "2 hours," "Once per 12 hours," and "72 hours," respectively.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, New Condition C, Change (2)

New Condition C would apply when one battery charger on one subsystem is inoperable.

New Required Action C.1 would require the affected battery terminal voltage to be restored to greater than or equal to the minimum established float voltage within 2 hours. The battery charger, in addition to maintaining the battery operable, provides DC control power to AC circuit breakers and thus supports the recovery of AC power following events such as loss-of-offsite

power or station blackout. The 2-hour CT provides an allowance for returning an inoperable charger to operable status or for reestablishing an alternate means (e.g., spare battery charger) of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. PBAPS will provide two 200-ampere (amp) rated permanently installed (one per unit) non safety-related alternate battery chargers that can be placed in service within 2 hours to assure the discharging battery will be above its minimum established float voltage. The licensee stated that newly installed fuse boxes and transfer switches (shown in Attachment 8 of the LAR), along with operating procedures to connect the alternate battery chargers will assure proper separation between safety and non-safety related systems. The licensee further stated that the worst case battery discharge period will be limited to within 2 hours. At the end of the 2 hours, a terminal voltage of at least the minimum established float voltage provides indication that the battery is on the exponential charging current portion of its recharging cycle. This provides assurance that the battery can be restored to its fully charged condition from any discharge that might have occurred due to the charger inoperability. The NRC staff finds the proposed new Required Action C.1 and its associated CT acceptable because the proposed action is consistent with TSTF-500.

New Required Action C.2 would require that the battery float current be verified as less than or equal to 2 amps once per 12 hours. This would indicate that, if the battery had been discharged as the result of the inoperable battery charger it had been recharged and fully capable of supplying the maximum expected load requirement. In the LAR, the licensee stated that the battery with terminal voltage of at least the minimum established float voltage and with no cells less than 2.07 V, can be fully recharged within 12 hours since the time to fully charge the battery in this condition depends on the previous discharge and the recharge characteristic of the battery. The licensee stated that a worst case battery discharge in 2 hours under normal plant loading conditions will result in less than 5 percent capacity removed from the battery, and the recharged battery float current of 2 amps indicates that the battery is 98 percent charged (see Section 3.2.3.3 of this SE for additional details on the 2-amp float current). In addition, the licensee stated that the 200-amp alternate battery charger is capable of recharging the battery to 95 percent capacity within 8 hours after a 2-hour discharge under normal DC loading. If at the expiration of the initial 12-hour period the battery float current is not less than or equal to 2 amps, this indicates that there may be additional battery problems, and the battery must be declared inoperable. The NRC staff finds the proposed new Required Action C.2 and its associated CT acceptable because the action to verify battery float current once per 12 hours is consistent with TSTF-500, and the 12-hour CT is applicable to PBAPS.

New Required Action C.3 would limit the restoration time for the inoperable battery, charger to 72 hours. This action is applicable if an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage has been used (e.g. balance of plant non-Class 1E battery charger). In the LAR, the licensee stated that the 72-hour CT will be used when both the operating and the installed standby battery chargers are inoperable. The LAR also states that the 72-hour CT reflects a reasonable time to restore the qualified battery charger to OPERABLE status, because the extended battery charger CT is based on the availability of an alternate battery charger that is appropriately sized to perform the design function of the charger that becomes inoperable. PBAPS will provide two 200 amp rated permanently installed (one per unit) non safety-related alternate battery chargers. The alternate battery chargers can be placed in service within 72 hours to ensure that the discharging battery terminal remains above its minimum established float voltage for the battery's operability. The NRC staff finds the proposed new Required Action C.3 and its associated CT acceptable because the action to restore the battery chargers to operable status within 72 hours is consistent with TSTF-500, and the 72-hour CT is applicable to PBAPS.

Based on the above, the NRC staff concludes that the proposed new Condition C, with its associated Required Actions and CTs, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.1.3 PBAPS, Units 2 and 3, TS 3.8.4, Current Condition C (Revised and Renumbered as Condition D), Change (3)

PBAPS Unit 2 TS 3.8.4, Current Condition C (Revised and Renumbered as Condition D)

Current PBAPS Unit 2 TS 3.8.4 Condition C states:

Condition C.	One Unit 2 DC electrical power subsystem inoperable.

Revised and renumbered PBAPS Unit 2 TS 3.8.4 Condition D (from Section 3.2.1.2) would state:

Condition D.	One Unit 2 DC electrical power subsystem inoperable for reasons other than Condition C.

Current PBAPS Unit 2 TS 3.8.4 Required Action C.1 states:

Required Action C.1	Restore Unit 2 DC electrical power subsystem to OPERABLE status.

Renumbered PBAPS Unit 2 TS 3.8.4 Required Action D.1 would state:

Required Action D.1	Restore Unit 2 DC electrical power subsystem to OPERABLE status.

The CT for renumbered PBAPS Unit 2 TS 3.8.4 Required Action D.1 would remain unchanged and would state "2 hours."

PBAPS Unit 3 TS 3.8.4, Current Condition C (Revised and Renumbered as Condition D)

Current PBAPS Unit 3 TS 3.8.4 Condition C (from 3.2.1.2) states:

Condition C.	One Unit 3 DC electrical power subsystem inoperable.

Revised and renumbered PBAPS Unit 3 TS 3.8.4 Condition D (from Section 3.2.1.2) would state:

Condition D.	One Unit 3 DC electrical power subsystem inoperable for reasons other than Condition C.

Current PBAPS Unit 3 TS 3.8.4, Required Action C.1 states:

Required Action C.1	Restore Unit 3 DC electrical power subsystem to OPERABLE status.

Renumbered PBAPS Unit 3 TS 3.8.4 Required Action D.1 would state:

Required Action D.1	Restore Unit 3 DC electrical power subsystem to OPERABLE status.

The CT for renumbered PBAPS Unit 3 TS 3.8.4 Required Action D.1 would remain unchanged and would state "2 hours."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current Condition C (Revised and Renumbered as Condition D), Change (3)

Revised and renumbered Condition D would apply when one unit's (Unit 2 or Unit 3) DC subsystem is inoperable for reasons other than the proposed Condition C. The proposed new Condition C (from Section 3.2.1.2) inoperability relates to one battery charger on one subsystem. Since an inoperable battery charger or battery would render the DC subsystem inoperable, the current Condition for inoperable DC electrical power subsystem would be revised to exclude the cases of inoperable battery charger or battery from reasons of an inoperable DC subsystem by adding the statement "for reasons other than Condition C." The NRC staff finds the proposed revised and renumbered Condition D acceptable because it reflects the addition of the two conditions related to an inoperable DC electrical power subsystem to the TS 3.8.4 (References 12 and 4).

Current Required Action C.1 would be renumbered as Required Action D.1 with the same CT of 2 hours. If one of the required DC electrical power subsystems is inoperable, the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent postulated worst case single failure could result in the loss of minimum necessary DC electrical subsystems to mitigate a postulated worst case accident, continued power operation is limited to 2 hours. The NRC staff finds that renumbering Required Action C.1 as D.1 is editorial in nature, and is, therefore, acceptable.

Based on the above, the NRC staff concludes that the proposed revised and renumbered Condition D, with its associated Required Action and CT, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.1.4 PBAPS, Units 2 and 3, TS 3.8.4, Current Condition D (Revised and Renumbered as Condition E), Change (4)

Current PBAPS, Units 2 and 3, TS 3.8.4 Condition D states:

Condition D.	Required Action and associated Completion Time of Condition A, B, C not met.

Revised and renumbered PBAPS, Units 2 and 3, TS 3.8.4 Condition E would state:

Condition E.	Required Action and associated Completion Time of Condition A, B, C, or D not met.

Current PBAPS, Units 2 and 3, TS 3.8.4 Required Action D.1 states:

Required Action D.1	Be in MODE 3

Revised and Renumbered PBAPS, Units 2 and 3, Required Action E.1 and E.2 would state:

Required Action E.1	Be in MODE 3
	AND
Required Action E.2	Be in MODE 4.

The CTs for revised and renumbered PBAPS, Units 2 and 3, TS 3.8.4 Required Action E.1 and E.2 would state "12 hours" and "36 hours," respectively.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current Condition D (Revised and Renumbered as Condition E), Change (4)

Current Condition D applies when the Required Action and associated CT of the previous Conditions A, B, C (revised and renumbered as D) are not met. Condition D would be revised by adding the two new Conditions C (inoperable battery charger) and D (one Unit 2 or Unit 3 electrical power subsystem inoperable for reasons other than Condition C) and be renumbered as Condition E. The revised and renumbered TS 3.8.4 Condition E would apply when the Required Action and associated CT of the previous Conditions A, B, C, or D would not be met. This Condition would apply if the DC electrical subsystem cannot be restored to operable status within the required CT. The NRC staff finds that the revised and renumbered Condition E reflects the addition of the proposed two new Conditions C and D to the TS 3.8.4, and is, therefore, acceptable.

The previous Conditions A, B, C, or D, are related to the inoperability of the unit DC subsystems (battery chargers, battery, and other components). In this case, Unit 2 must be brought to Mode 3 and Mode 4 in 12 and 36 hours respectively, as stated in the PBAPS TS Bases. The LAR states that the allowed CTs (12 hours and 36 hours) are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems. The NRC staff finds the Required Actions E.1 and E.2 with their respective CTs are consistent with TSTF-500, and are, therefore, acceptable.

Based on the above, the NRC staff concludes that the proposed revised and renumbered Condition D, with its associated Required Actions and CTs, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.1.5 PBAPS, Units 2 and 3, TS 3.8.4, Current Condition E (Renumbered as Condition F, Change (5)

Current PBAPS TS 3.8.4 Condition E states:

Condition E.	Two or more DC inoperable DC electrical power subsystems.

Renumbered PBAPS TS 3.8.4 Condition F would state:

Condition F.	Two or more DC inoperable DC electrical power subsystems.

Current PBAPS TS 3.8.4 Required Action E.1 states:

Required Action E.1	Enter LCO 3.0.3.

Renumbered PBAPS TS 3.8.4 Required Action F.1 would state:

Required Action F.1	Enter LCO 3.0.3.

The CT for renumbered PBAPS, Units 2 and 3, TS 3.8.4 Required Action F.1 would remain unchanged and would state "Immediately."

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current Condition E (Renumbered Condition F), Change (5)</u>

Current Condition E corresponds to a level of degradation in the DC electrical power subsystems that cause a required safety function to be lost. When more than one DC source is lost, and this results in the loss of a required function, the plant is in a condition outside the accident analysis. Therefore, no additional time is justified for continued operation. LCO 3.0.3 must be entered "Immediately" to commence a controlled shutdown. The licensee proposed to renumber current Condition E to Condition F and Required Action E.1 to F.1. The NRC staff finds that the proposed change is editorial in nature, and is, therefore, acceptable.

Based on the above, the NRC staff concludes that the proposed renumbered Condition E, with its associated Required Action and CT, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.1.6 PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.1 (Revised), Change (6)

Current PBAPS, Units 2 and 3, SR 3.8.4.1 states:

SR 3.8.4.1	Verify battery terminal voltage is ≥ 123.5 V on float charge.

Revised PBAPS, Units 2 and 3, SR 3.8.4.1 would state:

SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage.

The frequency for revised SR 3.8.4.1 would remain unchanged and would state "In accordance with the Surveillance Frequency Control Program."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.1 (Revised), Change (6)

The revised SR 3.8.4.1 would verify that the battery terminal voltage is greater than or equal to the minimum established float voltage. The purpose of SR 3.8.4.1 is to verify the battery terminal voltage while the batteries are on a float charge to ensure the effectiveness of the battery chargers is not degraded. The battery terminal voltage selected by the battery manufacturer is the minimum voltage which ensures an optimum charging voltage is applied to the battery. In the LAR, the licensee stated that the voltage requirements are based on the nominal design voltage of the battery and are consistent with the minimum established float voltage (2.13 Vpc times the number of connected cells). For the 58-cell battery, the voltage at the battery terminals is 123.5 V (2.13 Vpc multiplied by 58 cells). This minimum voltage will maintain the battery plates in a condition that supports maintaining the grid life.

SR 3.8.4.1 would be revised to verify that the battery terminal voltage is greater than or equal to the minimum established float voltage. With these license amendments, the minimum established battery float voltage numerical value (design limit) would be relocated to a licensee-controlled program. This will allow flexibility to monitor and control this limit at values directly related to the battery ability to perform its required safety function. The NRC staff finds that relocating the TS numerical value of the battery's terminal float voltage to a licensee-controlled program will allow adequate monitoring of the battery's ability to perform its safety functions, and is consistent with TSTF-500.

Based on the above, the NRC staff concludes that the proposed revised SR 3.8.4.1 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met, and is, therefore, acceptable.

3.2.1.7 PBAPS, Units 2 and 3, TS 3.8.4, Current SRs 3.8.4.2, 3.8.4.3, 3.8.4.4, and 3.8.4.5 (Deleted), Change (7)

Current PBAPS, Units 2 and 3, SRs 3.8.4.2, 3.8.4.3, 3.8.4.4, and 3.8.4.5 state:

SR 3.8.4.2:	Verify no visible corrosion at the battery terminals and connectors. OR Verify battery connection resistance is ≤ 40 E-6 ohms
SR 3.8.4.3:	Verify battery cells, cell plates, and racks show no visual indication of physical damage or abnormal deterioration that could potentially degrade battery performance.
SR 3.8.4.4:	Remove visible corrosion and verify battery cell to cell and terminal connections are coated with anti-corrosion material.
SR 3.8.4.5:	Verify battery connection resistance is ≤ 40 E-6 ohms.

Revised PBAPS, Units 2 and 3, SRs 3.8.4.2 through 3.8.4.5 would state:

SR 3.8.4.2: DELETED

SR 3.8.4.3: DELETED

SR 3.8.4.4: DELETED

SR 3.8.4.5: DELETED

The frequencies for current PBAPS, Units 2 and 3, SR 3.8.4.2, SR 3.8.4.3, SR 3.8.4.4, and SR 3.8.4.5 state "In accordance with the Surveillance Frequency Control Program."

The frequencies for revised PBAPS, Units 2 and 3, SR 3.8.4.2 through 3.8.4.5 would be deleted.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current SRs 3.8.4.2, 3.8.4.3, 3.8.4.4, and 3.8.4.5 (Deleted), Change (7)

The proposed changes would relocate the requirements of the above SRs: 3.8.4.2 (visual inspection for corrosion or verification of connection resistance), 3.8.4.3 (visual inspection for physical damage or abnormal deterioration), 3.8.4.4 (removal of visible corrosion and ensuring verifying battery cell to cell and terminal connections coated with anti-corrosion material), and 3.8.4.5 (verification of connection resistance) to a new TS 5.5.15, "Battery Monitoring and Maintenance Program."

Visual inspection of the battery terminals (SRs 3.8.4.2, 3.8.4.3, and 3.8.4.4) is an important preventive maintenance practice for maintaining a healthy battery (e.g., the early identification and cleaning of battery terminal corrosion can prevent corrosion from spreading between the post and the connector). However, visual inspection of the battery terminals alone does not provide an indication of a battery's capability to perform its design function. Furthermore, the preventive maintenance for the batteries and related components are subject to the regulatory requirements of 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants." Therefore, the NRC staff finds that the parameters of these preventive maintenance activities will be adequately controlled in the new TS 5.5.15, "Battery Monitoring and Maintenance Program."

The resistance verification of SRs 3.8.4.2 and 3.8.4.5 represents the minimum acceptable requirements for operability of the battery. The resistance values represent limits at which some actions should be taken, not necessarily when the operability of the battery is in question. In the LAR, the licensee stated that the connection resistance limit is less than equal to 40 micro ohms. In general, the plant safety analyses do not assume a specific battery inter-cell connection resistance value, but typically assume that the batteries will supply adequate power. Therefore, the key operability issue is the overall battery connection resistance. Between surveillances, the resistance of each battery inter-cell connection varies independently from all the others. Some of these connection resistance values may be higher or lower than others, and the battery will still be able to perform its function and is not considered inoperable. Overall connection resistance has a direct impact on operability and is adequately determined by completion of the battery service or modified performance discharge tests. Therefore, the NRC staff finds that the battery connection resistance verifications will be more appropriately controlled under the proposed TS 5.5.15, "Battery Monitoring and Maintenance Program."

Based on the above, the NRC staff finds that the proposed elimination of SR 3.8.4.2, SR 3.8.4.3, SR 3.8.4.4, and SR 3.8.4.5 from TS 3.8.4 ensures that the visual inspection and verification of connection resistances for the batteries will be appropriately monitored and maintained in accordance with the new TS 5.5.15, "Battery Monitoring and Maintenance Program" and the new requirements in TS 3.8.6, and is consistent with TSTF-500. Therefore, the NRC staff finds that there is assurance that safe plant conditions will continue to be maintained, and as such, the proposed change is acceptable.

3.2.1.8 PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.6 (Revised), Change (8)

Current PBAPS, Units 2 and 3, SR 3.8.4.6 states:

SR 3.8.4.6	Verify each required battery charger supplies ≥ 200 amps at 125 V for ≥ 4 hours.

Revised PBAPS, Units 2 and 3, SR 3.8.4.6 would state:

SR 3.8.4.6	Verify each required battery charger supplies ≥ 200 amps at greater than or equal to the minimum established float voltage for ≥ 4 hours. <u>OR</u> Verify each battery charger can recharge the battery to the fully charged state within 20 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state.

The frequency for revised PBAPS, Units 2 and 3, SR 3.8.4.6 would remain unchanged and would state "In accordance with the Surveillance Frequency Control Program."

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.6 (Revised), Change (8)</u>

Current SR 3.8.4.6 verifies the design capacity of each required battery charger based on ampere and voltage requirements of the chargers. The proposed change would revise this SR by replacing the voltage requirements with the phrase "greater than or equal to the minimum established float voltage," and adding an alternate testing criterion.

The revised SR 3.8.4.6 would provide two options. The first option requires that each battery charger be capable of supplying greater than or equal to 200 amps for station service subsystems at the minimum established float voltage for ≥ 4 hours. The ampere requirements are based on the output rating of the chargers. In the LAR, the licensee stated that the voltage requirements are based on the charger voltage level after a response to a loss of AC power. Battery manufacturers establish this float voltage limit to provide the optimum charge on the battery and to maintain the battery plates in a condition that supports maintaining the grid life. Maintaining this voltage limit ensures that the battery will be capable of providing its designed safety function. Therefore, the NRC staff finds that relocating this float voltage design limit to a licensee-controlled program will allow flexibility to monitor and control this limit at values directly

related to the battery's ability to perform its required safety function, and is, therefore, acceptable.

The second option of revised SR 3.8.4.6 would require that each battery charger be capable of recharging the battery to the fully charged state within 20 hours while supplying the largest combined demands of the various continuous steady state loads, after a battery discharge to the bounding design basis event discharge state. The battery is typically discharged to the bounding design event discharge state after a service test. This option provides an alternate method for verifying the design capacity of each charger because it may not be available following the battery service test and will need to be supplemented with additional loads. In the LAR, the licensee stated that each class 1E battery charger is capable of recharging a battery from the minimum discharge condition in 20 hours while supplying a normal steady-state DC load following the design basis event of a loss of coolant accident (LOCA) coincident with a loss-of-offsite power. Therefore, the NRC staff finds that the proposed alternate testing criteria for the revised SR 3.8.4.6 will confirm the battery charger design capacity after a service test, and as such, will satisfy the purpose of current SR 3.8.4.6.

The surveillance frequency for revised SR 3.8.4.6 would be controlled by the Surveillance Frequency Control Program (SFCP). In the LAR, the licensee stated that PBAPS has implemented TSTF-425, "Relocate Surveillance Frequencies to Licensee Control," for Units 2 and 3, and will maintain the existing proposed SR frequencies in accordance with the SFCP current frequencies (see Section 3.2.3.11, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (11)," of this SE for more details on the TSTF-425 guidelines for SFCP). NRC amended the licenses for PBAPS to adopt TSTF-425 on August 27, 2010 (Reference 15). The frequency of current SR 3.8.4.6, which verifies the design capacity of each battery charger, is controlled by the SFCP.

Since the revised SR 3.8.4.6 would verify the battery charger's design capacities, the NRC staff finds that controlling the frequency of revised SR 3.8.4.6 in accordance with the SFCP is, therefore, acceptable.

Based on the above, the NRC staff concludes that the proposed revised SR 3.8.4.6 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met, and is, therefore, acceptable.

3.2.1.9 PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.7 (Revised), Change (9)

Current PBAPS, Units 2 and 3, SR 3.8.4.7 states:

SR 3.8.4.7 ---------- NOTES ----------

1. SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7 when SR 3.8.4.8 envelops the duty cycle of the battery.

2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.

Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for design duty cycle when subjected to a battery service test.

Revised PBAPS, Units 2 and 3, SR 3.8.4.7 would state:

SR 3.8.4.7 ---------- NOTES ----------

1. The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of SR 3.8.4.7.

2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.

Verify battery capacity is adequate to supply, and maintain in OPERABLE status, the required emergency loads for design duty cycle when subjected to a battery service test.

The frequency for the revised PBAPS, Units 2 and 3, SR 3.8.4.7 would remain unchanged and would state "In accordance with the Surveillance Frequency Control Program."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.7 (Revised), Change (9)

Current Note 1 to SR 3.8.4.7 states that SR 3.8.4.8 may be performed in lieu of the service test in SR 3.8.4.7 when SR 3.8.4.8 envelops the duty cycle of the battery. Current SR 3.8.4.8 would be relocated and renumbered as SR 3.8.6.6 (see Section 3.2.3.16, "PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.6 (Relocated – Current SR 3.8.4.8), Change (16)," of this SE for more details).

The licensee proposed revising Note 1 to allow the performance of the modified performance discharge test in SR 3.8.6.6 instead of the service test in SR 3.8.4.7. In the LAR, the licensee confirmed that the modified performance discharge test in SR 3.8.6.6 (current SR 3.8.4.8) completely encompasses the load profile of the battery service discharge test. As discussed in the PBAPS Unit 2 TS Bases B 3.8.4, a modified performance discharge test is a special test of the battery capability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This test will confirm the battery's ability, as found, to satisfy the design requirement (battery duty cycle) of the DC electrical power system. Since the duty cycle of the modified performance discharge test in SR 3.8.6.6 (current SR 3.8.4.8) will envelop the battery's duty cycle, the NRC staff finds that the allowance in the revised Note 1 continues to satisfy the intent of the current Note 1 in SR 3.8.4.7 and is consistent with TSTF-500. Therefore, the NRC staff finds the proposed revised SR 3.8.4.7 acceptable because the revised SR 3.8.4.7 satisfies the intent of the current SR 3.8.4.7.

Based on the above, the NRC staff concludes that the proposed change meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met, and is, therefore, acceptable.

3.2.1.10 PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.8 (Deleted and Relocated to new SR 3.8.6.6), Change (10)

Current PBAPS, Units 2 and 3, SR 3.8.4.8 states:

SR 3.8.4.8 ----------NOTE----------

This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.

Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.

Revised PBAPS, Units 2 and 3, SR 3.8.4.8 would state:

SR 3.8.4.8: DELETED

The frequencies for current PBAPS, Units 2 and 3, SR 3.8.4.8 state "In accordance with the Surveillance Frequency Control Program" AND "12 months when battery shows degradation or has reached 85 percent of the expected life with capacity < 100% of manufacturer's rating" AND "24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating."

The frequencies for revised PBAPS, Units 2 and 3, SR 3.8.4.8 would be deleted.

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.8 (Deleted and Relocated to SR 3.8.6.6), Change (10)</u>

The licensee proposed deleting the current SR 3.8.4.8 and relocating its requirements to new SR 3.8.6.6. The purpose of this SR is to demonstrate the operability of the battery; thus, this surveillance is relocated to TS 3.8.6, "Battery Parameters." This change is discussed further in Section 3.2.3.16, "PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.6 (Relocated – Current SR 3.8.4.8), Change (16)," of this SE.

The NRC staff finds that the proposed change to delete current SR 3.8.4.8 from TS 3.8.4 and relocate the requirements to a new SR 3.8.6.6 in TS 3.8.6 is consistent with TSTF-500, and is, therefore, acceptable.

3.2.2 TS 3.8.5 (DC Sources - Shutdown) Changes

This section addresses the proposed changes to both PBAPS Unit 2 TS 3.8.5 and PBAPS Unit 3 TS 3.8.5. PBAPS TS 3.8.5 requirements are similar for both Unit 2 and Unit 3, except for the LCO.

The PBAPS Unit 2 TS LCO 3.8.5 requires the following DC electrical power subsystems to be operable: (a) Unit 2 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown"; and (b) Unit 3 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown." The PBAPS Unit 2 TS 3.8.5 is applicable in Modes 4 and 5, during movement of irradiated fuel assemblies in the secondary containment.

The PBAPS Unit 3 TS LCO 3.8.5 requires the following DC electrical power subsystems to be operable: (a) Unit 3 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown"; and (b) Unit 2 DC electrical power subsystems needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown." The PBAPS, Unit 3, TS 3.8.5 is applicable in Modes 4 and 5, during movement of irradiated fuel assemblies in the secondary containment.

The proposed changes to PBAPS, Units 2 and 3, TS 3.8.5 would (1) add a new condition to address the operability of the PBAPS Units' DC battery chargers and (2) revise the existing condition and an SR.

The following NRC staff's evaluation for the proposed changes to PBAPS TS 3.8.5 is applicable to both Units 2 and 3.

3.2.2.1 PBAPS, Units 2 and 3, TS 3.8.5, New Condition A (Added), Change (1)

New PBAPS, Units 2 and 3, TS 3.8.5 Condition A would state:

Condition A.	One battery charger on one subsystem inoperable.
	<u>AND</u>
	The redundant subsystem battery and chargers OPERABLE.

New PBAPS, Units 2 and 3, TS 3.8.5 Required Actions A.1, A.2, and A.3 would state:

Required Action A.1	Restore battery terminal voltage to greater than or equal to the minimum established float voltage.
<u>AND</u>	
Required Action A.2	Verify battery float current ≤ 2 amps.
<u>AND</u>	
Required Action A.3	Restore battery charger to OPERABLE status.

New CTs for PBAPS, Units 2 and 3, Required Actions A.1, A.2 and A.3 are "2 hours," "Once per 12 hours," and "72 hours," respectively.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.5, New Condition A (Added), Change (1)

New Condition A would be applicable when one battery charger on one subsystem is inoperable and the redundant subsystem battery and chargers are operable. According to TSTF-500, Condition A is included in the TS only when the plant specific implementation of TS 3.8.5 may require both a DC electrical subsystem and its redundant subsystem to be operable. The shutdown unit LCO 3.8.5 requires both DC electrical power subsystems in the shutdown unit and the opposite unit needed to support the DC electrical power distribution subsystem(s) required by LCO 3.8.8, "Distribution Systems – Shutdown." From the technical basis for TS B 3.8.5, the electrical power components require to be operable in a DC electrical power subsystem by LCO 3.8.5 and depend on the equipment required to be operable by LCO 3.8.8. Since TS 3.8.5 requires both DC electrical power subsystems (i.e., a DC electrical subsystem and its redundant subsystem) to be operable, the NRC staff finds the new Condition A acceptable and consistent with TSTF-500.

The proposed new Required Actions provide a tiered response that focuses on returning the battery to the fully charged state and restoring a fully qualified charger to OPERABLE status in a reasonable time period.

New Required Action A.1 would require that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. The battery charger, in addition to maintaining the battery operable, provides DC control power to AC circuit breakers and thus supports the recovery of AC power following events such as loss-of-offsite power or station blackout. The 2-hour CT would provide for returning the inoperable charger to OPERABLE status or providing an alternate means (e.g., spare battery charger) of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. PBAPS will provide two 200-amp rated permanently installed (one per unit) non safety-related alternate battery chargers that can be placed in service within 2 hours to assure the discharging battery will be above its minimum established float voltage. At the end of the 2 hours, a terminal voltage of at least the minimum established float voltage provides indication that the battery is on the exponential charging current portion of its recharging cycle. This provides assurance that the battery can be restored to its fully charged condition from any discharge that might have occurred due to the charger inoperability. The NRC staff finds the proposed new Required Action A.1 and its associated CT acceptable because the proposed action is consistent with TSTF-500.

New Required Action A.2 would require that the battery float current be verified as less than or equal to 2 amps once per 12 hours. This would indicate that if the battery had been discharged as the result of the inoperable battery charger, it had been fully recharged. In the LAR, the licensee stated that the battery with terminal voltage of at least the minimum established float voltage and with no cells at less than 2.07 V can be fully recharged within 12 hours since the time to fully charge the battery in this condition depends on the previous discharge and the recharge characteristic of the battery. The licensee further stated that a worst case battery discharge in 2 hours under normal plant loading conditions will result in less than 5 percent capacity removed from the battery, and the recharged battery float current of 2 amps indicates that the battery is 98 percent charged (see Section 3.2.3.3, "PBAPS, Units 2 and 3, TS 3.8.6, Float Current Monitoring (Added to Replace Specific Gravity Measurement), Change (3)," for additional details on the 2-amp float current). In addition, the licensee stated that the 200-amp alternate battery charger is capable of recharging the battery to 95 percent capacity within 8 hours after a 2-hour discharge under normal DC loading. If at the expiration of the initial 12-hour period the battery float current is not less than or equal to 2 amps, this indicates there

may be additional battery problems and the battery must be declared inoperable. This verification provides assurance that the battery has sufficient capacity to perform its safety function. The NRC staff finds the proposed new Required Action A.2 and its associated CT acceptable because the action to verify battery float current once per 12 hours is consistent with TSTF-500, and the 12-hour CT is applicable to PBAPS.

New Required Action A.3 would limit the restoration time for the inoperable battery charger to 72 hours. This action is applicable if an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage has been used (e.g., balance of plant non-Class 1E battery charger). In the LAR, the licensee stated that the 72-hour CT will be used when both the operating and the installed standby battery chargers are inoperable. The LAR also states that the 72-hour CT reflects a reasonable time to effect restoration of the qualified battery charger to OPERABLE status because the extended battery charger completion time is based on the availability of an alternate battery charger that is appropriately sized to perform the design function of the charger that becomes inoperable. PBAPS will provide two 200 amps rated permanently installed (one per unit) non safety-related alternate battery chargers. The alternate battery chargers can be placed in service within 72 hours to ensure that the discharging battery terminal remains above its minimum established float voltage for the battery's operability. The NRC staff finds the proposed new Required Action A.3 and its associated CT acceptable because the action to restore the battery chargers to operable status within 72 hours is consistent with TSTF-500, and the 72-hour CT is applicable to PBAPS.

Based on the above, the NRC staff concludes that the proposed new Condition A, with its associated Required Actions and CTs, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.2.2 PBAPS, Units 2 and 3, TS 3.8.5; Current Condition A (Revised and Renumbered as Condition B), Change (2)

Current PBAPS, Units 2 and 3, TS 3.8.5 Condition A states:

Condition A	One or more required DC electrical power subsystems inoperable.

Revised and renumbered PBAPS, Units 2 and 3, TS 3.8.5 Condition B (from Section 3.2.2.1) would state:

Condition B	One or more required DC electrical power subsystems inoperable for reasons other than Condition A. <u>OR</u> Required actions and associated completion time of Condition A not met.

Current PBAPS, Units 2 and 3, TS 3.8.5 Required Actions A.1, A.2.1, A.2.2, and A.2.3 state:

Required Action A.1	Declare affected required feature(s) inoperable.
	OR
Required Action A.2.1	Suspend CORE ALTERATIONS.
AND	
Required Action A.2.2	Suspend movement of irradiated fuel assemblies in the secondary containment.
AND	
Required Action A.2.3	Initiate action to restore required DC electrical power subsystems to OPERABLE status.

Revised and renumbered PBAPS, Units 2 and 3, TS 3.8.5 Required Actions B.1, B.2.1, B.2.2, B.2.3, and B.2.4

Required Action B.1	Declare affected required feature(s) inoperable.
	OR
Required Action B.2.1	Suspend CORE ALTERATIONS.
AND	
Required Action B.2.2	Suspend movement of irradiated fuel assemblies in the secondary containment.
AND	
Required Action B.2.3	Initiate action to suspend operations with a potential for draining the reactor vessel.
AND	
Required Action B.2.4	Initiate action to restore required DC electrical power subsystems to OPERABLE status.

The CTs for revised and renumbered PBAPS TS 3.8.5 Required Actions B.1, B.2.1, B.2.2, B.2.3, and B.2.4 would remain unchanged and would state "Immediately."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.5 Current Condition A (Revised and Renumbered as Condition B), Change (2)

Current Condition A would be revised and renumbered as Condition B by adding "for reasons other than Condition A," and the alternate condition that would be applicable when the Required Actions and associated CT of Condition A are not met. This change reflects the addition of new Condition A. The NRC staff finds this change consistent with the TSTF-500, and therefore, acceptable.

Current Required Actions A.1, A.2.1, A.2.2, and A.2.3 would be renumbered as B.1, B.2.1, B.2.2, and B.2.3 with the same associated CTs "Immediately." A new Required Action B.2.3, "Initiate action to suspend operations with a potential for draining the reactor vessel," with associated CT of "Immediately." If two subsystems are required by LCO 3.8.8, "Distribution Systems – Shutdown," the remaining subsystem with DC power available may be capable of supporting sufficient systems to allow continuation of Core Alterations and irradiated fuel movement. Therefore, the option of declaring the required features inoperable with the associated DC power source(s) also inoperable is implemented with restrictions in accordance with the affected required features LCO Actions. Otherwise sufficiently conservative actions are made (i.e., to suspend Core Alterations, movement of irradiated fuel assemblies, and operations with a potential for draining the reactor vessel) to minimize the probability of the occurrence of postulated events. Suspension of these activities does not preclude completion of actions to establish a safe, conservative condition. It is further required to initiate action to immediately restore required DC electrical power subsystems to operable status. The restoration of the required DC electrical power subsystems should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power. The CT of "Immediately" is consistent with the required times for actions requiring prompt attention. The NRC staff finds the Required Actions and associated CTs for the revised and renumbered Condition B acceptable because they are consistent with the TSTF-500.

Based on the above, the NRC staff concludes that the proposed revised and renumbered Condition B, with its associated Required Actions and CTs, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.2.3 PBAPS, Units 2 and 3, TS 3.8.5; Current SR 3.8.5.1 (Revised); Change (3)

PBAPS Unit 2 TS 3.8.5, Current SR 3.8.5.1 (Revised)

Current PBAPS Unit 2 SR 3.8.5.1 states:

SR 3.8.5.1 - NOTE -

The following SRs are not required to be performed: SR 3.8.4.7 and SR 3.8.4.8.

- -

For required Unit 2 DC electrical power subsystems, the following SRs are applicable:

SR 3.8.4.1	SR 3.8.4.4	SR 3.8.4.7
SR 3.8.4.2	SR 3.8.4.5	SR 3.8.4.8.
SR 3.8.4.3	SR 3.8.4.	

Revised PBAPS Unit 2 SR 3.8.5.1 would state:

SR 3.8.5.1 ----------NOTE----------
The following SRs are not required to be performed: SR 3.8.4.6, and SR 3.8.4.7.

For required Unit 2 DC electrical power subsystems, the following SRs are applicable:

SR 3.8.4.1 SR 3.8.4.6 SR 3.8.4.7

The frequency for revised PBAPS Unit 2 SR 3.8.5.1 would remain unchanged and would state "In accordance with applicable SRs."

PBAPS Unit 3 TS 3.8.5, Current SR 3.8.5.1 (Revised)

Current PBAPS Unit 3 SR 3.8.5.1 states:

SR 3.8.5.1 ----------NOTE----------
The following SRs are not required to be performed: SR 3.8.4.7 and SR 3.8.4.8.

For required Unit 3 DC electrical power subsystems, the following SRs are applicable:

SR 3.8.4.1	SR 3.8.4.4	SR 3.8.4.7
SR 3.8.4.2	SR 3.8.4.5	SR 3.8.4.8.
SR 3.8.4.3	SR 3.8.4.	

Revised PBAPS Unit 3 SR 3.8.5.1 would state:

SR 3.8.5.1 ----------NOTE----------
The following SRs are not required to be performed: SR 3.8.4.6, and SR 3.8.4.7.

For required Unit 3 DC electrical power subsystems, the following SRs are applicable:

SR 3.8.4.1 SR 3.8.4.6 SR 3.8.4.7

The frequency for revised PBAPS Unit 3 SR 3.8.5.1 would remain unchanged and would state "In accordance with applicable SRs."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.5, Current SR 3.8.5.1 (Revised), Change (3)

The revised SR 3.8.5.1 would require the licensee to perform all surveillance required by SR 3.8.4.1, 3.8.4.6, and 3.8.4.7. As discussed in Sections 3.2.1.8 and 3.2.3.16 of this SE, (1) SRs 3.8.4.2, 3.8.4.3, 3.8.4.4, and 3.8.4.5, will be deleted from TS 3.8.4, and (2) SR 3.8.4.8 will be relocated to TS 3.8.6 and renumbered as SR 3.8.6.6. Therefore, deleting current SRs 3.8.4.2, 3.8.4.3, and 3.8.4.4, 3.8.4.5, and 3.8.4.8 from SR 3.8.5.1 is consistent with the proposed changes to TS 3.8.4.

The Note in the revised SR 3.8.5.1 would not require SR 3.8.4.6 and SR 3.8.4.7 to be performed. The SRs 3.8.4.6 and 3.8.4.7, are the battery charger capacity test and the battery service test. This Note is consistent with TSTF-500. According to TSTF-500, the purpose of the Note is to preclude requiring the operable DC sources from being discharged below their capability to provide the required power supply or being rendered inoperable during the performance of SRs 3.8.4.6 and 3.8.4.7. The staff finds the Note to the revised SR 3.8.5.1 consistent with TSTF-500. Therefore, the NRC staff finds that the revised SR 3.8.5.1 continue to satisfy the intent of current SR 3.8.5.1, is consistent with TSTF-500, and is, therefore, acceptable.

Based on the above, the NRC staff concludes that the proposed revised SR 3.8.5.1 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met and is acceptable.

3.2.3 TS 3.8.6 (Battery Parameters) Changes

The licensee proposed replacing the battery specific gravity monitoring with the float current monitoring for determining the state of charge (OPERABILITY) of the battery. The licensee also proposed revising the current TS 3.8.6 title, LCO, Actions and SRs, deleting Table 3.8.6-1, "Battery Cell Parameter Requirements," and relocating some SRs to the new TS 5.5.15 "Battery Monitoring and Maintenance Program."

The current TS 3.8.6 and the proposed changes to TS 3.8.6 are similar for both PBAPS, Units 2 and 3. Therefore, the following NRC staff evaluation for the proposed changes to PBAPS, TS 3.8.6, is applicable to both Unit 2 and Unit 3.

3.2.3.1 PBAPS, Units 2 and 3, TS 3.8.6, Title (Revised), Change (1)

The proposed change would revise the title of TS 3.8.6 from "Battery Cell Parameters" to "Battery Parameters."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Title (Revised), Change (1)

The NRC staff finds that deleting the term "Cell" in the title of TS 3.8.6 is editorial in nature. Therefore the NRC staff concludes that the proposed revised title of TS 3.8.6 does not change the intent of the TS 3.8.6, and is consistent with TSTF-500, and is, therefore, acceptable.

3.2.3.2 PBAPS, Units 2 and 3, TS 3.8.6, Table 3.8.6-1, "Battery Cell Parameter Requirements" (Deleted), Change (2)

The current TS Table 3.8.6-1, "Battery Cell Parameter," specifies the requirements (Categories A, B, and C limits) for the battery cell parameters (electrolyte level, float voltage, and specific gravity). The proposed change would delete TS Table 3.8.6-1 and relocate the table requirements to the proposed new LCOs and SRs in TS 3.8.6 and the proposed new Battery Monitoring and Maintenance Program in TS 5.5.15.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Table 3.8.6-1 (Deleted), Change (2)

The TS Table 3.8.6-1, Category A defines the normal limits for each designated pilot cell, Category B defines the normal limits for each connected cell, and Category C defines the allowable limits for each connected cell.

The licensee proposed relocating the Category A and B values (electrolyte level, float voltage, and specific gravity) of TS Table 3.8.6-1 to the new TS 5.5.15, "Battery Monitoring and Maintenance Program" (see Section 3.2.4.1, "PBAPS, Units 2 and 3, TS 5.5.15, 'New Battery Monitoring and Maintenance Program' (Added), Change (1)," of this SE for more details). The Category A and B values of TS Table 3.8.6-1, represent appropriate monitoring levels and appropriate preventive maintenance levels for long-term battery quality and extended battery life. In the LAR, the licensee stated that the Category A and B values will continue to be controlled at their current levels in the TS 5.5.15, and actions to restore deficient values will be implemented in accordance with the licensee's corrective action program. The NRC staff finds relocating these values to the "Battery Monitoring and Maintenance Program" acceptable since the licensee provided assurance that these battery parameter values will continue to be controlled at their current level, and that actions to restore deficient values will be implemented in accordance with the licensee's corrective action program. Furthermore, the battery and its preventive maintenance and monitoring program are under the regulatory requirements of 10 CFR 50.65. Therefore, the NRC staff finds that this relocation will continue to assure that the battery is maintained at current levels of performance, and that operators appropriately focus on monitoring the battery parameters for degradation.

The licensee proposed to address out-of-limit conditions for the Category C limits for electrolyte level and float voltage in the proposed TS 3.8.6, new Conditions C and A, respectively; and to monitor the Category C limits in the proposed new SR 3.8.6.3 (electrolyte level) and SR 3.8.6.2 (float voltage) (See Sections 3.2.3.13, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.3 (Revised), Change (13)," and 3.2.3.12, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.2 (Revised), Change (12)," of this SE for more details). In addition, the licensee proposed replacing the use of the Category C limits for specific gravity to verify the state of charge of the battery with the use of float current monitoring in the proposed new SR 3.8.6.1 (see Section 3.2.3.11, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (12)," of this SE for more details). The licensee proposed to continue measuring the specific gravity of all cells at each discharge test consistent manufacturer recommendations in the new TS 5.5.15, "Battery Monitoring and Maintenance Program" (see Section 3.2.4.1, "PBAPS, Units 2 and 3, TS 5.5.15, 'New Battery Monitoring and Maintenance Program' (Added), Change (1)," of this SE for more details). Since the Category C limits for electrolyte level and float voltage will be monitored in the new SRs 3.8.6.3 and 3.8.6.2, respectively, and the Category C limits for specific gravity will be replaced by the float current monitoring in the new SR 3.8.6.1, the NRC staff finds that these new SRs will continue to satisfy the intent of the Category C limits.

In summary, the NRC staff finds that relocating Category A and B limits for the battery cell parameters to the new TS "Battery Monitoring and Maintenance Program," and addressing the Category C limits in new TS Conditions and SRs is acceptable because (1) the Category A and B values are maintenance levels, (2) specific gravity criteria are being replaced with float current monitoring limits, and (3) the licensee provided assurance that these battery parameter values will continue to be controlled at their current level, and that actions to restore deficient values will be implemented in accordance with the licensee's corrective action program.

Based on the above, the NRC staff concludes that the proposed elimination of Table 3.8.6-1, as discussed above, ensures the battery parameters (maintenance, testing, and monitoring) will be appropriately monitored and maintained in accordance with the new TS 5.5.15, "Battery Monitoring and Maintenance Program," and the new requirements in TS 3.8.6. Therefore, the NRC staff finds that there is assurance that safe plant conditions will continue to be maintained, and as such, the proposed change is acceptable.

3.2.3.3 PBAPS, Units 2 and 3, TS 3.8.6, Float Current Monitoring (Added to Replace Specific Gravity Measurement), Change (3)

The current TS Table 3.8.6-1, "Battery Cell Parameter," specifies the requirements (Categories A, B, and C limits) for the battery cell parameters (electrolyte level, float voltage, and specific gravity). The proposed change would delete TS Table 3.8.6-1 and relocate the table requirements to proposed new LCOs and SRs in TS 3.8.6 and the proposed new "Battery Monitoring and Maintenance Program" in TS 5.5.15.

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Float Current Monitoring (Added to Replace Specific Gravity Measurement), Change (3)</u>

Currently, battery cell specific gravity verification is required by existing SR 3.8.6.1, SR 3.8.6.2 and TS 3.8.6 Condition A based on the Category A, B, and C values of current TS Table 3.8.6-1. The Category C specific gravity values are the allowable values for each battery connected cell. The licensee proposed replacing the requirement for monitoring the specific gravity to determine the battery state of charge with the requirement for monitoring float current that will be addressed by the proposed new SR 3.8.6.1 (see Section 3.2.3.11, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (11)," of this SE for additional discussion). In Attachment 1 of the LAR, the licensee stated that the measuring equipment that will be used to monitor float current under new SR 3.8.6.1 will have the necessary accuracy and capability to measure electrical currents in the expected range.

Float current monitoring is recognized by the industry as being a more direct method for determining battery state of charge than specific gravity monitoring. In Enclosure 1 of the LAR, the licensee provided a letter dated March 31, 2017, from EnerSys, the manufacturer of the PBAPS, Class 1E batteries, verifying the acceptability of using float current measurement as a reliable indication of the batteries' state of charge for the life of the batteries.

The licensee proposed a float current of 2 amps or less. In Attachment 1 of the LAR, the licensee stated that the battery float current of 2 amp or less is indicative of a 98 percent battery charge based on a review performed by the battery manufacturer, as provided in the manufacturer's letter. The licensee clarified that a 5 percent design is incorporated into the battery sizing analysis to ensure that with a battery float current of 2 amps or less, the batteries will have greater than 100 percent capacity to support design bases accident DC loads.

The NRC staff finds that the confirmation of the use of the float current monitoring from the battery manufacturer to determine the batteries' state of charge in addition to the 5 percent design margin used for the batteries' sizing provide adequate assurance that the float current monitoring will not have a significant impact on the ability to accurately determine the operability of the batteries.

Specific gravity monitoring is appropriate for troubleshooting activities and for periodic trending of the battery's state-of-health. The licensee will continue taking and trending specific gravity measurements during maintenance and testing activities prior to performing a battery service test or battery modified performance discharge test in accordance with the new proposed "Battery Monitoring and Maintenance Program" in TS 5.5.15.

Based on the above, the NRC staff finds that the proposed float current monitoring is a suitable replacement for the specific gravity monitoring when used to determine the state of charge of the PBAPS batteries. Therefore, the NRC staff concludes that the proposed float current monitoring meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met, and is, therefore, acceptable.

3.2.3.4 PBAPS, Units 2 and 3, TS LCO 3.8.6 (Revised), Change (4)

Current PBAPS, Units 2 and 3, LCO 3.8.6 states:

> LCO 3.8.6 Battery cell parameters for the station batteries shall be within the limits of Table 3.8.6-1.

Revised PBAPS, Units 2 and 3, LCO 3.8.6 would state:

> LCO 3.8.6 Battery parameters for the station electrical power subsystem batteries shall be within limits.

<u>Evaluation of Unit 2 and Unit 3 TS 3.8.6; LCO 3.8.6 (Revised); Change (4)</u>

The LCO 3.8.6 would be revised by adding the term "electrical power subsystem" and deleting the term "cell" and the reference to Table 3.8.6-1. Since the batteries are part of the DC electrical power subsystems, the NRC staff finds that the added (i.e., electrical power subsystem) term does not change the intent of the LCO. In addition, since the term "cell" and Table 3.8.6-1 will be deleted from the TS 3.8.6 (see above Sections 3.2.3.1, "PBAPS, Units 2 and 3, TS 3.8.6, Title (Revised), Change (1)," and 3.2.3.2, "PBAPS, Units 2 and 3, TS 3.8.6, Table 3.8.6-1, 'Battery Cell Parameter Requirements' (Deleted), Change (2)," of this SE for additional discussion), the NRC staff finds that deleting the term "cell" and the reference to Table 3.8.6-1 from the LCO 3.8.6 is consistent with the proposed changes to the TS 3.8.6, as discussed in other sections of this SE, and with TSTF-500.

Based on the above, the NRC staff concludes that the proposed revised LCO 3.8.6 is acceptable and will continue to meet the requirements of 10 CFR 50.36(c)(2) since the proposed changes are editorial in nature and do not change the intent of the LCO 3.8.6.

3.2.3.5 PBAPS Unit 2 and Unit 3, TS 3.8.6, Current Condition A (Revised), Change (5)

Current PBAPS, Units 2 and 3, TS 3.8.6 Condition A states:

Condition A.	One or more batteries with one or more battery cell parameters not within Category A or B limits.

Revised PBAPS, Units 2 and 3, TS 3.8.6 Condition A would state:

Condition A.	One battery on one subsystem with one or more battery cells float voltage < 2.07.

Current PBAPS, Units 2 and 3, Required Actions A.1, A.2, and A.3 state:

Required Action A.1	Verify pilot cells electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.
AND	
Required Action A.2	Verify battery cell parameters meet Table 3.8.6-1 Category C limits.
AND	
Required Action A.3	Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.

Revised PBAPS, Units 2 and 3, Required Actions A.1, A.2, and A.3 would state:

Required Action A.1	Perform SR 3.8.4.1.
AND	
Required Action A.2	Perform SR 3.8.6.1.
AND	
Required Action A.3	Restore affected cell float voltage ≥ 2.07 V.

The CTs for current PBAPS, Units 2 and 3, Required Actions A.1, A.2, and A.3 state "1 hour," "24 hours," and "31 days," respectively.

The CTs for revised PBAPS, Units 2 and 3, Required Actions A.1, A.2, and A.3 would state "2 hours," "2 hours," and "24 hours," respectively.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Current Condition A (Revised), Change (5)

The proposed change would delete current Condition A with its associated Required Actions and CTs and add new Condition A, Required Actions and CTs. As discussed in Section 3.2.3.2, "PBAPS, Units 2 and 3, TS 3.8.6, Table 3.8.6-1, "Battery Cell Parameter Requirements" (Deleted), Change (2)," of this SE, TS Table 3.8.6-1 will be deleted from TS 3.8.6. Since current Condition A references the battery parameter's limits in the Table 3.8.6-1, the NRC staff finds that deleting the current Condition A with its associated Required Actions and CTs is consistent

with the elimination of TS Table 3.8.6-1. Therefore, the NRC staff concludes that deleting TS 3.8.6 current Condition A is an editorial change in nature, does not change the intent of TS 3.8.6, and is, therefore, acceptable.

New TS 3.8.6 Condition A would apply when one battery on one subsystem is found with one or more battery cell(s) with a float voltage of less than 2.07 V. In the LAR, the licensee stated that the battery cells are of flooded lead acid construction which specific gravity corresponds to an open circuit battery voltage of approximately 120 V for 58 cell battery (i.e. cell voltage of 2.07 Vpc). The open circuit voltage is the voltage maintained when there is no charging or discharging. Therefore, the minimum established float voltage is 2.07 V based on the 58 cell battery. The NRC staff finds that the revised Condition A is consistent with TSTF-500, and is, therefore, acceptable.

New Required Actions A.1 and A.2 would require the licensee to verify that the battery terminal voltage to be greater than or equal to the minimum established float voltage (revised SR 3.8.4.1), and each battery's float current is less than or equal to 2 amps (revised SR 3.8.6.1) (see Sections 3.2.1.7, "PBAPS, Units 2 and 3, TS 3.8.4, Current SR 3.8.4.1 (Revised), Change (7)," and 3.2.3.11, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (12)," of this SE for more details on the SRs). These actions will ensure that there is still sufficient battery capacity to perform the intended function so that the affected battery will not be required to be considered inoperable solely as a result of one or more cells less than 2.07 V. Therefore, the new Required Action A.3 would allow continued operation for a limited period up to 24 hours for restoring the affected cell(s) voltage to greater than or equal to 2.07 V. The NRC staff finds that new Required Actions A.1, A.2, and A.3 and associated CTs are consistent with TSTF-500, and as such, provide reasonable assurance of safety.

Based on the above, the NRC staff concludes that the proposed revised Condition A, with its associated Required Actions and CTs, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the required DC electrical power subsystems are capable of performing their safety functions, and is, therefore, acceptable.

3.2.3.6 PBAPS, Units 2 and 3, TS 3.8.6, Current Condition B (Revised), Change (6)

Current PBAPS, Units 2 and 3, TS 3.8.6 Condition B, states:

Condition B.	Required Action and associated Completion Time of Condition A not met <u>OR</u> One or more batteries with average electrolyte temperature of the representation cells not within limits. <u>OR</u> One or more batteries with one or more battery cell parameters not within Category C limits.

Revised PBAPS, Units 2 and 3, TS 3.8.6 Condition B would state:

Condition B.	One battery on one subsystem with float current > 2 amps.

Current PBAPS, Units 2 and 3, TS 3.8.6 Required Action B.1

Required Action B.1	Declare associated battery inoperable.

Revised PBAPS, Units 2 and 3, TS 3.8.6 Required Action B.1 and B.2 would state:

Required Action B.1	Perform SR 3.8.4.1.
AND	
Required Action B.2	Restore battery float current to ≤ 2 amps.

The CTs for current PBAPS, Units 2 and 3, Required Action B.1 state "1 hour," "24 hours," and "31 days," respectively.

The CTs for revised PBAPS, Units 2 and 3, Required Actions B.1 and B.2 would state "2 hours," and "12 hours," respectively.

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Current Condition B (Revised), Change (6)

Current Condition B with associated Required Action and CT would be deleted from the TS. Current Condition B describes three conditions of battery inoperability. The first condition (i.e., Required Action and Associated CT of Condition A not met) would be revised and addressed in the proposed new TS 3.8.6 Condition F because additional conditions are proposed for TS 3.8.6 (See Section 3.2.3.10, "PBAPS, Units 2 and 3, TS 3.8.6, New Condition F (Added), Change (10)," of this SE for more details). The second condition (i.e., one or more batteries with average electrolyte temperature of the representative cells not within limits) would be revised and addressed in the proposed new TS 3.8.6 Condition E because the licensee proposed monitoring pilot cell electrolyte temperature (new SR 3.8.6.4) (See Section 3.2.3.9, "PBAPS, Units 2 and 3, TS 3.8.6, New Condition E, Change (9)," of this SE for more details). The third condition (i.e., one or more batteries with battery cells parameters not within Category C limits) would be deleted because the licensee proposed deleting the TS Table 3.8.6-1, Category C limits from the TS and addressing the Category C limiting values in proposed TS 3.8.6 Conditions and SRs (see Section 3.2.3.2, "PBAPS, Units 2 and 3, TS 3.8.6, Table 3.8.6-1, 'Battery Cell Parameter Requirements' (Deleted), Change (2)," of this SE for more details). Therefore, the NRC staff finds that deleting the current Condition B with associated Required Action and CT is consistent with the proposed changes to the TS, and is therefore, acceptable.

Revised Condition B would apply when one battery in one subsystem is found with float current greater than 2 amps. The battery float current greater than 2 amps indicates that a partial discharge of the battery capacity has occurred. The discharge in battery may be due to a temporary loss of a battery charger or possibly due to one or more battery cells in a low voltage condition reflecting some loss of capacity.

The revised Required Action B.1 would verify within 2 hours that the battery terminal voltage is greater than or equal to the minimum established float voltage (revised SR 3.8.4.1), thus confirming battery charger operability. If the terminal voltage is found to be less than the minimum established float voltage there are two possibilities, the battery charger is inoperable or is operating in the current limit mode. If the battery had been discharged due to an inoperable battery charger, the 2-hour CT would provide time to return the inoperable charger to

operable status or placing the alternate battery charger in service to restore the battery terminal voltage to greater than or equal to the minimum established float voltage. Condition A addresses charger inoperability. At the end of the 2 hours, a terminal voltage of at least the minimum established float voltage provides indication that the battery is on the exponential charging current portion of its recharging cycle. This provides assurance that the battery can be restored to its fully charged condition. The NRC staff finds the proposed new Required Action B.1 and its associated CT acceptable because the proposed action is consistent with TSTF-500.

Revised Required Action B.2 would require the affected battery float current to be restored to less than 2 amps within 12 hours. This would confirm that the affected battery had been fully recharged from any discharge that might have occurred. In the LAR, the licensee stated that the battery with terminal voltage of at least the minimum established float voltage and with no cells at less than 2.07 V, can be fully recharged within 12 hours since the time to fully charge the battery in this condition depends on the previous discharge and the recharge characteristic of the battery. The licensee stated that a worst case battery discharge in 2 hours under normal plant loading conditions will result in less than 5 percent capacity removed from the battery; and the recharged battery float current of 2 amps indicates that the battery is 98 percent charged (see Section 3.2.3.3, "PBAPS, Units 2 and 3, TS 3.8.6, Float Current Monitoring (Added to Replace Specific Gravity Measurement), Change (3)," of this SE for more details on the 2 amp float current). Restoring the affected battery to its fully charged state provides the assurance that the battery has sufficient capacity to perform its safety function. The NRC staff finds the proposed revised Required Action B.2 and its associated CT acceptable because the action to verify battery float current once per 12 hours is consistent with TSTF-500, and the 12-hour CT is applicable to PBAPS.

The NRC staff concludes that, based on the above discussion, the proposed revised TS 3.8.6 Condition B, with its associated Required Actions and CTs, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the batteries are capable of performing their safety functions, and is, therefore, acceptable.

3.2.3.7 PBAPS, Units 2 and 3, TS 3.8.6, New Condition C (Added), Change (7)

New PBAPS, Units 2 and 3, TS 3.8.6 Condition C with Note would state:

- - - - - - - - - - - - - - NOTE -
Required Action C.2 shall be completed if electrolyte level was below the top of plates.
- -

Condition C.	One battery on one subsystem with one or more cells electrolyte level less than minimum established design limits.

New PBAPS, Units 2 and 3, TS 3.8.6 Required Actions C.1, C.2, and C.3 with Note would state:

- NOTE - - - - - - - - - - - - - - - - -

Required Actions C.1 and C.2 are only applicable if electrolyte level was below the top of plates.

- -

Required Action C.1		Restore affected cell electrolyte level to above the top of plates.
	AND	
Required Action C.2		Verify no evidence of leakage.
	AND	
Required Action C.3		Restore electrolyte level to greater than or equal to minimum established design limits.

New CTs for PBAPS, Units 2 and 3, TS 3.8.6 Required Action C.1, C.2, and C.3 would state "8 hours," "12 hours," and "31 days," respectively:

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, New Condition C (Added), Change (7)

New Condition C would apply when one battery on one subsystem, with one or more cells, electrolyte level is less than the minimum established design limits.

If the electrolyte level is below the top of the plates there is a potential for dryout and plate degradation. New Required Actions C.1 and C.2 would require restoring the electrolyte level to above the top of the plates (current Table 3.8.6-1, Category C, limit for electrolyte level) within 8 hours, and the new Required Action C.2 would ensure that the cause of the loss of electrolyte level is not due to a leak in the battery cell jar within 12 hours. These actions would be modified by a Note that would indicate that they are only applicable if the electrolyte level is below the top of the plates. In the LAR, the licensee stated that the provisions in TS 5.5.15, "Battery Monitoring and Maintenance Program," to initiate actions to equalize and test in accordance with manufacturer's recommendation would be performed in addition to Required Action C.2 following the restoration of the battery electrolyte level to above the top of the plates. The licensee clarified that based on the results of the manufacturer's recommended testing, the batteries may have to be declared inoperable and the affected cells replaced. Therefore, the new Required Actions C.1 and C.2 ensure that the batteries will be restored to an operable condition in a timely manner. The NRC staff finds that the proposed new Required Action C.1 and C.2, with their associated CTs, are acceptable because the proposed actions are consistent with TSTF-500.

If the electrolyte level is above the top of the plates, but below the minimum established design limits, the battery still retains sufficient capacity to perform the intended safety function and is not considered inoperable. The new Required Action C.3 would require restoring the affected battery electrolyte level to greater than or equal to the minimum established design limits within 31 days. The NRC staff finds that the proposed new Required Action C.3 with its associated CT acceptable because the proposed action is consistent with TSTF-500.

Based on the above discussion, the NRC staff concludes that the proposed TS 3.8.6 new Condition C, with its associated Notes, Required Actions, and CTs, provides acceptable

remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the batteries are capable of performing their safety functions, and is, therefore, acceptable.

3.2.3.8 PBAPS, Units 2 and 3, TS 3.8.6, New Condition D (Added), Change (8)

New PBAPS, Units 2 and 3, TS 3.8.6 Condition D would state:

Condition D.	One battery with pilot cell electrolyte temperature less than minimum established design limits.

New PBAPS, Units 2 and 3, TS 3.8.6 Required Action D.1 would state:

Required Action D.1	Restore battery pilot cell temperature to greater than or equal to minimum established design limits.

New CT for new PBAPS, Units 2 and 3, TS 3.8.6 Required Action D.1 would state "12 hours."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, New Condition D (Added), Change (8)

The proposed new TS 3.8.6 Condition D would apply when one battery is found with a pilot cell electrolyte temperature less than the minimum established design limit. A low electrolyte temperature limits the current and power available from the battery. This new Condition D would be applicable when one or more batteries on one subsystem have a pilot cell electrolyte temperature less than minimum established design limits.

Batteries are designed with margins to account for factors that affect battery performance. The licensee sized batteries is based on the PBAPS TS Bases B 3.8.6. In the LAR, the licensee stated that the batteries are sized with correction margins that include temperature and aging; and a 5 percent design margin will be maintained to ensure that with a battery float current of 2 amps or less, the batteries are 98 percent charged. Therefore, when the capacity is degraded, sufficient capacity exists to perform the intended function and the affected battery is not required to be considered inoperable solely as a result of the pilot cell temperature not met.

In the LAR, the licensee also stated that in order to support maintaining the required 5 percent design margin, the minimum allowed battery electrolyte temperature will be changed from 40 degrees Fahrenheit (°F) to 50°F. Historical battery room temperature records support this change.

Furthermore, the licensee stated that the current battery room low temperature control room alarm setpoint is 65°F and the battery pilot cell temperature will be verified to be maintained greater than or equal to 50°F after TSTF-500 is implemented. Additionally, battery room temperatures are monitored on a periodic basis and plant procedures provide operators with directions to take action upon receipt of high or low temperature alarms. The licensee stated that the battery room temperature excursion are expected to be detected and corrected prior to the average battery electrolyte temperature dropping below the minimum electrolyte temperature.

Based on these above considerations (i.e., battery margin and room temperature monitoring) and the fact that batteries have very large thermal inertia, the NRC staff finds that a battery room temperature excursion would likely be corrected by the licensee prior to the battery electrolyte reaching its maximum or minimum design temperature. In addition, the NRC staff

concludes that the pilot cell temperature is an accurate representation of the temperature of the PBAPS batteries because: (1) batteries have very large thermal inertia; (2) PBAPS batteries are designed with margins (i.e., temperature, aging, and design); and (3) the licensee monitors and corrects low battery room temperatures.

In TSTF-500, Revision 2, it states that, due to the use of pilot cell temperature in lieu of average cell temperature and the change of the minimum voltage limit for battery cells, changes are necessary in the method pilot cells are selected. In the LAR, the proposed new "Battery Monitoring and Maintenance Program" in TS 5.5.5 would state that "the pilot cell selection shall be based on the lowest voltage cell in the battery" (see Section 3.2.4, "TS 5.5 (Programs and Manual) Change," of this SE for more details). The NRC staff finds that the selection of a pilot cell based on the battery's lowest voltage cell is consistent with TSTF-500 and is, therefore, acceptable.

The new Required Action D.1 would require restoration of the pilot cell temperature to greater than or equal to the minimum established design limits within 12 hours. The NRC staff finds that the 12-hour CT is consistent with TSTF-500, and as such, provides adequate time to restore the battery electrolyte temperature within established limits.

Based on the above discussion, the NRC staff concludes that the proposed TS 3.8.6 new Condition D, with its associated Required Action and CT, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the batteries are capable of performing their safety functions, and is, therefore, acceptable.

3.2.3.9 PBAPS, Units 2 and 3, TS 3.8.6, New Condition E, Change (9)

New PBAPS, Units 2 and 3, TS 3.8.6 Condition E would state:

Condition E.	One or more batteries in redundant subsystems with battery parameters not within limits.

New PBAPS, Units 2 and 3, TS 3.8.6 Required Action E.1 would state:

Required Action E.1	Restore battery parameter for batteries in one system to within limits.

New CT for PBAPS, Units 2 and 3, TS 3.8.6 Required Action E.1 would state "2 hours."

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, New Condition E (Added), Change (9)</u>

The licensee proposed adding new TS 3.8.6 Condition E to address the condition where one or more batteries in redundant subsystems have battery parameters not within limits. If this condition exists, there is not sufficient assurance that the batteries will be capable of performing their intended safety functions. With redundant batteries involved, loss of function is possible for multiple systems that depend upon the batteries. The NRC staff finds the new Condition E acceptable because it is consistent with TSTF-500.

The new Required Action E.1, that the licensee proposed, would restore the battery parameters for the affected battery in one subsystem to be restored to, within limits, 2 hours. The NRC staff considers the 2-hour time period to be consistent with similar LCOs established by the TS (i.e.,

TS 3.8.7 Distribution Systems - Operating) and reasonable, considering the potential for loss of function of components that depend on the batteries (i.e., AC vital bus subsystem(s), electrical breaker control/position indication power), the NRC staff finds the duration of 2 hours to resolve the condition acceptable, and is consistent with TSTF-500.

Based on the above, the NRC staff concludes that the proposed change, TS 3.8.6 new Condition E, with its associated Required Action and CT, provides acceptable remedial actions as allowed by 10 CFR 50.36(c)(2) to ensure that the batteries are capable of performing their safety functions, and is, therefore, acceptable.

3.2.3.10 PBAPS, Units 2 and 3, TS 3.8.6, New Condition F (Added), Change (10)

New PBAPS, Units 2 and 3, TS 3.8.6 Condition F would state:

Condition F.	Required Action and associated Completion Time of Condition A, B, C, D, or E not met. <u>OR</u> One battery on one subsystem with one or more battery cells with float voltage < 2.07 V and float current > 2 amps.

New PBAPS, Units 2 and 3, TS 3.8.6 Required Action F.1 would state:

Required Action F.1	Declare associated battery inoperable.

New CT for new PBAPS, Units 2 and 3, TS 3.8.6 Required Action F.1 would state "Immediately."

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, New Condition F, Change (10)</u>

The proposed new Condition F would apply when battery parameters fall outside the allowance of the Required Actions for Condition A, B, C, D, or E. Under this condition, it is assumed that there is insufficient capacity to supply the maximum expected load requirements. New Condition F would also address an alternate condition where one battery on one subsystem is found with one or more battery cells having a float voltage less than 2.07 V and a float current greater than 2 amps. In this case, the battery may not have sufficient capacity to perform its intended design function. The NRC staff finds the new Condition F consistent with TSTF-500, and therefore, acceptable.

The Required Action F.1 for either of these the above entry conditions for new Condition F is to declare the associated battery inoperable with a CT of "immediately." Since the battery capacity may be insufficient to supply the required loads in the new Condition F, the NRC staff finds the Required Action and associated CT for new Condition F are reasonable and consistent with TSTF-500.

Based on the above, the NRC staff concludes that the proposed TS 3.8.6 new Condition F, with its associated Required Action and CT, provides acceptable remedial actions as allowed by 10 CFR 50.36(c) to ensure that the batteries are capable of performing their safety functions, and is, therefore, acceptable.

3.2.3.11 PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (11)

Current PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.1 states:

SR 3.8.6.1	Verify battery cell parameters meet Table 3.8.6.-1 Category A limits.

Revised PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.1 would state:

SR 3.8.6.1	---------- NOTE ---------- Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. ---------- Verify each battery float current is ≤ 2 amps

The frequency for revised PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.1 would remain unchanged and would state "In accordance with the Surveillance Frequency Control Program."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (11)

The requirements of the current SR 3.8.6.1 would be deleted from the TS. Current SR 3.8.6.1 requires verification of battery cell parameters meeting Table 3.8.6-1, Category A limits. The Category A limits do not represent a condition in which the batteries cannot perform their functions. As discussed in Section 3.2.3.2, "PBAPS, Units 2 and 3, TS 3.8.6; Table 3.8.6-1, 'Battery Cell Parameter Requirements' (Deleted), Change (2)," of this SE, the NRC staff concludes that relocating the Category A limits of TS Table 3.8.6-1 and the remedial actions associated with restoring the battery cell parameters to within limits to the new "Battery Monitoring and Maintenance Program" specified in TS Section 5.5.15. Therefore, the NRC staff finds that deleting the requirements of current SR 3.8.6.1 is consistent with the elimination of Table 3.8.6-1 from the TS.

The licensee proposed revised SR 3.8.6.1, which would require verification that the float current for each battery is less than or equal to 2 amps. The purpose of this SR is to determine the state of charge of the battery. Float charge is the condition in which the battery charger is supplying the continuous small amount of current (i.e., less than or equal to 2 amps) required to overcome the internal losses of a battery to maintain the battery in a fully charged state. The float current requirements are based on the float current indicative of a charged battery. As discussed in Section 3.2.3.13 of this SE, the use of float current to determine the state of charge of the battery is consistent with the battery manufacturer recommendations.

The revised SR 3.8.6.1 would be modified by a Note which states that SR 3.8.6.1 is not required to be met when the battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. When this minimum established float voltage is not maintained at the battery's terminals, it likely indicates issues with the battery or the associated battery charger. In this case, the Required Actions for the new TS 3.8.4 Conditions C and D will provide the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit is established based on the nominal float voltage value and is not directly applicable when this

minimum established float voltage is not maintained. Based on this information, the NRC staff finds the new Note and the revised SR 3.8.6.1 acceptable and consistent with TSTF-500.

The licensee proposed to specify the frequency for the revised SR 3.8.6.1 in the SFCP in accordance with TSTF-425, Revision 3, "Relocate Surveillance Frequencies to Licensee Control – RITSTF Initiative 5b" (Reference 11). The current PBAPS TS have incorporated TSTF-425, which allows the licensee to relocate most periodic frequencies of TS SRs to the SFCP required by TS 5.5.14, "Surveillance Frequency Control Program." According to TSTF-425, all frequencies can be relocated to the SFCP except:

- Frequencies that reference other approved programs for the specific interval (such as the In-Service Testing Program or the Primary Containment Leakage Rate Testing Program);

- Frequencies that are purely event-driven (e.g., "each time the control rod is withdrawn to the 'full out' position");

- Frequencies that are event-driven, but have a time component for performing the surveillance on a one-time basis once the event occurs (e.g., "within 24 hours after thermal power reaching > 95 percent RTP [rated thermal power]"); and

- Frequencies that are related to specific conditions (e.g., battery degradation, age and capacity) or conditions for the performance of an SR (e.g., "drywell to suppression chamber differential pressure decrease").

As discussed above, the proposed revised SR 3.8.6.1 is consistent with TSTF-500, and thus, the frequency for the revised SR 3.8.6.1, which would verify the battery float current, would be expected to be specified similar to the frequency of the TSTF-500 SR for verifying the battery float current. PBAPS, Units 2 and 3, adopted TSTF-425 guidelines by Amendment Nos. 278 and 281, dated August 27, 2010 (Reference 15). According to the TSTF-425 guidelines, the frequency for the TSTF-500 SR for verifying battery float current can be relocated into the SFCP because it is specified in number of days, does not reference other approved programs, is not event-driven, and is not related to a specific condition of the battery. Since the frequency for this TSTF-500 SR can be relocated to the SFCP, and the frequency for the revised SR 3.8.6.1 is expected to be specified similar to the frequency of this TSTF-500 SR, the NRC staff finds that controlling the frequency for the revised SR 3.8.6.1 in accordance with the SFCP in TS 5.5.14 is acceptable.

The NRC staff concludes that the proposed change revised SR 3.8.6.1 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met and it is, therefore, acceptable.

3.2.3.12 PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.2 (Revised), Change (12)

Current PBAPS, Units 2 and 3, TS 3.8.6, SR 3.8.6.2 states:

SR 3.8.6.2	Verify each battery cell meets Table 3.8.6.1 Category B limits.

Revised PBAPS, Units 2 and 3, TS 3.8.6, SR 3.8.6.2 would read state:

SR 3.8.6.2 Verify each battery pilot cell float voltage is ≥ 2.07 V.

The frequency for revised PBAPS, Units 2 and 3, TS 3.8.6, SR 3.8.6.2 would state "In accordance with the Surveillance Frequency Control Program."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.2 (Revised), Change (12)

The requirements of the current SR 3.8.6.2 would be deleted from the TS. The current SR 3.8.6.2 requires verification of battery cell parameters meeting Table 3.8.6-1 Category B limits. The Category A limits do not represent a condition in which the batteries cannot perform their functions. As discussed in Section 3.2.3.2, "PBAPS, Units 2 and 3, TS 3.8.6, Table 3.8.6-1, 'Battery Cell Parameter Requirements' (Deleted), Change (2)," of this SE, the NRC staff concludes that relocating the Category B limits of TS Table 3.8.6-1 and the remedial actions associated with restoring the battery cell parameters to within limits to the new Battery Monitoring and Maintenance Program specified in TS Section 5.5. Therefore, the NRC staff finds that deleting the requirements of current SR 3.8.6.2 is consistent with the elimination of Table 3.8.6-1 from the TS.

The licensee proposed revised SR 3.8.6.2, which would require verification that the float voltage of each battery pilot cell is greater than or equal to 2.07 V. This voltage level (2.07 V) represents the minimum SR acceptable voltage for operability. In the LAR, the licensee stated that optimal long-term battery performance is obtained by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer, which corresponds to 130.5 V (nominal float voltage) at the battery terminals, or 2.25 Vpc for a 58-cell battery. This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge, which could eventually render the battery inoperable. The licensee further stated that the float voltage at the batteries' terminals is maintained between 2.23 Vpc and 2.27 Vpc. Float voltages in this range or less, but greater than 2.13 Vpc, will be addressed in the new "Battery Monitoring and Maintenance Program" in TS 5.5.15 to ensure optimal long-term battery performance (see Section 3.2.4.1, "PBAPS, Units 2 and 3, TS 5.5.15, 'New Battery Monitoring and Maintenance Program' (Added), Change (1)," of this SE for more details). The battery's cell float voltage limit of 2.07 V reflects the operability limit for the batteries. As discussed in Section 3.2.3.8 of this SE, the pilot cell will be selected based on the lowest voltage cell in the battery. This will ensure that when the pilot cell float voltage is greater than or equal to 2.07 V, all battery cells will be greater than or equal to 2.07 V. Based on this information, the NRC staff finds that when the battery's pilot cell and all other cells, float voltages are greater than or equal to 2.07 V, there is adequate assurance that the battery's terminal voltage is at an acceptable threshold for establishing battery operability. Therefore, the NRC staff finds the revised SR 3.8.6.2 acceptable and consistent with TSTF-500.

The licensee proposed to specify the frequency for the revised SR 3.8.6.2 in the SFCP required by TS 5.5.14 and implemented in accordance with TSTF-425, Revision 3. Provided in TSTF-425, are the guidelines for relocating SR frequencies to the SFCP (see Section 3.2.3.11, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (11)," of this SE for additional discussion regarding the TSTF-425 guidance). As discussed above, the revised SR 3.8.6.2 is consistent with TSTF-500, and thus, the frequency for the revised SR 3.8.6.2, which would verify the battery pilot cell float voltage, would be expected to be specified similar to the frequency of the TSTF-500 SR for verifying the battery's pilot cell float voltage. According to TSTF-425 guidelines, the frequency for the TSTF-500 SR for verifying the battery's pilot cell

float voltage can be relocated into the SFCP because it is specified in number of days, does not reference other approved programs, is not event-driven, and is not related to a specific condition of the battery. Since the frequency for this TSTF-500 SR can be relocated to the SFCP, and the revised SR 3.8.6.3 is expected to be specified similar to the frequency of this TSTF-500 SR, the NRC staff finds that controlling the frequency for the revised SR 3.8.6.2 in accordance with the SFCP in TS 5.5.14 is acceptable.

Based on the above discussion, the NRC staff concludes that the proposed revised SR 3.8.6.2 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the associated LCOs will be met, and is, therefore, acceptable.

3.2.3.13 PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.3 (Revised), Change (13)

Current PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.3 states:

SR 3.8.6.3 Verify average electrolyte temperature of representative cells are ≥ 40°F.

Revised PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.3 would state:

SR 3.8.6.3 Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.

The frequency for revised PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.3 would remain unchanged and would state "In accordance with the Surveillance Frequency Control Program."

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, Revised Current SR 3.8.6.3 (Revised), Change (13)

Current SR 3.8.6.3, which requires the monitoring of the battery's representative cells average electrolyte temperature, will be replaced with new SR 3.8.6.4, which would require the monitoring of the battery's pilot cell temperature (see Section 3.2.3.14, "PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.4 (Added), Change (14)," of this SE for more details). Since the battery cell electrolyte temperature will be monitored per new SR 3.8.6.4, the NRC staff finds the elimination of current SR 3.8.6.3 acceptable.

Revised SR 3.8.6.3 would require the each battery connected cells electrolyte level to be greater than or equal to the "minimum established design limits." Operation of the batteries at electrolyte levels greater than the minimum established design limit ensures that the battery plates do not suffer physical damage and continue to maintain adequate electron transfer capability. The licensee proposed relocating the minimum established design limits for the battery electrolyte level to a licensee-controlled program. This relocation will allow flexibility to monitor and control this limit at values directly related to the battery ability to perform its required safety function. Based on this information, the NRC staff finds the revised SR 3.8.6.3 consistent with TSTF-500, and therefore, acceptable.

The licensee proposed to specify the surveillance frequency for new SR 3.8.6.3 in the SFCP required by TS 5.5.15. The surveillance frequency for new SR 3.8.6.3 is for verification of each battery connected cell electrolyte level. The frequency does not reference other approved programs, is not event-driven, and is not related to a specific condition of the battery.

The licensee proposed to specify the frequency for the revised SR 3.8.6.3 in the SFCP required by TS 5.5.14 and implemented in accordance with TSTF-425, Revision 3 (see Section 3.2.3.11, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.1 (Revised), Change (11)," of this SE for more details regarding the TSTF-425 guidelines for relocating surveillance frequencies). As discussed above, the revised SR 3.8.6.3 is consistent with TSTF-500, and thus, the frequency for the revised SR 3.8.6.3, which would the battery's connected cell electrolyte level, would be expected to be specified similar to the frequency of the TSTF-500 SR for verifying the battery's connected cell electrolyte level. According to the TSTF-425 guidelines, the frequency for the TSTF-500 SR for verifying the battery's connected cell electrolyte level can be relocated to a SFCP because it is specified in number of days, does not reference other approved programs, is not event-driven, and is not related to a specific condition of the battery. Since the frequency for this TSTF-500 SR can be relocated to the SFCP, and the frequency for the revised SR 3.8.6.3 is expected to be specified similar to the frequency of this TSTF-500 SR, the NRC staff finds that controlling the frequency for the revised SR 3.8.6.3 in accordance with the SFCP in TS 5.5.14 is acceptable.

Based on the above discussion, the NRC staff concludes that the proposed changes revised SR 3.8.6.3 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met and is, therefore, acceptable.

3.2.3.14 PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.4 (Added), Change (14)

New PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.4 would state:

> SR 3.8.6.4 Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.

The frequency for new PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.4 would state "In accordance with the Surveillance Frequency Control Program."

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.4 (Added), Change (14)</u>

The licensee proposed adding new SR 3.8.6.4 would require verifying the pilot cell temperature to be greater than or equal to the minimum established design limits. As discussed in Section 3.2.3.8, of this SE. The PBAPS batteries are designed with margins (i.e., temperature, aging, and design), and there is monitoring to correct low battery room temperatures. In addition, batteries have very large thermal inertia. As a result, the pilot cell temperature is an accurate representation of the temperature of the battery bank. When the pilot cell temperature is greater than or equal to the minimum established design limits, there is reasonable assurance that the battery's minimum electrolyte temperature is maintained.

The licensee also proposed relocating the specific limiting values for the battery electrolyte temperature to the "Battery Monitoring and Maintenance Program." SR 3.8.6.4 would require the electrolyte temperature to be greater than or equal to the "minimum established design limits." Depending on the available excess capacity of the associated battery, the minimum temperature necessary to support operability of the battery can vary. Relocation of the minimum established design limit for the battery electrolyte temperature to the "Battery Monitoring and Maintenance Program" will allow flexibility to monitor and control this limit at values directly related to the battery ability to perform its intended function. Incorporating the

minimum established design temperature limit into the plant's UFSAR provides reasonable assurance that the value will be appropriately maintained by the licensee to accurately reflect the design of the plant. Based on this information, the NRC staff finds the new SR 3.8.6.4 consistent with TSTF-500, and therefore, acceptable.

The licensee proposed to specify the frequency for the new SR 3.8.6.4 in the SFCP required by TS 5.5.14. Currently, the frequency for the existing SR 3.8.6.3 (deleted by the proposed TS change) for verifying the battery representative cells temperature (average) is controlled in accordance with the SFCP. Since the new SR 3.8.6.4 would verify battery pilot cell temperature, the NRC staff finds that controlling the frequency for the new SR 3.8.6.4 in accordance with the SFCP is acceptable.

Based on the above discussion, the NRC staff concludes that the proposed new SR 3.8.6.4 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the limiting conditions for operation associated LCOs will be met, and is, therefore, acceptable.

3.2.3.15 PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.5 (Added), Change (15)

The proposed change would add new SR 3.8.6.5, which will require verification that the float voltage of each battery connected cells are greater than 2.07 V.

New PBAPS, Units 2 and 3, TS 3.8.6, SR 3.8.6.5 would state:

SR 3.8.6.5 Verify each battery connected cell float voltage is ≥ 2.07 V.

The frequency for new PBAPS, Units 2 and 3, TS 3.8.6.6 SR 3.8.6.5 would state "In accordance with the Surveillance Frequency Control Program."

<u>Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.5 (Added), Change (15)</u>

New SR 3.8.6.5 would require verification that the float voltage of pilot cells and all battery connected cells are greater than or equal to 2.07 V. The 2.07 V battery individual cell limit reflects the operability limit for the batteries. In the LAR, the licensee stated that optimal long-term battery performance is obtained by maintaining a float voltage greater than or equal to the minimum established design limits provided by the battery manufacturer, which corresponds to 130.5 V (nominal float voltage) at the battery terminals, or 2.25 Vpc for 58-cell battery. This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge, which could eventually render the battery inoperable. The licensee further stated that the float voltage at the batteries' terminals is maintained between 2.23 Vpc and 2.27 Vpc. Float voltages, in this range or less, but greater than 2.13 Vpc, will be addressed in the revised new "Battery Monitoring and Maintenance Program" in TS 5.5.15 to ensure optimal long-term battery performance (see Section 3.2.4.1, "PBAPS, Units 2 and 3, TS 5.5.15, New 'Battery Monitoring and Maintenance Program' (Added), Change (1)," of this SE for more details). Based on this information, the NRC staff finds that when all battery cells float voltages are greater than or equal to 2.07 V, there is adequate assurance that the battery terminal voltage is at an acceptable threshold for establishing battery operability. Therefore, the NRC staff finds the new SR 3.8.6.5 acceptable and consistent with the TSTF-500.

The licensee proposed to specify the surveillance frequency for the new SR 3.8.6.5 in the SFCP required by TS 5.5.1514 and implemented in accordance with TSTF-425, Revision 3 (see

Section 3.2.3.11, "PBAPS, Units 2 and 3, TS 3.8.6, Current SR 3.8.6.2 (Revised), Change (12)," of this SE for more details regarding the TSTF-425 guidelines for relocating surveillance frequencies). As discussed above, the new SR 3.8.6.5 is consistent with TSTF-500, and thus, the frequency for the new SR 3.8.6.5, which would verify the battery's connected cell float voltage, would be expected to be specified similar to the frequency of the TSTF-500 SR for verifying the battery's connected cell float voltage. According to TSTF-425 guidelines, the frequency for the TSTF-500 SR for verifying the battery's connected cell float voltage can be relocated to a SFCP because the frequency is specified in number of days, does not reference other approved programs, is not event-driven, and is not related to a specific condition of the battery. Since the frequency for this TSTF-500 SR can be relocated to the SFCP, and the frequency for the new SR 3.8.6.5 is expected to be specified similar to the frequency of this TSTF-500 SR, the NRC staff finds that controlling the frequency for the new SR 3.8.6.5 in accordance with the SFCP in TS 5.5.14 is acceptable according to the TSTF-425 guidelines.

Based on the above discussion, the NRC staff concludes that the proposed new SR 3.8.6.5 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the associated LCOs will be met, and is, therefore, acceptable.

3.2.3.16 PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.6 (Relocated – Current SR 3.8.4.8), Change (16)

New PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.6 would state:

SR 3.8.6.6

- NOTE - - - - - - - - - - - - - - - - - - -
This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.
- -

Verify battery capacity is ≥ 80% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.

Frequencies for new PBAPS, Units 2 and 3, TS 3.8.6 SR 3.8.6.6 would state:

Frequency

In accordance with the Surveillance Frequency Control Program

<u>AND</u>

12 months when battery shows degradation or has reached 85% of the expected life with capacity <100% of manufacturer's rating

<u>AND</u>

24 months when battery has reached 85% of the expected life with capacity ≥ 100% of manufacturer's rating

Evaluation of PBAPS, Units 2 and 3, TS 3.8.6, New SR 3.8.6.6 (Relocated – Current SR 3.8.4.8), Change (16)

The current SR 3.8.4.8 is a battery capacity test with three surveillance frequencies, which depend on the battery's expected life, degradation, and capacity. These frequencies are based on the qualified life (typically 20 years) and known historical performance characteristics for vented lead-acid batteries as discussed in the IEEE Std. 450-2002 (Reference 10). The purpose of current SR 3.8.4.8 (battery capacity test) is to demonstrate the operability of the battery; thus, this SR is being relocated to TS 3.8.6 for battery parameters, as new SR 3.8.6.6.

The new SR 3.8.6.6 would verify battery capacity similarly to current SR 3.8.4.8. The surveillance frequencies for the new SR 3.8.6.6 would remain the same as for current SR 3.8.4.8 and would provide adequate data points for trending in order to determine the state-of-health of the safety-related batteries given the expected service life. The surveillance frequencies (1) are appropriate given the condition of the battery, (2) allow sufficient time for corrective actions to be taken, and (3) are consistent with the safety significance of safety-related batteries. The NRC staff finds the new SR 3.8.6.6 acceptable because it is consistent with current SR 3.8.4.8 and TSTF-500.

Based on the above discussion, the NRC staff concludes that the proposed new SR 3.8.6.6 meets 10 CFR 50.36(c)(3) requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the associated LCOs will be met, and is, therefore, acceptable.

3.2.4 TS 5.5 (Programs and Manual) Change

The proposed change to TS 5.5 is similar for both PBAPS, Units 2 and 3. Therefore, the below NRC staff evaluation for the proposed change to TS 5.5 is applicable to both PBAPS, Units 2 and 3.

3.2.4.1 PBAPS, Units 2 and 3, TS 5.5.15, New Battery Monitoring and Maintenance Program (Added), Change (1)

New PBAPS, Units 2 and 3, TS 5.5.15 would state:

TS 5.5.15 Battery Monitoring and Maintenance Program

This Program provides controls for battery restoration and maintenance. The program shall be in accordance with IEEE Standard (Std.) 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," as endorsed by Regulatory Guide 1.129, Revision 2 (RG) with RG exceptions and program provisions as identified below:

a. The program allows the following RG 1.129, Revision 2 exceptions:

1. Battery temperature correction may be performed before or after conducting discharge tests.

2. RG 1.129, Regulatory Position 1, Subsection 2, "References," is not applicable to this program.

3. In lieu of RG 1.129, Regulatory Position 2, Subsection 5.2, "Inspections," the following shall be used: "Where reference is made to the pilot cell, pilot cell selection shall be based on the lowest voltage cell in the battery."

4. In Regulatory Guide 1.129, Regulatory Position 3, Subsection 5.4.1, "State of Charge Indicator," the following statements in paragraph (d) may be omitted: "When it has been recorded that the charging current has stabilized at the charging voltage for three consecutive hourly measurements, the battery is near full charge. These measurements shall be made after the initially high charging current decreases sharply and the battery voltage rises to approach the charger output voltage."

5. In lieu of RG 1.129, Regulatory Position 7, Subsection 7.6, "Restoration," the following may be used: "Following the test, record the float voltage of each cell of the string."

b. The program shall include the following provisions:

1. Actions to restore battery cells with float voltage < 2.13 V;

2. Actions to determine whether the float voltage of the remaining battery cells is ≥ 2.13 V when the float voltage of a battery cell has been found to be < 2.13 V;

3. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates;

4. Limits on average electrolyte temperature, battery connection resistance, and battery terminal voltage; and

5. A requirement to obtain specific gravity readings of all cells at each discharge test, consistent with manufacturer recommendations.

Evaluation of PBAPS, Units 2 and 3, TS 5.5.15, Battery Monitoring and Maintenance Program, Change (1)

The new Battery Maintenance and Monitoring Program would be in accordance with IEEE Std. 450-2002, as endorsed by RG 1.129, Revision 2. RG 1.129, Revision 2 (Reference 8), provides guidance with respect to the maintenance, testing, and replacement of vented lead-acid storage batteries in nuclear power plants. The exceptions to RG 1.129, Revision 2 (listed in TS 5.5.15) represent reasonable technical approaches and are appropriate for applying the RG provisions to the proposed TS requirements for operating plants.

The licensee initially proposed actions to determine whether the float voltage of the remaining battery cells is ≥ 2.07 V when the float voltage of a battery cell has been found to be < 2.13 V in the provision TS 5.5.15.b.2 for the new Battery Maintenance and Monitoring Program. The TSTF-500 BWR/4 TS (Reference 12) indicates a bracketed battery cell float voltage limit of 2.13 V (instead of 2.07 V) for this program. Since the battery float voltage of 2.07 V provides an indication for the battery's operability, the NRC staff requested the licensee to provide the basis for the proposed battery cell float voltage limit of 2.07 V in the battery maintenance program in letter dated August 28, 2018 (Reference 13). In letter dated September 14, 2018 (Reference 4), the licensee revised the battery float voltage limit of 2.07 V to 2.13 V in the "Battery Maintenance and Monitoring Program" to be consistent with TSTF-500. The NRC staff finds that the battery float voltage limit of 2.13 V is acceptable for the "Battery Maintenance and Monitoring Program" since the float voltage limit of 2.13 V represents an appropriate monitoring preventive maintenance voltage level for the battery, and is consistent with TSTF-500.

In the LAR, the licensee stated that monitoring of the current battery parameters (i.e., specific gravity, electrolyte level, cell temperature, float voltage, connection resistance, and physical condition) will be relocated to this program. The new "Battery Monitoring and Maintenance Program" will ensure that the above battery parameters will be maintained and that actions will be implemented should the battery parameter(s) not be met.

In PBAPS TS 5.4, "Procedures," it requires written procedures be established, implemented, and maintained for the new "Battery Monitoring and Maintenance Program" in TS 5.5.15. The licensee provided confirmation that the TS 5.5.15, "Battery Monitoring and Maintenance Program," would provide assurance that the battery parameters will be monitored and controlled in accordance with the program, and that actions to restore deficient parameters will be implemented in accordance with the licensee's corrective action program. Furthermore, the batteries and their preventive maintenance and monitoring program continue to be subject to the regulatory requirements of 10 CFR 50.65. The NRC staff finds that this change is consistent with TSTF-500 and provides assurance that the battery will be maintained at required levels of performance and that pertinent battery parameters will be monitored.

Based on the above discussion, the NRC staff concludes that the proposed new "Battery Monitoring and Maintenance Program" in TS 5.5.15 is consistent with TSTF-500, meets the

10 CFR 50.36 requirements for surveillances by ensuring that the necessary quality of systems and components is maintained and that the LCOs will be met, and is, therefore, acceptable.

3.3 Summary and Conclusion

Based on the above evaluation, the NRC staff finds that the proposed changes to the PBAPS, Units 2 and 3, TS to adopt TSTF-500, Revision 2, provide assurance of the continued availability of the DC power systems required to shut down the reactor and to maintain the reactor in a safe condition after an anticipated operational occurrence or a postulated design-basis accident. The NRC staff also finds that the proposed TS changes to the PBAPS, Units 2 and 3, DC electrical power systems continue to meet the requirements of 10 CFR 50.36, and as such, the PBAPS, Units 2 and 3, DC electrical power systems will continue to meet the intent of the AEC proposed GDC 24 and 39 following implementation of the TSTF-500, Revision 2. Therefore, the NRC staff concludes that the proposed changes are acceptable.

4.0 REGULATORY COMMITMENTS

In Attachment 4 of the LAR, the licensee made the following regulatory commitments to be implemented with the amendment:

COMMITMENT	COMMITTED DATE ONE-TIME OR "OUTAGE"	COMMITMENT TYPE	
		One-Time Action (Yes/No)	Programmatic (Yes/No)
The 2 amp float current value is an indication that the battery is 98 percent charged. PBAPS is committed to maintain a 5 percent design margin for the batteries.	Upon implementation of the approved TS amendment.	No	Yes
The Battery Monitoring and Maintenance Program, which will be contained in the PBAPS Technical Requirements Manual will require verification of the selection of the pilot cell or cells when performing SR 3.8.6.5.	Upon implementation of the approved TS amendment.	No	Yes
Exelon will revise the PBAPS Updated Final Safety Analysis Report in accordance with Attachment 5, List of Required Updated Final Safety Analysis Report (UFSAR) Descriptions.	Upon implementation of the approved TS amendment.	Yes	No

As discussed in Section 4.4.1 of the NRC's Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-101, Revision 4, "License Amendment Review Procedures" (Reference 14), since commitments made by a licensee in support of a license amendment are not legally binding, the NRC staff's SE should not rely on commitments as a basis for any part of the NRC staff's approval of a proposed amendment. However, the NRC staff may rely on a commitment if it is escalated into an obligation (e.g., license condition) or subsequently incorporated into a mandated licensing basis document (e.g., UFSAR). The NRC staff has not relied on the commitment as part of the NRC staff's acceptance of the proposed amendment. The NRC staff notes that, following the normal update to the FSAR, future changes to the program will be under the provisions of 10 CFR 50.59.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendments on September 14, 2018. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to the installation or use of facility components 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 published in the *Federal Register* on November 21, 2017 (82 FR 55405). 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.

7.0 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.

8.0 REFERENCES

1. Barstow, J., Exelon Generation Company, LLC, letter to U.S. Nuclear Regulatory Commission, "Application to Revise Technical Specifications to Adopt Technical Specification Task Force (TSTF)-500, Revision 2, "DC Electrical Rewrite-Update to TSTF-360," dated September 29, 2017 (ADAMS Accession No. ML17275A069).

2. Barstow, J., Exelon Generation Company, LLC, letter to U.S. Nuclear Regulatory Commission, "Application to Revise Technical Specifications to Adopt Technical Specification Task Force (TSTF)-500, Revision 2, "DC Electrical Rewrite-Update to

TSTF-360,"-Supplement 1, "Revision of Implementation Dates," dated August 1, 2018 (ADAMS Accession No. ML18213A271).

3. Helker, D. P., Exelon Generation Company, LLC, letter to U.S. Nuclear Regulatory Commission, "Supplemental Information to Support Application to Revise Technical Specifications to Adopt Technical Specification Task Force (TSTF)-500, Revision 2, "DC Electrical Rewrite Update to TSTF-360"," dated August 14, 2018 (ADAMS Accession No. ML18227A610).

4. Helker, D. P., Exelon Generation Company, LLC, letter to U.S. Nuclear Regulatory Commission, "Supplemental Information to Support Application to Revise Technical Specifications to Adopt Technical Specification Task Force (TSTF)-500, Revision 2, 'DC Electrical Rewrite Update to TSTF-360,'" dated September 14, 2018 (ADAMS Accession No. ML18257A017).

5. U.S. Nuclear Regulatory Commission, "Model Application for Plant-Specific Adoption of Traveler TSTF-500, Revision 2, 'DC Electrical Rewrite – Update to TSTF-360,'" dated August 22, 2011 (ADAMS Accession No. ML111751792).

6. Technical Specifications Task Force, letter to U.S. Nuclear Regulatory Commission, "Transmittal of TSTF-500, Revision 2, 'DC Electrical Rewrite – Update to TSTF-360,'" dated September 22, 2009 (ADAMS Accession No. ML092670242).

7. U.S. Nuclear Regulatory Commission, SECY-92-223, "Resolution of Deviations Identified During the Systematic Evaluation Program," dated September 18, 1992 (ADAMS Accession No. ML003763736)

8. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.75, Revision 3, "Criteria for Independence of Electrical Safety Systems," February 2005 (ADAMS Accession No. ML043630448).

9. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.129, Revision 2, "Maintenance, Testing, and Replacement of Vented Lead-Acid Storage Batteries for Nuclear Power Plants," February 2007 (ADAMS Accession No. ML063490110).

10. Institute of Electrical and Electronics Engineers, IEEE Standard 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batters for Stationary Applications," Piscataway, NJ.

11. Technical Specifications Task Force, letter to U.S. Nuclear Regulatory Commission, "Transmittal of TSTF-425, Revision 3, 'Relocate Surveillance Frequencies to Licensee Control – RITSTF Initiative 5b,'" dated March 18, 2009 (ADAMS Accession No. ML090850642).

12. U.S. Nuclear Regulatory Commission, NUREG-1433, Volume 1, Revision 4.0, "Standard Technical Specifications – General Electric BWR/4 Plants," April 2012 (ADAMS Accession No. ML12104A192).

13. Tobin, J. C., U.S. Nuclear Regulatory Commission, letter to Exelon Generation Company, LLC, "Peach Bottom Units 2 and 3 - Request for Additional Information

(FINAL) - Adopt TSTF-500 Battery TS Changes LAR (EPID L-2017-LLA-0312)," dated August 28, 2018 (ADAMS Accession No. ML18240A174).

14. U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Office Instruction LIC-101, Revision 5, "License Amendment Review Procedures," dated January 9, 2017 (ADAMS Accession No. ML16061A451).

15. U.S. Nuclear Regulatory Commission, "Peach Bottom Atomic Power Station, Units 2 and 3 – Issuance of Amendments Re: Adoption of Technical Specification Task Force (TSTF) Traveler 425, Revision 3, Relocate Surveillance Frequencies to Licensee Control," dated August 27, 2010 (ADAMS Accession No. ML102100388)

Principal Contributors: P. Sahay
A. Foli

Date: September 28, 2018

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - ISSUANCE OF AMENDMENT NOS. 320 AND 323 REGARDING THE ADOPTION OF TSTF-500, "DC ELECTRICAL REWRITE – UPDATE TO TSTF-360" (EPID L-2017-LLA-0312) DATED SEPTEMBER 28, 2018

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ADAMS Accession No.: ML18249A240 *by memorandum **by e-mail

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