

EXCEL

SERVICES CORPORATION

Date: December 11, 2000

To: Nanette Gilles

From: Donald R. Hoffman 

Subject: Transmittal of TSTF 360 Rev 1

Per our discussions, enclosed are the changes to TSTF 360, Revision 1, which reflect the agreements which have been reached between the NRC and the Industry on this issue. The Industry understands that the NRC will approve TSTF 360, Revision 1 based on the attached agreed to changes.

DRH;cd
Enclosure

cc: TSTF

{ 5.5.17 (PWRS), 5.5.14 (BWRs) } INSERT 5.5.[X] PROGRAM
5.5.X

Battery Monitoring and Maintenance Program

This Program provides for restoration and maintenance , based on [the recommendations of IEEE Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing , and Replacement of Vented Lead-Acid Batteries For Stationary Applications," or of the battery manufacturer] of the following:

- a. Actions to restore battery cells with float voltage < [2.13] V, and
- b. Actions to equalize and test battery cells that had been discovered with electrolyte level below the minimum established design limit.

INSERT: 3.8.4 ACTION Bases

ACTIONS A.1, A.2, and A.3

Condition A represents one {PWR: train}{BWR: division} with one [or two] battery chargers inoperable (e.g., the voltage limit of SR 3.8.4.1 is not maintained). The 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. Required Action A.1 requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. This time provides for returning the inoperable charger to OPERABLE status or providing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. Restoring the battery terminal voltage to greater than or equal to the minimum established float voltage provides good assurance that, within [12] hours, the battery will be restored to its fully charged condition (Required Action A.2) from any discharge that might have occurred due to the charger inoperability. *{Reviewer's Note: A plant that cannot meet the 12-hour Completion Time due to an inherent battery charging characteristic, can propose an alternate time equal to 2 hours plus the time experienced to accomplish the exponential-charging-current portion of the battery charge profile following the service test (SR 3.8.4.3).}* A discharged battery having terminal voltage of at least the minimum established float voltage indicates that the battery is on the exponential charging current portion (the second part) of its recharge cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus there is good assurance of fully recharging the battery within [12] hours, avoiding a premature shutdown with its own attendant risk.

If established battery terminal float voltage cannot be restored to greater than or equal to the minimum established float voltage within 2 hours, and the charger is not operating in the current-limiting mode, a faulty charger is indicated. A faulty charger that is incapable of maintaining established battery terminal float voltage does not provide assurance that it can revert to and operate properly in the current limit mode that is necessary during the recovery period following a battery discharge event that the DC system is designed for.

If the charger is operating in the current limit mode after 2 hours that is an indication that the battery is partially discharged and its capacity margins will be reduced. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within [12] hours (Required Action A.2).

Required Action A.2 requires that the battery float current be verified as less than or equal to [2] amps. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it has now been fully recharged. 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.

Required Action A.3 limits the restoration time for the inoperable battery charger to 7 days. 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). The 7 day completion time reflects a reasonable time to effect restoration of the qualified battery charger to operable status.

INSERT: Bases SR 3.8.6.6

... Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this [80]% limit.

INSERT: 3.8.5 ACTIONS Bases

ACTIONS A.1, A.2, and A.3

Addition to
Insert
3.8.5 ACTION
Bases

Condition A represents one {PWR: train}{BWR: division} with one [or two] battery chargers inoperable (e.g., the voltage limit of SR 3.8.4.1 is not maintained). The 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. Required Action A.1 requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. This time provides for returning the inoperable charger to OPERABLE status or providing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. Restoring the battery terminal voltage to greater than or equal to the minimum established float voltage provides good assurance that, within [12] hours, the battery will be restored to its fully charged condition (Required Action A.2) from any discharge that might have occurred due to the charger inoperability. {Reviewer's Note: A plant that cannot meet the 12-hour Completion Time due to an inherent battery charging characteristic, can propose an alternate time equal to 2 hours plus the time experienced to accomplish the exponential-charging-current portion of the battery charge profile following the service test (SR 3.8.4.3).} A discharged battery having terminal voltage of at least the minimum established float voltage indicates that the battery is on the exponential charging current portion (the second part) of its recharge cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus there is good assurance of fully recharging the battery within [12] hours, avoiding a premature shutdown with its own attendant risk.

If established battery terminal float voltage cannot be restored to greater than or equal to the minimum established float voltage within 2 hours, and the charger is not operating in the current-limiting mode, a faulty charger is indicated. A faulty charger that is incapable of maintaining established battery terminal float voltage does not provide assurance that it can revert to and operate properly in the current limit mode that is necessary during the recovery period following a battery discharge event that the DC system is designed for.

If the charger is operating in the current limit mode after 2 hours that is an indication that the battery is partially discharged and its capacity margins will be reduced. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within [12] hours (Required Action A.2).

Required Action A.2 requires that the battery float current be verified as less than or equal to [2] amps. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it has now been fully recharged. 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.

Required Action A.3 limits the restoration time for the inoperable battery charger to 7 days. 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). The 7 day completion time reflects a reasonable time to effect restoration of the qualified battery charger to operable status.

Addition to Insert 3.8.5 ACTIONS Bases

----- REVIEWER'S NOTE -----

ACTION A is included only when plant-specific implementation of LCO 3.8.5 includes the potential to require both {trains} of the DC System to be OPERABLE. If plant-specific implementation results in LCO 3.8.5 requiring only one {trains} of the DC System to be OPERABLE, then ACTION A is omitted and ACTION B is renumbered as ACTION A.

INSERT: 3.8.6 ACTION Bases

ACTIONS A.1, A.2, and A.3

With one or more cells in one or more batteries in one {PWR: train}{BWR: division} < [2.07] V, the battery cell is degraded. Within 2 hours verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage (SR 3.8.4.1) and of the overall battery state of charge by monitoring the battery float charge current (SR 3.8.6.1). This assures that there is still sufficient battery capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of one or more cells in one or more batteries < [2.07] V, and continued operation is permitted for a limited period up to 24 hours.

Since the Required Actions only specify "perform," a failure of SR 3.8.4.1 or SR 3.8.6.1 acceptance criteria does not result in this Required Action not met. However, if one of the SRs is failed the appropriate Condition(s), depending on the cause of the failures, is entered.

B.1 and B.2

One or more batteries in one {PWR: train}{BWR: division} with float current > [2] amps indicates that a partial discharge of the battery capacity has occurred. This 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. Within 2 hours verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage. 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. Condition A addressed charger inoperability. If the charger is operating in the current limit mode after 2 hours that is an indication that the battery has been substantially discharged and likely cannot perform its required design functions. The time to return the battery to its fully charged condition in this case is a function of the battery charger capacity, the amount of loads on the associated DC system, the amount of the previous discharge, and the recharge characteristic of the battery. The charge time can be extensive, and there is not adequate assurance that it can be recharged within [12] hours (Required Action B.2). The battery must therefore be declared inoperable.

If the float voltage is found to be satisfactory but there are one or more battery cells with float voltage less than [2.07] V, the associated "OR" statement in Condition F is applicable and the battery must be declared inoperable immediately. If float voltage is satisfactory and there are no cells less than [2.07] V there is good assurance that, within [12] hours, the battery will be restored to its fully charged condition (Required Action B.2) from any discharge that might have occurred due to a temporary loss of the battery charger. *{Reviewer's Note: A plant that cannot meet the 12-hour Completion Time due to an inherent battery charging characteristic, can propose an alternate time equal to 2 hours plus the time experienced to accomplish the exponential-charging-current portion of the battery charge profile following the service test (SR 3.8.4.3).}* A discharged battery with float voltage (the charger setpoint) across its terminals indicates that the battery is on the exponential charging current portion (the second part) of its recharge cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus there is good assurance of fully recharging the battery within [12] hours, avoiding a premature shutdown with its own attendant risk.

If the condition is due to one or more cells in a low voltage condition but still greater than [2.07] V and float voltage is found to be satisfactory, this is not indication of a substantially discharged battery and [12] hours is a reasonable time prior to declaring the battery inoperable.

Since Required Action B.1 only specifies "perform," a failure of SR 3.8.4.1 acceptance criteria does not result in the Required Action not met. However, if SR 3.8.4.1 is failed, the appropriate Condition(s), depending on the cause of the failure, is entered.

Addition
to Insert
3.8.6 ACTION
Bases

Addition to Insert 3.8.6 ACTIONS Bases

If SR 3.8.6.1 is failed then there is not assurance that there is still sufficient battery capacity to perform the intended function and the battery must be declared inoperable immediately.

TSTF-360
Rev 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The Train A and Train B DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>INSERT 3.8.4 ACTIONS</p> <p>A. One DC electrical power subsystem inoperable C</p> <p>for reasons other than Condition A or B</p>	<p>A.1 C</p> <p>Restore DC electrical power subsystem to OPERABLE status.</p>	<p>[2] hours</p>
<p>B. Required Action and Associated Completion Time not met. D</p>	<p>D B.1</p> <p>Be in MODE 3.</p> <p>AND D B.2</p> <p>Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.4.1 Verify battery terminal voltage is $\geq 129/258$ V on float charge.</p> <p>greater than or equal to the minimum established float voltage</p>	<p>7 days</p>

(continued)

TSTF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

APPLICABILITY: MODES 5 and 6,
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>INSERT 3.8.5 ACTIONS →</p> <p>A. One or more required DC electrical power subsystems inoperable. B</p> <p><i>[For reasons other than Condition A]</i></p> <p><u>OR</u></p> <p><i>Required Action and associated Completion Time of Condition A not met.]</i></p>	<p>A.1 Declare affected required feature(s) inoperable. B</p> <p><u>OR</u></p> <p>A.2.1 Suspend CORE ALTERATIONS. B</p> <p><u>AND</u></p> <p>A.2.2 Suspend movement of irradiated fuel assemblies. B</p> <p><u>AND</u></p> <p>A.2.3 Initiate action to suspend operations involving positive reactivity additions. B</p> <p><u>AND</u></p>	<p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>(continued)</p>

TSIF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery ~~Cell~~ Parameters

INSERT IEEE-450
REVIEWERS NOTE

LCO 3.8.6 Battery cell parameters for the Train A and Train B batteries shall be within the limits of Table 3.8.6-1.

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
<p>A. One or more batteries with one or more battery cell parameters not within Category A or B limits.</p> <p>INSERT 3.8.6 ACTIONS</p>	<p>A.1 Verify pilot cell[s] electrolyte level and float voltage meet Table 3.8.6-1 Category C values.</p> <p>AND</p>	<p>1 hour</p>
	<p>A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C values.</p> <p>AND</p>	<p>24 hours</p> <p>AND</p> <p>Once per 7 days thereafter</p>
	<p>A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.</p>	<p>31 days</p>

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The Train A and Train B DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

INSERT 3.8.4 ACTIONS

ACTIONS		
CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One DC electrical power subsystem inoperable for reasons other than Condition Apr 5. C	A.1 Restore DC electrical power subsystem to OPERABLE status. C	[2] hours
B. Required Action and Associated Completion Time not met. D	B.1 Be in MODE 3. AND	6 hours
	B.2 Be in MODE 5. D	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ 129 V on float charge	7 days

greater than or equal to the minimum established float voltage

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.4.²</p> <p>NOTE This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> <p><i>greater than or equal to</i> Verify each battery charger supplies \geq [400] amps at \geq [125] V for \geq [8] hours. the minimum established float voltage</p> <p>INSERT CHARGER SR</p>	<p>[18 months]</p>
<p>SR 3.8.4.³</p> <p>NOTES</p> <p>1. The modified performance discharge test in SR 3.8.4.² may be performed in lieu of the service test in SR 3.8.4.² ⁽⁶⁾ once per 60 months ⁽³⁾</p> <p>2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>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.</p>	<p>[18 months]</p>

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

APPLICABILITY: MODES 5 and 6,
 During movement of irradiated fuel assemblies.

INSERT 3.8.5 ACTIONS

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p><u>A</u>. One or more required DC electrical power subsystems inoperable</p> <p><u>B</u></p> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin: 10px 0;"> <p>[For reasons other than Condition A. <u>OR</u> Required Action and associated Completion Time of Condition A not met.]</p> </div>	<p><u>A.1.1</u> Declare affected required feature(s) inoperable.</p> <p><u>B</u></p> <p><u>OR</u></p> <p><u>A.2.1</u> Suspend CORE ALTERATIONS.</p> <p><u>B</u></p> <p><u>AND</u></p> <p><u>A.2.2</u> Suspend movement of irradiated fuel assemblies.</p> <p><u>B</u></p> <p><u>AND</u></p> <p><u>A.2.3</u> Initiate action to suspend operations involving positive reactivity additions.</p> <p><u>B</u></p> <p><u>AND</u></p>	<p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>(continued)</p>

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Ca11 Parameters

INSERT IEEE-45D
REVIEWERS NOTE

LCO 3.8.6 Battery ~~cell~~ parameters for Train A and Train B batteries shall be within the limits of Table 3.8.6-1.

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
<p>A. One or more batteries with one or more battery cell parameters not within Category A or B limits.</p>	<p>A.1 Verify pilot cell[s] electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.</p>	1 hour
	<p>AND</p> <p>A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C limits.</p>	<p>24 hours</p> <p>AND</p> <p>Once per 7 days thereafter</p>
	<p>AND</p> <p>A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.</p>	31 days

INSERT
3.8.6 ACTIONS

(continued)

BASES

ACTIONS

A.1, A.2, and A.3 (continued)

Continued operation is only permitted for 31 days before battery cell parameters must be restored to within Category A and B limits. With the consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function and to allow time to fully restore the battery cell parameters to normal limits, this time is acceptable prior to declaring the battery inoperable.

F
B.1

is

any

allowances of the Required Actions for Condition A, B, C, or D

battery

INSERT 3.8.6 F.1
BASES

With one or more batteries with one or more battery cell parameters outside the Category C limit for any connected cell, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC electrical power subsystem must be declared inoperable.

Additionally, other potentially extreme conditions, such as not completing the Required Actions of Condition A within the required Completion Time or average electrolyte temperature of representative cells falling below 60°F, are also cause for immediately declaring the associated DC electrical power subsystem inoperable.

SURVEILLANCE REQUIREMENTS

INSERT
3.8.6 SR
BASES

SR 3.8.6.1

This SR verifies that Category A battery cell parameters are consistent with IEEE-450 (Ref. 3), which recommends regular battery inspections (at least one per month) including voltage, specific gravity, and electrolyte temperature of pilot cells.

SR 3.8.6.2

The quarterly inspection of specific gravity and voltage is consistent with IEEE-450 (Ref. 3). In addition, within 24 hours of a battery discharge < [110] V or a battery overcharge > [150] V, the battery must be demonstrated to meet Category B limits. Transients, such as motor starting transients, which may momentarily cause battery voltage to drop to ≤ [110] V, do not constitute a battery discharge

MOVE SR 3.8.6.2
from SR 3.8.4.8

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The Train A and Train B DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>INSERT 3.8.4 ACTIONS</p> <p>A. One DC electrical power subsystem inoperable for reasons other than Condition A or B.</p>	<p>A.1 C</p> <p>Restore DC electrical power subsystem to OPERABLE status.</p>	<p>[2] hours</p>
<p>B. Required Action and associated Completion Time not met.</p> <p>D</p>	<p>B.1 D AND B.2 O</p> <p>Be in MODE 3.</p> <p>Be in MODE 5.</p>	<p>6 hours</p> <p>36 hours</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.4.1 Verify battery terminal voltage is \geq [229/258] V on float charge, greater than or equal to the minimum established float voltage</p>	<p>7 days</p>

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 DC electrical power subsystem shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

APPLICABILITY: MODES 5 and 6,
 During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p><i>INSERT 3.8.5 ACTIONS</i> →</p> <p><i>A.</i> One or more required DC electrical power subsystems inoperable, <i>B</i></p> <p><i>[For reasons other than Condition A.</i> <i>OR</i> <i>Required Action and associated Completion Time of Condition A not met.]</i></p>	<p><i>A.1</i> Declare affected required feature(s) inoperable. <i>B</i></p> <p><u>OR</u></p> <p><i>A.2.1</i> Suspend CORE ALTERATIONS. <i>B</i></p> <p><u>AND</u></p> <p><i>A.2.2</i> Suspend movement of irradiated fuel assemblies. <i>B</i></p> <p><u>AND</u></p> <p><i>A.2.3</i> Initiate action to suspend operations involving positive reactivity additions. <i>B</i></p> <p><u>AND</u></p>	<p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>(continued)</p>

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

INSERT IEEE-450
 REVIEWERS NOTE

LCO 3.8.6 Battery cell parameters for the Train A and Train B batteries shall be within the limits of Table 3.8.6-1.

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 or more batteries with one or more battery cell parameters not within Category A or B limits.	A.1 Verify pilot cell[s] electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.	1 hour
	<u>AND</u>	
	A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C limits.	24 hours
	<u>AND</u>	Once per 7 days thereafter
	<u>AND</u>	
	A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days

INSERT
 3.8.6 ACTIONS

(continued)

TSTF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The [Division 1 and Division 2 station service, and DG 1B, 2A, and 2C] DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS		
CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. One DC electrical power subsystem inoperable <i>for reasons other than Condition A or B</i></p>	<p>A.1 Restore DC electrical power subsystem to OPERABLE status.</p>	<p>[2] hours</p>
<p>B. Required Action and Associated Completion Time of Condition A not met for station service DC subsystem.</p> <p><i>(B, or C)</i></p>	<p>B.1 Be in MODE 3.</p>	<p>12 hours</p>
	<p>B.2 Be in MODE 4.</p>	<p>36 hours</p>
<p>E. Required Action and associated Completion Time of Condition A not met for DG DC subsystem.</p>	<p>E.1 Declare associated DG inoperable.</p>	<p>Immediately</p>

TSTF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 DC electrical power subsystems shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

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

INSERT 3.8.5 ACTIONS		
CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. One or more required DC electrical power subsystems inoperable.</p> <p>B. [For reasons other than Condition A, OR Required Action and associated Completion Time of Condition A not met.]</p>	<p><u>B</u></p> <p>A.1 Declare affected required feature(s) inoperable.</p>	Immediately
	<p><u>OR</u></p> <p>A.2.1 Suspend CORE ALTERATIONS.</p>	Immediately
	<p><u>AND</u></p> <p>A.2.2 Suspend movement of irradiated fuel assemblies in the [secondary] containment.</p>	Immediately
	<p><u>AND</u></p>	(continued)

TSTF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery ~~Cell~~ Parameters

INSERT IEEE-450
REVIEWERS NOTE

LCO 3.8.6 Battery ~~Cell~~ parameters for the [station service and DG] batteries shall be within ~~the~~ limits ~~of Table 3.8.6-1~~.

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
<p>A. One or more batteries with one or more battery cell parameters not within Category A or B limits.</p> <p>INSERT 3.8.6 ACTIONS</p>	<p>A.1 Verify pilot cell[s] electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.</p>	1 hour
	<p>AND</p> <p>A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C limits.</p>	<p>24 hours</p> <p>AND</p> <p>Once per 7 days thereafter</p>
	<p>AND</p> <p>A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.</p>	31 days

(continued)

TSTF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The [Division 1], [Division 2], and [Division 3] DC electrical power subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

INSERT 3.8.4 ACTIONS

ACTIONS			
CONDITION		REQUIRED ACTION	COMPLETION TIME
<p>A. [Division 1 or 2] DC electrical power subsystem inoperable. C for reasons other than Condition A or B</p>	<p>K.1 C</p>	<p>Restore [Division 1 and 2] DC electrical power subsystems to OPERABLE status.</p>	<p>[2] hours</p>
<p>B. [Division 3] DC electrical power subsystem inoperable. D for reasons other than Condition A or B</p>	<p>K.1 D</p>	<p>Declare High Pressure Core Spray System [and 2C Standby Service Water System] inoperable.</p>	<p>Immediately</p>
<p>K. Required Action and associated Completion Time not met. E</p>	<p>E K.1 AND K.2 E</p>	<p>Be in MODE 3.</p> <p>Be in MODE 4.</p>	<p>12 hours</p> <p>36 hours</p>

TSTF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 DC electrical power subsystem(s) shall be OPERABLE to support the electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems—Shutdown."

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

INSERT 3.8.5 ACTIONS

ACTIONS CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. One or more required DC electrical power subsystems inoperable; B</p> <p><i>[For reasons other than Condition A, OR Required Action and associated Completion Time of Condition A not met.]</i></p>	<p>A.1 B Declare affected required feature(s) inoperable.</p> <p>OR</p> <p>A.2.1 B Suspend CORE ALTERATIONS.</p> <p>AND</p> <p>A.2.2 B Suspend movement of irradiated fuel assemblies in the [primary or secondary] containment.</p> <p>AND</p> <p>A.2.3 B Initiate action to suspend operations with a potential for draining the reactor vessel.</p> <p>AND</p>	<p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>Immediately</p> <p>(continued)</p>

TSTF-360
REV 1

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

INSERT IEEE-4SD
REVIEWER'S NOTE

LCO 3.8.6 Battery ~~cell~~ parameters for the [Division 1, 2, and 3] batteries shall be within the limits of Table 3.8.6-1.

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
<p>A. One or more batteries with one or more battery cell parameters not within Category A or B limits.</p>	<p>A.1 Verify pilot cell[s] electrolyte level and float voltage meet Table 3.8.6-1 Category C limits.</p>	1 hour
	<p><u>AND</u></p> <p>A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C limits.</p>	<p>24 hours</p> <p><u>AND</u></p> <p>Once per 7 days thereafter</p>
	<p><u>AND</u></p> <p>A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.</p>	31 days

INSERT
3.8.6 ACTIONS

(continued)

TSTF-360
REV1

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>F 8. Required Action and associated Completion Time of Condition A not met.</p> <p><u>OR</u></p> <p>One or more batteries with average electrolyte temperature of the representative cells < [60]°F.</p> <p><u>OR</u></p> <p>One or more batteries with one or more battery cell parameters not within Category C values.</p>	<p>F 8.1 Declare associated battery inoperable.</p> <p><i>B, C, D, or E</i></p> <p><i>INSERT 3.8.6 F</i></p>	<p>Immediately</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.6.1 Verify battery cell parameters meet Table 3.8.6-1 Category A limits.</p>	<p>7 days</p>

(continued)

INSERT 3.8.6 SRs

MOVE SR 3.8.6.6 (from SR 3.8.4.8)

TSTF-360
REV. 1

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.6.2 Verify battery cell parameters meet Table 3.8.6-1 Category B limits.</p>	<p>92 days</p> <p><u>AND</u></p> <p>Once within 24 hours after battery discharge < [110] V</p> <p><u>AND</u></p> <p>Once within 24 hours after battery overcharge > [150] V</p>
<p>SR 3.8.6.3 Verify average electrolyte temperature of representative cells is \geq [60]^oF.</p>	<p>92 days</p>

BASES

SURVEILLANCE
REQUIREMENTS
(continued)

SR 3.8.4.6 ²

verifies

This SR requires that each battery charger be capable of supplying [400] amps and [125] V for \geq [8] hours. These requirements are based on the design capacity of the chargers (Ref. 4). According to Regulatory Guide 1.32 (Ref. 10), the battery charger supply is required to be based on the largest combined demands of the various steady state loads and the charging capacity to restore the battery from the design minimum charge state to the fully charged state, irrespective of the status of the unit during these demand occurrences. The minimum required amperes and duration ensures that these requirements can be satisfied. ←

battery →

recommended

9

INSERT
B SR 3.8.4.2

The Surveillance Frequency is acceptable, given the unit conditions required to perform the test and the other administrative controls existing to ensure adequate charger performance during these [18 month] intervals. In addition, this Frequency is intended to be consistent with expected fuel cycle lengths.

This Surveillance is required to be performed during MODES 5 and 6 since it would require the DC electrical power subsystem to be inoperable during performance of the test.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would perturb the electrical distribution system and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.4.7 ³

A battery service test is a special test of battery capability, as found, to satisfy the design requirements (battery duty cycle) of the DC electrical power system. The discharge rate and test length should correspond to the design duty cycle requirements as specified in Reference 4.

The Surveillance Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.32 (Ref. 10) and Regulatory Guide 1.129 (Ref. 11), which state that the battery service test should be performed during refueling operations or at some other outage, with intervals between tests, not to exceed [18 months].

(continued)

TSTF-360
REV 1

Table 3.8.6-1 (page 1 of 1)
Battery Cell Parameter Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE LIMITS FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and $\leq \frac{1}{4}$ inch above maximum level indication mark(a)	> Minimum level indication mark, and $\leq \frac{1}{4}$ inch above maximum level indication mark(a)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 V	≥ 2.13 V	> 2.07 V
Specific Gravity ^{(b)(c)}	$\geq [1.195]$	$\geq [1.190]$ <u>AND</u> Average of all connected cells $> [1.200]$	Not more than 0.020 below average of all connected cells <u>AND</u> Average of all connected cells $\geq [1.190]$

- (a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum level during equalizing charges provided it is not overflowing.
- (b) Corrected for electrolyte temperature and level. Level correction is not required, however, when battery charging is $< [2]$ amps when on float charge.
- (c) A battery charging current of $< [2]$ amps when on float charge is acceptable for meeting specific gravity limits following a battery recharge, for a maximum of $[7]$ days. When charging current is used to satisfy specific gravity requirements, specific gravity of each connected cell shall be measured prior to expiration of the $[7]$ day allowance.

TSTF-360
REV 1

BASES (continued)

ACTIONS

INSERT
3.8.4 ACTION
BASES

^C
A.1

^C

Condition ^A represents one division with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for complete loss of DC power to the affected division. The 2 hour limit is consistent with the allowed time for an inoperable DC distribution system division.

For reasons other than condition A or B

If one of the required [Division 1 or 2] DC electrical power subsystems is inoperable (e.g., inoperable battery, inoperable battery charger, or inoperable battery charger and associated inoperable battery), the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition. Since a subsequent worst case single failure could, however, result in the loss of minimum necessary DC electrical subsystems, continued power operation should not exceed 2 hours. The 2 hour Completion Time is based on Regulatory Guide 1.93 (Ref. 7) and reflects a reasonable time to assess unit status as a function of the inoperable DC electrical power subsystem and, if the DC electrical power subsystem is not restored to OPERABLE status, to prepare to effect an orderly and safe unit shutdown.

^D

B.1

With the Division 3 DC electrical power subsystem inoperable, the HPCS and 2C Standby Service Water System may be incapable of performing their intended functions and must be immediately declared inoperable. This declaration also requires entry into applicable Conditions and Required Actions of LCO 3.5.1, "ECCS—Operating," [and LCO 3.7.1, "Standby Service Water (SSW)] System and [Ultimate Heat Sink (UHS)"]].

^E ^E
C.1 and C.2

inoperable

If the DC electrical power subsystem cannot be restored to OPERABLE status within the associated Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources - Shutdown

LCO 3.8.5 DC electrical power subsystems shall be OPERABLE to support the DC electrical power distribution subsystem(s) required by LCO 3.8.10, "Distribution Systems - Shutdown."

APPLICABILITY: MODES {5 and 6},
During movement of irradiated fuel assemblies.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>[A. One [or two] battery charger[s] on one {PWR: train BWR: division}] inoperable.</p> <p><u>AND</u></p> <p>The redundant {PWR: train BWR: division} battery and charger[s] OPERABLE.</p>	<p>A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.</p>	[2] hours
	<p><u>AND</u></p> <p>A.2 Verify battery float current \leq [2] amps.</p>	Once per [12] hours
	<p><u>AND</u></p> <p>A.3 Restore battery charger[s] to OPERABLE status.</p>	7 days]

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>B. One or more required DC electrical power subsystems inoperable for reasons other than Condition A.</p> <p><u>OR</u></p> <p>Required Action and associated Completion Time of Condition A not met.</p>	<p>B.1 Declare affected required feature(s) inoperable.</p> <p><u>OR</u></p>	<p>Immediately</p>
	<p>B.2.1 Suspend CORE ALTERATIONS.</p> <p><u>AND</u></p>	<p>Immediately</p>
	<p>B.2.2 Suspend movement of irradiated fuel assemblies.</p> <p><u>AND</u></p>	<p>Immediately</p>
	<p>B.2.3 {PWR: Initiate action to suspend operations involving positive reactivity additions.} {BWR: Initiate action to suspend operations with a potential for draining the reactor vessel.}</p> <p><u>AND</u></p>	<p>Immediately</p>
	<p>B.2.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status.</p>	<p>Immediately</p>

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.5.1</p> <p>-----NOTES----- The following SRs are not required to be performed: SR 3.8.4.2 and SR 3.8.4.3.</p> <p>-----</p> <p>For DC sources required to be OPERABLE, the following SRs are applicable:</p> <p>SR 3.8.4.1, SR 3.8.4.2, and SR 3.8.4.3.</p>	<p>In accordance with applicable SRs</p>

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>-----NOTE----- Required Action C.2 shall be completed if electrolyte level was below the top of plates. -----</p> <p>C. One [or two] batter[y][ies on one {PWR: train BWR: division}] with one or more cells electrolyte level less than minimum established design limits.</p>	<p>-----NOTE----- Required Actions C.1 and C.2 are only applicable if electrolyte level was below the top of plates. -----</p> <p>C.1 Restore electrolyte level to above top of plates.</p> <p><u>AND</u></p> <p>C.2 Verify no evidence of leakage.</p> <p><u>AND</u></p> <p>C.3 Restore electrolyte level to greater than or equal to minimum established design limits.</p>	<p>8 hours</p> <p>12 hours</p> <p>31 days</p>
<p>D. One [or two] batter[y][ies on one {PWR: train BWR: division}] with pilot cell electrolyte temperature less than minimum established <i>design limits.</i></p>	<p>D.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.</p>	<p>12 hours</p>
<p>E. One or more batteries in redundant {PWR: trains BWR: divisions} with battery parameters not within limits.</p>	<p>E.1 Restore battery parameters for batteries in one {PWR: train BWR: division} to within limits.</p>	<p>2 hours</p>
<p>F. Required Actions and associated Completion Time of Condition A, B, C, D, or E not met.</p> <p><u>OR</u></p> <p>One or more batteries float current > [10] amps.</p>	<p>F.1 Declare associated battery inoperable.</p>	<p>Immediately</p>

One [or two] batter[y][ies on one {PWR: train BWR: division}] with one or more battery cells float voltage < [2.07]V and float current > [2] amps.