Enclosure 1
Markup of TSTF-360 STS 3.8.4, 3.8.5, and 3.8.6 and Bases

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

Restore battery terminal voltage to greater than or equal to the minimum established float voltage.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One [or two] battery charger[s on one {train}] inoperable.	A.1 ~~Verify associated batter[y][ies] not discharging.~~	2 hours
	AND	
	Verify battery float current ≤ [2] amps.	
	A.2 ~~Determine the associated batter[y][ies] state of charge is sufficient to perform the design duty cycle.~~	Once per 12 hours
	AND	
	A.3 Restore battery charger[s] to OPERABLE status.	7 days
[B. One [or two] batter[y][ies on one train] inoperable.	B.1 Restore batter[y][ies] to OPERABLE status.	[2] hours]
C. One DC electrical power subsystem inoperable for reasons other than Condition A [or B].	C.1 Restore DC electrical power subsystem to OPERABLE status.	[2] hours
D. Required Action and associated Completion Time not met.	D.1 Be in MODE 3.	{6} hours
	AND	
	D.2 Be in MODE {5}.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage.	7 days
SR 3.8.4.2	greater than or equal to Verify each battery charger supplies ≥ [400] amps at the minimum established float voltage for ≥ [~~4~~ 8] hours. **OR** Verify each battery charger can recharge the battery to the fully charged state within [24] 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.	[18 months]
SR 3.8.4.3	----------NOTES---------- 1. The modified performance discharge test in SR 3.8.6.6 may be performed in lieu of SR 3.8.4.3. 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. ---------- 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.	[18 months]

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

Restore battery terminal voltage to greater than or equal to the minimum established float voltage.

CONDITION	REQUIRED ACTION	COMPLETION TIME
[A. One [or two] battery charger[s on one {train}] inoperable. AND The redundant {train} battery and charger[s] OPERABLE.	A.1 ~~Verify associated batter[y][ies] not discharging.~~ AND Verify battery float current ≤ [2] amps. A.2 ~~Determine the associated batter[y][ies] state of charge is sufficient to perform the design duty cycle.~~ AND A.3 Restore battery charger[s] to OPERABLE status.	[2] hours Once per 12 hours 7 days]
B. One DC electrical power subsystem inoperable[for reasons other than Condition A. OR Required Action and associated Completion Time of Condition A not met].	B.1 Declare affected required feature(s) inoperable. OR B.2.1 Suspend CORE ALTERATIONS. AND B.2.2 Suspend movement of irradiated fuel assemblies. AND B.2.3 {PWR: Initiate action to suspend operations involving	Immediately Immediately Immediately Immediately

CONDITION	REQUIRED ACTION	COMPLETION TIME
	positive reactivity additions.} {BWR: Initiate action to suspend operations with a potential for draining the reactor vessel.}	
	AND	Immediately
	B.2.4 Initiate action to restore required DC electrical power subsystems to OPERABLE status.	

SURVEILLANCE REQUIREMENTS

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

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

as specified in Specification 5.5.X

REVIEWER'S NOTE

Licensee's must also implement a program to monitor battery parameters that is 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."

LCO 3.8.6 Battery parameters for the {Train A and Train B} 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.

B.1 Perform SR 3.8.4.1 2 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~One or more batteries~~ with one or more battery cells float voltage < [2.07] V.	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 voltage ≥ [2.07] V.	24 hours
B. ~~One or more batteries~~ float current > [2] amps.	~~B.1~~ B.2 Restore battery float current to ≤ [2] amps.	~~24~~ 12 hours
NOTE Required Actions C.1 and C.3 shall be completed if electrolyte level was below the top of plates.	C.1 Restore electrolyte level to above top of plates.	8 hours
	AND	
	~~C.2~~ NOTE Only applicable if electrolyte level was below the top of plates.	
C. ~~One or more batteries~~ with one or more cells electrolyte level less than minimum established design limits.	~~Perform SR 3.8.6.5 for affected~~	~~Once per 12 hours~~

One [or two] batter[y][ies on one train]

Required Actions C.1, C.2, and C.3 are

C.2 Verify no evidence of leakage by visual inspection. 12 hours
AND

CONDITION	REQUIRED ACTION	COMPLETION TIME
	C.3 ~~cell(s).~~ Initiate action to equalize and test in accordance with manufacturer's recommendation. AND C.4 Restore electrolyte level to greater than or equal to minimum established design limits.	~~for 7 days~~ 12 hours 31 days
One [or two] batter[y] [ies on one train] D. ~~One or more batteries~~ 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.~~ F. Required Actions and associated Completion Time of Condition A, B, C, or D not met. ~~OR~~ ~~One or more batteries float current > [10] amps.~~	~~E.1~~ F. Declare associated battery inoperable. OR One [or two] batter[y] [ies on one train] with one battery cells float voltage < [2.07] V and float current > [2] amps.	Immediately
E. One or more batteries in redundant trains with cell parameters not within limits.	E.1 Restore cell parameters for batteries in one train to within limits.	2 hours.

~~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.	7 days
SR 3.8.6.2	Verify each battery pilot cell voltage is ≥ [2.07] V.	31 days
SR 3.8.6.3	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.4	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	31 days

SURVEILLANCE		FREQUENCY
SR 3.8.6.5	Verify each battery connected cell voltage is ≥ [2.07] V.	92 days
SR 3.8.6.6	——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. ——————————— Verify battery capacity is ≥ [80]% of the manufacturer's rating when subjected to a performance discharge test or a modified performance discharge test.	60 months 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

Insert for Section 5.5

5.5.X Battery Monitoring and Maintenance Program

This program provides for battery monitoring and maintenance that is 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." The program shall include, but not be limited to, the following:

Provisions for taking the battery manufacturer's prescribed actions when one or more battery cells' float voltage is found < [2.13] V.

[Each battery also has adequate storage capacity to meet the assumed duty cycle for the station blackout event.]

INSERT: Battery Capacity

... meet the assumed duty cycle for the ~~bounding~~ design basis event. Additional margin is designed and supports the ability of the battery to carry the DC loads continuously for ~~approximately~~ [2] hours as discussed in the FSAR, Chapter [8] (Ref. 4).

at least

[in the design basis event scenario and for at least [4] hours in the station blackout scenario]

INSERT: Vpc Bases

... The minimum design voltage limit is 105/210 V.

The battery cells are of flooded lead acid construction with a nominal specific gravity of [1.215]. This specific gravity corresponds to an open circuit battery voltage of approximately 120 V for a [58] cell battery (i.e., cell voltage of [2.065] volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage ≥ [2.065] Vpc, the battery cell will maintain its capacity for [30] days without further charging per manufacturer's instructions. Optimal long term performance however, is obtained by maintaining a float voltage [2.22 to 2.28] Vpc. This provides adequate over-potential which limits the formation of lead sulfate and self discharge. The nominal float voltage of [2.25] Vpc corresponds to a total float voltage output of [130.5] V for a [58] cell battery as discussed in the FSAR, Chapter [8] (Ref. 4).

INSERT: Charger

~~This charging capacity exceeds the minimum requirements for the charger to support the required DC loads in analyzed accidents. This excess capability supports minimizing the operational limitations imposed on battery testing and associated recharging.~~

The battery charger is normally in the float-charge mode. Float-charge is the condition in which the charger is supplying the connected loads and the battery cells are receiving adequate current to optimally charge the battery. This assures the internal losses of a battery are overcome and the battery is maintained in a fully charged state.

When desired, the charger can be placed in the equalize mode. The equalize mode is at a higher voltage than the float mode and charging current is correspondingly higher. The battery charger is operated in the equalize mode after a battery discharge or for routine maintenance. Following a battery discharge, the battery recharge characteristic accepts current at the current limit of the battery charger (if the discharge was significant, e.g., following a battery service test) until the battery terminal voltage approaches the charger voltage setpoint. Charging current then reduces exponentially during the remainder of the recharge cycle. Lead-calcium batteries have recharge efficiencies of greater than 95%, so once at least 105% of the ampere-hours discharged have been returned, the battery capacity would be restored to the same condition as it was prior to the discharge. This can be monitored by direct observation of the exponentially decaying charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery.

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 establishing and maintaining the battery capable of supporting its required post-accident function. Required Action A.1 requires that any associated battery discharge be terminated within 2 hours. Provided a means (either via the inoperable charger or an alternate means) of maintaining battery terminal voltage ≥ [2.07] Vpc is provided, the battery capacity will be maintained without further discharge. This also reflect s a DC bus voltage that assures sufficient voltage to continue to support OPERABILITY of the associated required DC loads. The Completion Time of 2 hours assures that any battery discharge that was experienced prior to establishing alternate charging is limited to a 2 hour discharge.

Required Action A.2 allows 12 hours to establish that the battery capacity remains (or is restored) sufficient to perform its required safety function (duty cycle) and further requires that this determination be periodically re-verified. This provides assurance that in the event of a DBA during the 7 days allowed by Required Action A.3 to restore the battery charger to OPERABLE status, the battery will be available to perform its assumed function. If at the expiration of the initial 12 hour period the battery capacity can not be determined to be sufficient to perform the design duty cycle, the battery must be declared inoperable and Condition [B] entered. It is not required to perform a test (e.g., battery service test) to confirm the batter capacity; rather the intent of this Required Action is to evaluate the capacity based on available operational data. The ability of the battery to satisfy this Required Action can be evaluated by indirect means, such as observation of the charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery. Consideration of excess capacity that was determined by previous testing may also be utilized in this evaluation.

During the 12 hour Completion Time of Required Action A.2, provided the battery is otherwise not known to be inoperable (including charging currents not in excess of [10] amps), the battery may be considered OPERABLE and operation continued in accordance with Action A. This is an acceptable presumption based on the limited discharge of the battery (< 2 hour), the expectation that at least some recharge is occurring (Required Action A.1 assures no further discharging is occurring), and that confirmation will be available within 12 hours of discovery of the inoperable battery charger.

Required Action A.3 limits the restoration time for the inoperable battery charger to 7 days. During the 7 day period the battery terminal voltage may have been maintained below the minimum established float voltage. However, given the limited time at a reduced float voltage, the assurance of not continually discharging the battery, and assurance that sufficient battery capacity remains to perform its intended function, the 7 day Completion Time reflects a reasonable time to effect restoration of the battery charger to OPERABLE status.

Replace with
New Insert:
3.8.4 ACTION Bases

INSERT: 3.8.4 ACTION Bases (continued)

B.1

REVIEWERS NOTE

Delete ACTION B if Required Action B.1 Completion Time is the same as Required Action C.1 Completion Time. A [12] hour Completion Time may be considered for Required Action B.1 (as outlined in the optional Bases provided at the end of the Required Action B.1 Bases below) based on compensatory factors acceptable to the NRC Staff.

Replace with New Insert: 3.8.4 ACTION Bases

Condition B represents one {PWR: train}{BWR: division} with one [or two] batter[y][ies] inoperable. With one [or two] batter[y][ies] inoperable, the DC bus is being supplied by the OPERABLE battery charger[s]. Any event that results in a loss of the AC bus supporting the battery charger[s] will also result in loss of DC to that {train}. Therefore, it is imperative that the operator's attention focus on stabilizing the unit, thereby minimizing the potential for complete loss of DC power to the affected {train}. The [2] hour limit allows sufficient time to effect restoration of an inoperable battery while minimizing the risk of a loss of AC power to the associated battery charger as a result of imposing a required unit shutdown. During this time, additional single failures are not required to be assumed. Therefore, even in the event of a loss of offsite power (alone or in conjunction with a DBA), the battery charger will be expected to restore power to the DC subsystem after the associated diesel generator is connected. [As such, 12 hours is an acceptable extension to the period allowed for: 1) loss of both the battery and the charger (LCO 3.8.4, Condition C), or 2) for the complete deenergization of the DC bus (LCO 3.8.9, ACTIONS).]

INSERT: SR 3.8.4.1 Bases

..., while supplying the continuous steady state loads of the associated DC subsystem. On float charge, battery cells will receive adequate current to optimally charge the battery. The voltage requirements are based on the nominal design voltage of the battery and are consistent with the minimum float voltage established by the battery manufacturer ([2.25] Vpc or [130.5] V at the battery terminals). This voltage maintains the battery plates in a condition that supports maintaining the grid life (expected to be approximately 20 years).

INSERT: SR 3.8.4.2 Bases

This charging capacity exceeds the minimum requirements for the charger to support the required DC loads in analyzed accidents. This excess capability supports minimizing the operational limitations imposed on battery testing and associated recharging.

largest combined demands of the various continuous steady state loads (irrespective of the status of the plant during which these demands occur). This level of loading may not normally be be available following the battery service test and will need to be supplemented with additional loads.

[8]

This SR provides two options. One option requires that each battery charger be capable of supplying [400] amps at the minimum established float voltage for [4] hours. The ampere requirements are based on the output rating of the chargers. The voltage requirements are based on the charger voltage level after a response to a loss of AC power. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least [2] hours.

The other option requires that each battery charger be capable of recharging the battery after a service test coincident with supplying the ~~expected normal operating loads~~. The duration for this test may be longer than the charger sizing criteria since the battery recharge is affected by float voltage, temperature, and the exponential decay in charging current. The battery is recharged when the measured charging current is ≤ [2] amps.

INSERT: Bases SR 3.8.6.6

Add New Insert: 3.8.5 Applicable Safety Analysis Bases

... 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

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.

Replace with New 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) and the redundant {PWR: train}{BWR: division} battery and charger[s] OPERABLE. The ACTIONS provide a tiered response that focuses on establishing and maintaining the battery capable of supporting its required post-accident function. Required Action A.1 requires that any associated battery discharge be terminated within 2 hours. Provided a means (either via the inoperable charger or an alternate means) of maintaining battery terminal voltage ≥ [2.07] Vpc is provided, the battery capacity will be maintained without further discharge. This also reflect s a DC bus voltage that assures sufficient voltage to continue to support OPERABILITY of the associated required DC loads. The Completion Time of 2 hours assures that any battery discharge that was experienced prior to establishing alternate charging is limited to a 2 hour discharge.

Required Action A.2 allows 12 hours to establish that the battery capacity remains (or is restored) sufficient to perform its required safety function (duty cycle) and further requires that this determination be periodically re-verified. This provides assurance that in the event of a DBA during the 7 days allowed by Required Action A.3 to restore the battery charger to OPERABLE status, the battery will be available to perform its assumed function. If at the expiration of the initial 12 hour period the battery capacity can not be determined to be sufficient to perform the design duty cycle, the battery must be declared inoperable and Condition [B] entered. It is not required to perform a test (e.g., battery service test) to confirm the batter capacity; rather the intent of this Required Action is to evaluate the capacity based on available operational data. The ability of the battery to satisfy this Required Action can be evaluated by indirect means, such as observation of the charging current or by evaluating the amp-hours discharged from the battery and amp-hours returned to the battery. Consideration of excess capacity that was determined by previous testing may also be utilized in this evaluation.

During the 12 hour Completion Time of Required Action A.2, provided the battery is otherwise not known to be inoperable (including charging currents not in excess of [10] amps), the battery may be considered OPERABLE and operation continued in accordance with Action A. This is an acceptable presumption based on the limited discharge of the battery (< 2 hour), the expectation that at least some recharge is occurring (Required Action A.1 assures no further discharging is occurring), and that confirmation will be available within 12 hours of discovery of the inoperable battery charger.

Required Action A.3 limits the restoration time for the inoperable battery charger to 7 days. During the 7 day period the battery terminal voltage may have been maintained below the minimum established float voltage. However, given the limited time at a reduced float voltage, the assurance of not continually discharging the battery, and assurance that sufficient battery capacity remains to perform its intended function, the 7 day Completion Time reflects a reasonable time to effect restoration of the battery charger to OPERABLE status.

as specified in Specification 5.5.[X]

INSERT: 3.8.6 Background Bases

... In addition to the limitations of this Specification, the [licensee controlled program] also implements a program for monitoring various battery parameters that is 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" (Ref.1).

The battery cells are of flooded lead acid construction with a nominal specific gravity of [1.215]. This specific gravity corresponds to an open circuit battery voltage of approximately 120 V for a [58] cell battery (i.e., cell voltage of [2.065] volts per cell (Vpc)). The open circuit voltage is the voltage maintained when there is no charging or discharging. Once fully charged with its open circuit voltage ≥ [2.065] Vpc, the battery cell will maintain its capacity for [30] days without further charging per manufacturer's instructions. Optimal long term performance however, is obtained by maintaining a float voltage [2.22 to 2.28] Vpc. This provides adequate over-potential which limits the formation of lead sulfate and self discharge. The nominal float voltage of [2.25] Vpc corresponds to a total float voltage output of [130.5] V for a [58] cell battery as discussed in the FSAR, Chapter [8] (Ref. 2).

~~The current flow into the battery is also a primary parameter used to monitor the capacity of the battery. During a service test or performance test discharge, the fully charged battery voltage (nominal open circuit voltage at [2.065] Vpc) will decrease to approximately [1.8] Vpc (or for a [58] cell battery [105] V battery terminal voltage). The battery recharges at the current limit of the battery charger ([400] amps) until the battery terminal voltage approaches the voltage setpoint for the charger (or equalize the battery terminal voltage will be approximately 135 V or 2.33 Vpc). Charging current reduces exponentially during the remainder of the recharge cycle. Industry test data has shown that when charging at float voltage or greater, and the charging current reduces to approximately [2] amps, 98% of the original battery capacity is restored. Industry test data has also shown that when charging at equalize voltage, and the charging current reduces to approximately 13% of the chargers current limit setting ([52] amps), 95% of the original battery capacity has been restored. With the designed margins in batter sizing and the excess capacity available above the maximum assumed load, battery OPERABILITY (including post maintenance return to service) is assured at charging currents well above [10] amps.~~

INSERT: 3.8.6 LCO Bases

as specified in Specification 5.5.[X].

... Additional preventative maintenance, testing, and monitoring performed in accordance with the [licensee controlled program] is conducted without direct impact on the requirements of this Specification. Failure of any [licensee controlled program] requirement is evaluated against the Technical Specification limits, OPERABILITY determinations, and [Maintenance Rule Program], but does not necessarily result in failure to meet this LCO.

INSERT: 3.8.6 ACTION Bases

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

(in one {PWR: train}{BWR: division})

With one or more cells in one or more batteries < [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.

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. (Condition F)

(appropriate Condition(s) depending on the cause of the failure)

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 ~~applicable Condition in the associated Specification~~ is entered.

B.1 and B.2

(in one {PWR: train}{BWR: division} with)

~~With~~ one or more batteries 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. It is noted that should the battery float current reach > [10] amps, the battery is considered inoperable. However, while > [2] amps (but ≤ [10] amps) the battery capacity remains sufficient to perform its intended safety function. Taking into consideration that, while battery capacity is degraded, sufficient capacity exists to perform the intended function and to allow time to fully restore the battery parameters to normal limits, this time is acceptable for operation prior to declaring the DC batteries inoperable.

Replace with New Insert: 3.8.6 ACTION Bases B.1 and B.2

C.1, C.2, C.3, and C.4

(in one {PWR: train}{BWR: division})

(above the top of the plates but)

With one or more batteries with one or more cells electrolyte level below the minimum established design limits, the battery still retains sufficient capacity to perform the intended function. ~~Even in the event level drops slightly below the top of the plates, the plates are porous and acid will wick from the immersed plate~~. Therefore, the affected battery is not required to be considered inoperable solely as a result of electrolyte level not met. ~~Within 8 hours level is required to be restored to above the top of plates and~~ within 31 days the minimum established design limits for electrolyte level must be re-established.

Replace with New Insert: 3.8.6 ACTION Bases C.1, C.2, C.3, and C.4

Required Action C.2 is modified by a Note that requires that the affected cell voltage be monitored (SR 3.8.6.5) only if electrolyte level was below the top of the plates. Furthermore, Condition C is modified by a Note that requires Required Action C.2 be completed whenever electrolyte is discovered below the top of the plates. Since this Condition may be exited well before the end of the 7 day period, this Note is required to complete the necessary monitoring period. With electrolyte level below the top of plates there is a potential for dryout and plate degradation. Therefore, this monitoring will ensure continued plate integrity. Since the Required Action only specifies "perform," a failure of SR 3.8.6.5 acceptance criteria does not result in this Required Action not met. However, if one or more cell voltages fail to meet SR 3.8.6.5, Condition A is entered.

D.1

(in one {PWR: train}{BWR: division})

With one or more batteries with pilot cell temperature less than the minimum established design limits, 12 hours is allowed to restore the temperature to within limits. A low electrolyte temperature limits the current and power available. Since the battery is sized with margin, while battery 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.

Add → New Insert: 3.8.6 ACTION Basis E.1

INSERT: 3.8.6 E.1 Bases

Replace with New Insert: 3.8.6 ACTION Basis F.1 →

~~... discovering battery float charging current > [10] amps reflects sufficient loss of margin in battery capacity that immediately declaring the associated battery inoperable is required. This results in entering the ACTIONS of LCO 3.8.4.~~

INSERT: 3.8.6 SR Bases

SR 3.8.6.1

Verifying battery float current while on float charge is used to determine the state of charge of the battery. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a charged state. The float current requirements are based on the float current indicative of a charged battery. Use of float current to determine the state of charge of the battery is consistent with IEEE-450 (Ref. 1). The 7 day Frequency is consistent with IEEE-450 (Ref. 1).

This SR is modified by a Note that states the float current requirement is not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1. When this float voltage is not maintained the Required Actions of LCO 3.8.4 ACTION A are being taken, which provides the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of [2] amps is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained.

SR 3.8.6.2 and SR 3.8.6.5

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 at the battery terminals or [2.25] V per cell. This provides adequate over-potential which limits the formation of lead sulfate and self discharge, which could eventually render the battery inoperable. The Frequency for cell voltage verification every 31 days for pilot cell and 92 days for each connected cell is consistent with IEEE-450 (Ref. 1).

Float voltages in this range or less, but greater than [2.07] Vpc are addressed in Specification 5.5.[X]. Surveillances 3.8.6.2 and 3.8.6.5 require verification that the cell float voltages are equal to or greater than the short term absolute minimum voltage of [2.07] V.

SR 3.8.6.3

The limit specified for electrolyte level ensures that the plates suffer no physical damage and maintains adequate electron transfer capability. The Frequency is consistent with IEEE-450 (Ref. 1).

SR 3.8.6.4

This Surveillance ~~verification~~ verifies that the pilot cell temperature is greater than or equal to the minimum established design limit (i.e., [40]°F). Pilot cell electrolyte temperature is maintained above this temperature to assure the battery can provide the required current and voltage to meet the design requirements. Temperatures lower than assumed in battery sizing calculations act to inhibit or reduce battery capacity. The Frequency is consistent with IEEE-450 (Ref. 1).

TSTF-360

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

~~E.1~~

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

battery

~~With one~~ ~~or more batteries with~~ one or more battery ~~cell~~ parameter~~s~~ is outside the Category C limit for any connected ~~cell~~ battery, 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~~ When any 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.

INSERT 3.8.6 E.1 BASES

* Replace with New Immed. ACTION Bases F.1

SURVEILLANCE REQUIREMENTS

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.

INSERT 3.8.6 SR BASES

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 3.8.6.6 FROM SR 3.8.4.8

(continued)