SOUTHERN CALIFORNIA
EDISON®
An *EDISON INTERNATIONAL*® Company

Brian Katz
Vice President

November 30, 2007

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D.C. 20555

Subject: **Docket Nos. 50-361 and 50-362**
Proposed Change Number (PCN)-548, Revision 3
Battery and DC Sources Upgrades and Cross-Tie
San Onofre Nuclear Generating Station, Units 2 and 3

References: See Enclosure 1

Dear Sir or Madam:

Pursuant to 10CFR50.90, Southern California Edison (SCE) hereby requests the following amendment to operating licenses NPF-10 and NPF-15 for the San Onofre Nuclear Generating Station (SONGS), Units 2 and 3, respectively, to revise Technical Specifications (TSs) 3.8.1, "AC Sources – Operating," 3.8.4, "DC Sources – Operating," 3.8.5, "DC Sources – Shutdown," 3.8.6, "Battery Cell Parameters," 3.8.7, "Inverters – Operating," 3.8.9, "Distribution Systems – Operating," and 3.8.10, "Distribution Systems – Shutdown." This change will also add a new Battery Monitoring and Maintenance Program, TS Section 5.5.2.17. This revised amendment request completely supersedes our submittal of March 30, 2007, and incorporates the information provided in Reference 1.

The proposed TS changes will provide operational flexibility supported by DC electrical subsystem design upgrades that are in progress. These upgrades will provide increased capacity batteries, additional battery chargers, and the means to cross-connect DC subsystems while meeting all design battery loading requirements. With these modifications in place, it will be feasible to perform routine surveillances as well as battery replacements online.

As discussed in Reference 5, this license amendment request to permit an extended Completion Time when batteries are cross-tied is a pilot application of Regulatory Guide 1.200 For Trial Use, "Assessment Results for Risk-Informed Activities," and the associated draft Standard Review Plan, Chapter 19.1, "Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities." As also discussed in Reference 5, the NRC has indicated this review of pilot applications is eligible for a waiver of review fees.

P.O. Box 128
San Clemente, CA 92674-0128
949-368-9275
Fax 949-368-9881

A001
HRR

The proposed change includes upgrade of the battery maintenance practices to conform to i) industry standard IEEE 450-2002, in lieu of the current commitment to the 1980 revision, and/or ii) improved specifications as per Technical Specification Task Force (TSTF)-360, Revision 1, "DC Electrical Rewrite." Specific engineering evaluations and concurrence from the battery manufacturer have been used to justify the proposed changes where appropriate.

Also, the proposed change will revise terminology of trains, channels, systems, and subsystems to make the licenses for SONGS Units 2 and 3 consistent with industry convention.

The SONGS DC electrical system is a robust design with four full-capacity battery subsystems providing power to the four independent instrument and DC power subsystems. With this proposed change to the Technical Specifications, the routine operation with four battery subsystems will be maintained with an allowance to temporarily operate with three batteries supporting the four power subsystems to enable routine testing as well as scheduled or emergent maintenance with the Unit in Modes 1-4.

The Probabilistic Risk Assessment provided in Attachment I to Enclosure 3 has not changed from the last full submittal [Reference 3] which incorporated the responses to the NRC Request for Information [Reference 4]. There were no changes to Attachment I due to the most recent Request for Additional Information [Reference 2].

SCE has evaluated these requests under the standards set forth in 10CFR50.92(c) and determined that a finding of "no significant hazards consideration" is justified.

SCE requests the approval of the proposed amendments within one year. Once approved, the amendments shall be implemented within 120 days. Please note the battery upgrade project will not necessarily be completed prior to implementation of the amendment.

If you have any questions or require additional information, please contact Ms. Linda T. Conklin at 949-368-9443.

Sincerely,

Brian Katz

Enclosures:

1. References
2. Notarized Affidavits
3. Licensee's Evaluation

Attachments

- A. Existing Technical Specifications pages, Unit 2
- B. Existing Technical Specifications pages, Unit 3
- C. Proposed Technical Specifications pages, Underline and Strikeout, Unit 2
- D. Proposed Technical Specifications pages, Underline and Strikeout, Unit 3
- E. Proposed Technical Specifications pages, Unit 2
- F. Proposed Technical Specifications pages, Unit 3
- G.1. Proposed Bases pages, Unit 2 (for information only and representative for Unit 3)
- G.2. Proposed Licensee Controlled Specifications pages, Unit 2 (for Information only and representative for Unit 3)
- H. Summary of Regulatory Commitments
- I. Probabilistic Risk Assessment (PRA) Evaluation
- J. Responses to Request for Additional Information dated August 10, 2007, annotated with location of responses in Enclosure 3

cc: E. E. Collins, Jr., Regional Administrator, NRC Region IV
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 & 3
N. Kalyanam, NRC Project Manager, San Onofre Units 2 and 3
S. Y. Hsu, Department of Public Health, Radiologic Health Branch

ENCLOSURE 1

REFERENCES

1. August 10, 2007, letter from A. E. Scherer (SCE) to Document Control Desk (NRC), Subject: Response to Request for Additional Information on the Proposed Amendment Regarding Revision to DC Sources – TSTF-360, San Onofre Nuclear Generating Station, Units 2 and 3

2. May 3, 2007 letter from N. Kalyanam (NRC) to R. M Rosenblum (SCE), Subject: San Onofre Nuclear Generating Station, Units 2 and 3 Request for Additional Information on the Proposed Amendment Regarding Revision to DC Sources - TSTF-360 (TAC NOS. MD5140 and MD5141)

3. March 30, 2007 letter from B. Katz (SCE) to Document Control Desk (NRC), Subject: Docket Nos. 50-361 and 50-362, Proposed Change Number (PCN) 548, Revision 2, Battery and DC Sources Upgrades and Cross-Tie, San Onofre Nuclear Generating Station, Units 2 and 3

4. June 19, 2006 letter from A. E. Scherer (SCE) to Document Control Desk (NRC), Subject: Response to NRC Request for Information, Proposed Change Number (PCN)-548, Battery and DC Sources Upgrades and Cross-Tie, San Onofre Nuclear Generating Station, Units 2 and 3

5. March 17, 2004 letter from A. E. Scherer (SCE) to Document Control Desk (NRC), Subject: Letter of Intent to Participate in Probabilistic Risk Assessment Quality Pilot Application Program

ENCLOSURE 2

NOTARIZED AFFIDAVITS

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. for a Class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 2 of the San Onofre Nuclear Generating Station	))))))	Docket No. 50-361 Amendment Application No. 229, Revision 3

SOUTHERN CALIFORNIA EDISON COMPANY, et al. pursuant to 10CFR50.90, hereby submit Amendment Application No. 229, Revision 3. This amendment application consists of Proposed Change No. 548, Revision 3, to Facility Operating License No. NPF-10. Proposed Change No. 548, Revision 3, is a request to revise Technical Specifications (TSs) 3.8.1, "AC Sources – Operating," 3.8.4, "DC Sources – Operating," 3.8.5, "DC Sources – Shutdown," 3.8.6, "Battery Cell Parameters," 3.8.7, "Inverters – Operating," 3.8.9, "Distribution Systems – Operating," and 3.8.10, "Distribution Systems – Shutdown." This change will also add a new Battery Monitoring and Maintenance Program, TS Section 5.5.2.17. This change will extend the Completion Time for an inoperable subsystem battery by allowing manual cross-connect of distribution subsystems, include improvements included in Revision 1 to Technical Specification Task Force (TSTF) – 360, and make editorial modifications more consistent with industry use.

State of California
County of San Diego

Brian Katz

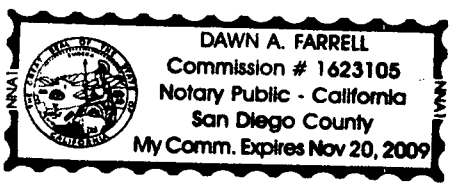
Brian Katz, Vice President

Subscribed and sworn to ~~(or affirmed)~~ before me this 30th day of

November, 2007

personally known to me ~~or proved to me on the basis of satisfactory evidence~~ to be the person who appeared before me.

Signature Dawn A. Farrell
Notary Public



UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. for a Class 103 License to Acquire, Possess, and Use a Utilization Facility as Part of Unit No. 3 of the San Onofre Nuclear Generating Station	)))))	Docket No. 50-362 Amendment Application No. 213, Revision 3

SOUTHERN CALIFORNIA EDISON COMPANY, et al. pursuant to 10CFR50.90, hereby submit Amendment Application No. 213, Revision 3. This amendment application consists of Proposed Change No. 548, Revision 3, to Facility Operating License No. NPF-15. Proposed Change No. 548, Revision 3, is a request to revise Technical Specifications (TSs) 3.8.1, "AC Sources – Operating," 3.8.4, "DC Sources – Operating," 3.8.5, "DC Sources – Shutdown," 3.8.6, "Battery Cell Parameters," 3.8.7, "Inverters – Operating," 3.8.9, "Distribution Systems – Operating," and 3.8.10, "Distribution Systems – Shutdown." This change will also add a new Battery Monitoring and Maintenance Program, TS Section 5.5.2.17. This change will extend the Completion Time for an inoperable subsystem battery by allowing manual cross-connect of distribution subsystems, include improvements included in Revision 1 to Technical Specification Task Force (TSTF) – 360, and make editorial modifications more consistent with industry use.

State of California
County of San Diego

Brian Katz

Brian Katz, Vice President

Subscribed and sworn to ~~(or affirmed)~~ before me this 30th day of

November, 2007

personally known to me ~~or proved to me on the basis of satisfactory evidence~~ to be the person who appeared before me.

Signature Dawn A. Farrell
Notary Public

ENCLOSURE 3

LICENSEE'S EVALUATION

PCN 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

LICENSEE'S EVALUATION

PCN 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

SUBJECT: **Proposed Change No. 548, Rev. 3, is a request to revise Technical Specifications (TSs) 3.8.1, "AC Sources – Operating," 3.8.4, "DC Sources – Operating," 3.8.5, "DC Sources – Shutdown," 3.8.6, "Battery Cell Parameters," 3.8.7, "Inverters – Operating," 3.8.9, "Distribution Systems – Operating," and 3.8.10, "Distribution Systems – Shutdown," and to add new Battery Monitoring and Maintenance Program, TS Section 5.5.2.17.**

1. INTRODUCTION

The proposed change is intended to provide operational flexibility supported by Direct Current (DC) electrical subsystem design upgrades that are in progress. These upgrades will provide increased capacity batteries, additional battery chargers, and the means to cross-connect DC subsystems. With these modifications in place, it will be feasible to perform routine surveillances as well as battery replacements online.

The proposed change includes improvements to the various electrical specifications reflected in Technical Specification Task Force (TSTF) – 360, Revision 1, "DC Electrical Rewrite" [Ref. 7.1] and upgrade of the battery maintenance practices to conform to industry standard IEEE 450-2002. The proposed change will also revise terminology of trains, channels, systems and subsystems to make the San Onofre Nuclear Generating Station (SONGS) licenses consistent with industry convention. Specific engineering evaluations and concurrence from the battery manufacturer have been used to justify the proposed changes where appropriate.

To allow operational flexibility associated with these design upgrades, the proposed change is to amend the Operating Licenses and revise Technical Specification (TS) 3.8.4, "DC Sources – Operating" to extend the Completion Time (CT) for an inoperable subsystem battery by allowing manual cross-connect of DC distribution subsystems A and C, or B and D, during Modes 1-4.

The SONGS DC electrical system is a robust design with four full-capacity battery subsystems providing power to the four independent instrument and DC power subsystems. With this proposed change to the TS, the routine operation with four battery subsystems will be maintained with an allowance to temporarily operate with three batteries supporting the four power subsystems to enable routine testing as well as scheduled or emergent maintenance with the Unit in Modes 1-4.

2. PROPOSED CHANGE

Southern California Edison (SCE) is requesting a change to the SONGS 2 and 3 Technical Specifications. The proposed changes provide DC System operability enhancements to allow battery testing, maintenance, and battery replacement activities online. Additionally, the proposed changes would adopt Technical Specification Task Force (TSTF) Standard Technical Specification (STS) Change Traveler 360 (TSTF-360), Revision 1, "DC Electrical Rewrite." The proposed changes would revise Technical Specification (TS) 3.8.1, "AC Sources - Operating," TS 3.8.4, "DC Sources - Operating," TS 3.8.5, "DC Sources - Shutdown," TS 3.8.6, "Battery Cell Parameters," TS 3.8.7, "Inverters - Operating, TS 3.8.9, "Distribution Systems - Operating," and TS 3.8.10, "Distribution Systems – Shutdown." The proposed change will also add new TS Section 5.5.2.17, "Battery Monitoring and Maintenance Program" and new Licensee Controlled Specifications (LCS) 3.8.104, 3.8.105, and 3.8.106.

The following provides the description of changes. (Strikeout shows deletion of existing text and underline shows addition of new text.)

Table of Contents

The title of TS 3.8.6 is revised from "Battery Cell Parameters" to "Battery Parameters."

TS 3.8.1

SR 3.8.1.1 The words in the NOTES "Buses 3A04 and 3D1 are" and "Buses 3A06 and 3D2 are" are simplified to "Bus 3A04 is" and "Bus 3A06 is," respectively (example for the Unit 2 TS).

TS 3.8.4

A. Revise LCO, Modify and Relocate TS 3.8.4 Conditions and Required Actions

A.1. LCO 3.8.4 is revised from "The Train A, Train B, Train C, and Train D DC electrical power subsystems shall be OPERABLE" to "The Train A and Train B DC electrical power subsystems shall be OPERABLE."

A.2. New Condition A is existing Condition C relabeled and modified:

"One or two required battery charger(s) ~~or associated control equipment or cabling~~ on one train inoperable."

This Condition is modified by a new NOTE: Only applicable to 1800 amp-hour rated batteries.

Condition A includes the following Required Actions and Completion Times (CTs) (the existing Required Action C.1 and its CT are deleted):

A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.
CT: 2 hours

AND

A.2 Verify battery float current $\leq$ 1.50 amps.
CT: Once per 12 hours

AND

A.3.1 Restore required battery charger(s) to OPERABLE status.
CT: 72 hours

OR

A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.
CT: 72 hours

AND

A.3.2.2 Restore required battery charger(s) to OPERABLE status.
CT: 7 days

A.3. New Condition B is added:

"One or two required battery charger(s) on one train inoperable."

This Condition is modified by a NOTE: Only applicable to 1260 amp-hour rated batteries.

Condition B includes the following Required Actions and Completion Times (CTs):

B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.
CT: 2 hours

AND

B.2 Verify battery float current $\leq$ 0.75 amp.
CT: Once per 12 hours

AND

B.3.1 Restore required battery charger(s) to OPERABLE status.
CT: 72 hours

OR

B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.

CT: 72 hours
AND

B.3.2.2 Restore required battery charger(s) to OPERABLE status.
CT: 7 days

A.4. New Condition C is existing Condition D relabeled and modified:

"Required Action and associated Completion Time of Condition ~~C~~ A or B not met."

A.5. New Condition D is existing Condition A relabeled and modified:

"One DC electrical power subsystem ~~battery or associated control equipment or cabling~~ inoperable for reasons other than Condition A or B."

Condition D includes the following Required Actions and Completion Times (CTs):

D.1 Restore DC electrical power subsystem to OPERABLE status.
CT: 2 hours

OR

D.2 Cross connect with same train DC subsystem (1800 amp-hour rated battery required).
CT: 2 hours

A.6. New Condition E is added:

"DC Subsystem Buses cross connected (1800 amp-hour rated battery required)."

Condition E includes the following Required Action and Completion Time (CT):

E.1 Restore DC Subsystem Buses to non-cross-connected configuration.
CT: 21 days

The CT is modified by a NOTE: Completion Time is 30 days when cross connected to upgrade to 1800 amp-hour rated batteries.

A.7. New Condition F is existing Condition B relabeled and modified:

"Required Action and Associated Completion Time of Condition D or E not met."

Existing Required Actions B.1 and B.2 are relabeled to F.1 and F.2.

B. Modify and Relocate TS 3.8.4 Surveillance Requirements (SRs)

B.1. Existing SR 3.8.4.1 is modified:

"Verify battery terminal voltage is greater than or equal to the minimum established float voltage ~~≥ 129 V on float charge~~."

B.2. Requirements of existing SRs 3.8.4.2, 3.8.4.3, 3.8.4.4, and 3.8.4.5 are removed and relocated to the LCS.

B.3. Existing SR 3.8.4.6 is modified and renumbered to SR 3.8.4.2:

"Verify each battery charger supplies ≥ rated ~~300~~ amps at ≥ the minimum established float voltage ~~129 V~~ for ≥ 8 ~~12~~ hours."

The NOTE is deleted:
~~Credit may be taken for unplanned events that satisfy this SR.~~

B.4. Existing SR 3.8.4.7 is modified and renumbered to SR 3.8.4.3:

"Verify ~~battery~~ capacity of the 1260 amp-hour rated battery 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."

NOTE 1 is modified: The battery performance discharge test in SR 3.8.~~4.8~~ 6.7 may be performed in lieu of SR 3.8.4.~~7~~3 once per 48 months for batteries rated at 1260 amp-hours.

NOTES 2 and 3 are deleted:
~~2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~
~~3. Credit may be taken for unplanned events that satisfy this SR.~~

B.5. New SR 3.8.4.4 is added:

"Verify capacity of the 1800 amp-hour rated battery 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."
Frequency: 30 months

This SR is modified by a NOTE: The modified performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.4 for batteries rated at 1800 amp-hours.

B.6. Existing SR 3.8.4.8 is modified and relocated to new SR 3.8.6.7. See TS 3.8.6, Item C.7, for discussion.

TS 3.8.5

A. Revise LCO, Modify and Relocate TS 3.8.5 Conditions and Required Actions

A.1. LCO 3.8.5 is revised by adding "The" at the beginning of the existing statement.

A.2. New Condition A is existing Condition B relabeled and modified. For details, see TS 3.8.4, new Condition A.

A.3. New Condition B is added. For details, see TS 3.8.4, new Condition B.

A.4. Existing Condition C is modified:

"Required Action and associated Completion Time of Condition A or B not met."

A.5. New Condition D is existing Condition A relabeled and modified:

"One or more required ~~battery or associated control equipment or cabling~~ DC electrical power subsystem(s) inoperable for reasons other than Condition A or B."

A.6 A new NOTE is added under ACTIONS:

"LCO 3.0.3 is not applicable."

B. Modify and Relocate TS 3.8.5 Surveillance Requirement

SR 3.8.5.1 is modified to reflect changes previously described in TS 3.8.4, DC Sources – Operating:

"For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, ~~SR 3.8.4.2,~~ ~~SR 3.8.4.3,~~ ~~SR 3.8.4.4~~, ~~SR 3.8.4.5~~, SR 3.8.4.2~~6~~, SR 3.8.4.3~~7~~, ~~SR 3.8.4.8,~~ and SR 3.8.4.4."

The NOTE is modified: The following SRs are not required to be performed: SR 3.8.4.2~~6~~, ~~and~~ SR 3.8.4.3~~7~~, and SR 3.8.4.4 ~~and SR 3.8.4.8~~.

TS 3.8.6

A. Replace Battery Specific Gravity Monitoring with Float Current Monitoring for State-of-Charge (OPERABILITY) Determination

The specific gravity limits of existing Table 3.8.6-1 and the associated footnotes are being deleted. (Table 3.8.6-1 is being deleted.) Currently, verification of battery cell specific gravity is required by existing SR 3.8.6.1 and SR 3.8.6.2. SCE proposes replacing the requirements to measure specific gravity with requirements to monitor float current to determine state-of-charge.

B. Revise LCO, Modify and Relocate TS 3.8.6 Conditions and Required Actions

B.1. The title of TS 3.8.6 is revised from "Battery Cell Parameters" to "Battery Parameters." A corresponding change to the TS Table of Contents is made to be consistent with the revised TS 3.8.6 title.

B.2. LCO 3.8.6 is revised from "Battery cell parameters for the Train A, Train B, Train C, and Train D batteries shall be within the Category A and B limits of Table 3.8.6-1" to "Battery parameters for the Train A and Train B batteries shall be within limits."

B.3. Existing Table 3.8.6-1, Battery Surveillance Requirements, is deleted in its entirety while its requirements are included in new SRs in the TSs and LCS.

B.4. New Condition A is added:

"One or two batteries on one train with one or more battery cells with float voltage < 2.07 V."

Existing Condition A (and its associated Required Actions and CTs) is deleted: "~~One or more batteries with one or more battery cell parameters not within limits.~~"

New Condition A includes the following new Required Actions and Completion Times (CTs):

A.1 Perform SR 3.8.4.1.
CT: 2 hours
AND
A.2.1 Perform SR 3.8.6.1.
CT: 2 hours
OR
A.2.2 Perform SR 3.8.6.2.
CT: 2 hours
AND
A.3 Restore affected cell voltage ≥ 2.07 V.
CT: 24 hours

B.5. New Condition B is added (existing Condition B is modified and relabeled as Condition G):

"One or two batteries on one train with float current > 1.50 amps."

This Condition is modified by a NOTE: Only applicable to 1800 amp-hour rated batteries.

Condition B includes the following Required Actions and Completion Times (CTs):

B.1 Perform SR 3.8.4.1.
CT: 2 hours

AND

B.2 Restore battery float current to ≤ 1.50 amps.
CT: 12 hours

B.6. New Condition C is added:

"One or two batteries on one train with float current > 0.75 amp."

This Condition is modified by a NOTE: Only applicable to 1260 amp-hour rated batteries.

Condition C includes the following Required Actions and Completion Times (CTs):

C.1 Perform SR 3.8.4.1.
CT: 2 hours

AND

C.2 Restore battery float current to ≤ 0.75 amp.
CT: 12 hours

B.7. New Condition D is added:

"One or two batteries on one train with one or more cells with electrolyte level less than minimum established design limits."

Condition D includes the following Required Actions and Completion Times (CTs):

D.1 Restore electrolyte level to above the top of the plates.
CT: 8 hours

AND

D.2 Verify no evidence of leakage.
CT: 12 hours

AND

D.3 Restore electrolyte level to greater than or equal to minimum established design limits.
CT: 31 days

The Required Actions are modified by two NOTES: 1) Required Actions D.1 and D.2 are only applicable if electrolyte level is below the top of the plates, and 2) Required Action D.2 shall be completed if electrolyte level was below the top of the plates.

B.8. New Condition E is added:

"One or two batteries on one train with pilot cell electrolyte temperature less than minimum established design limits."

Condition E includes the following Required Action and Completion Time (CT):

E.1. Restore battery pilot cell temperature to greater than or equal to minimum established design limits.
CT: 12 hours

B.9. New Condition F is added:

"One or more batteries in redundant trains with battery parameters not within limits."

Condition F includes the following Required Action and Completion Time (CT):

F.1 Restore battery parameters for batteries in one train to within limits.
CT: 2 hours

B.10. New Condition G is existing Condition B modified and relabeled:

"Required Action and associated Completion Time of Condition A, B, D, E, or F not met.
OR
One or two ~~more~~ batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 1.50 amps ~~with average electrolyte temperature of the representative cells < 60°F~~.
~~OR~~
~~One or more batteries with one or more battery cell parameters not within Category C values.~~"

This Condition is modified by a new NOTE: Only applicable to 1800 amp-hour rated batteries.

B.11. New Condition H is added:

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

One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 0.75 amp."

This Condition is modified by a NOTE: Only applicable to 1260 amp-hour rated batteries.

Condition H includes the following Required Action and Completion Time (CT):

H.1 Declare associated battery inoperable.
CT: Immediately

C. Modify and Relocate TS 3.8.6 Surveillance Requirements

C.1. New SR 3.8.6.1 is added (existing SR 3.8.6.1 is deleted):

The existing SR 2.8.6.1 "Verify battery cell parameters meet Table 3.8.6-1 Category A limits" and Table 3.8.6-1 are deleted and replaced with the following:

"Verify each battery float current is ≤ 1.50 amps for batteries rated at 1800 amp-hours.
~~Verify battery cell parameters meet Table 3.8.6-1 Category A limits.~~"
Frequency: 7 days

This new SR is modified by a NOTE: Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1.

C.2. New SR 3.8.6.2 is added (existing SR 3.8.6.2 is deleted):

The existing SR 2.8.6.2 "Verify battery cell parameters meet Table 3.8.6-1 Category B limits" and Table 3.8.6-1 are deleted and replaced with the following:

"Verify each battery float current is ≤ 1.50 amps for batteries rated at 1800 amp-hours.
~~Verify battery cell parameters meet Table 3.8.6-1 Category B limits.~~"
Frequency: 7 days

This new SR is modified by a NOTE: Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1.

C.3. New SR 3.8.6.3 is added:

"Verify each battery pilot cell voltage is ≥ 2.07 V."
Frequency: 31 days

C.4. New SR 3.8.6.4 is added:

"Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits."
Frequency: 31 days

C.5. Existing SR 3.8.6.3 is modified and renumbered to SR 3.8.6.5:

"Verify each battery pilot cell ~~average electrolyte~~ temperature is greater than or equal to minimum established design limits ~~of representative cells is >60°F~~."
Frequency: 31 days (revised from 92 days)

C.6. New SR 3.8.6.6 is added:

"Verify each battery connected cell voltage is ≥ 2.07 V."
Frequency: 92 days

C.7. New SR 3.8.6.7 is existing SR 3.8.4.8 modified, renumbered, and relocated:

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

NOTES 1 and 2 are deleted:
~~1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~
~~2. Credit may be taken for unplanned events that satisfy this SR.~~

The Frequency is modified:
60 months
AND
12 months ~~----NOTE----Only applicable~~ when the battery shows degradation or has reached 85% of the expected life with capacity < 100% of the manufacturer's rating
AND
24 months when the battery has reached 85% of the expected life with capacity ≥ 100% of the manufacturer's rating

TS 3.8.7

LCO 3.8.7 is revised from "The required Train A, Train B, Train C, and Train D inverters shall be OPERABLE" to "The required Channel A, B, C, and D AC inverters shall be OPERABLE."

TS 3.8.9

LCO 3.8.9 is revised from "Train A and Train B AC; Trains A, B, C, and D DC; and Trains A, B, C, and D AC vital bus electrical power distribution subsystems

shall be OPERABLE" to "Train A and Train B AC, Subsystems A, B, C, and D DC, and Channels A, B, C, and D AC vital bus electrical power distribution systems shall be OPERABLE."

Condition A, Required Action A.1, and SR 3.8.9.1 are revised to change "electrical power distribution subsystem" to "electrical power distribution system." Required Action B.1 is revised as follows: "Restore AC vital bus ~~subsystem~~ to OPERABLE status."

TS 3.8.10

LCO 3.8.10 is revised to change "electrical power distribution subsystems" to "electrical power distribution systems."

Condition A, Required Actions A.2.4, and SR 3.8.10.1 are revised to change "electrical power distribution subsystem" to "electrical power distribution system."

Required Action A.2.5 is revised to change "shutdown cooling subsystem(s)" to "shutdown cooling system(s)."

Section 5.5 Procedures, Programs, and Manuals

SCE proposes adding new Battery Monitoring and Maintenance Program, TS Section 5.5.2.17. New TS Section 5.5.2.17 will state:

"This Program provides for battery restoration and maintenance, which includes the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and
b. Actions to verify that the remaining cells are above 2.07 V when a battery cell or cells have been found less than 2.13 V, and
c. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates."

3. BACKGROUND

TS 3.8.4 requires the Train A and Train B DC electrical power subsystems to be operable. The 125 VDC electrical power system consists of four independent and redundant Class 1E DC electrical power subsystems. Subsystems A and C support the Train A Class 1E Engineered Safety Features (ESF) equipment and subsystems B and D support the Train B Class 1E ESF equipment. Each subsystem consists of one 125 VDC battery, a battery charger for the battery, inverter, and miscellaneous connected loads. During normal operation, the 125 VDC load is powered from battery chargers that also maintain the batteries in a fully charged condition. In case of loss of AC power to a battery charger, the DC load is automatically powered from the associated battery.

The current DC system configuration has two independent and redundant trains; each train consists of two subsystems, each with a battery and battery charger power source. Subsystems A and C support Train A and Subsystems B and D support Train B. Subsystem C also provides control power for the Turbine Driven Auxiliary Feedwater Pump P140. Provisions in the existing design allow for temporarily cross-connecting DC subsystems of the same safety train during Modes 5 and 6 to facilitate maintenance on batteries and to maintain operability of the operating unit's 4.16kV Class 1E ESF buses. The Mode 5 and 6 cross-connect design includes permanently installed molded case isolation switches provided for each DC bus that can be connected via temporarily installed cable to a spare breaker on the DC bus. This spare breaker position is also utilized when necessary to connect a spare non-Class 1E battery charger via temporary cable to the bus in the event the normal charger is inoperable.

The DC system is currently being upgraded by SCE to replace each of the existing batteries with larger 1800 amp-hour rated batteries, add two 400 Amp rated swing battery chargers and 600 Amp, 250 Volt rated disconnect switches, and upgrade several circuit breakers in DC switchboards and distribution panels. Refer to Sketches 1 and 2 in this section. One swing battery charger will be shared between DC Subsystems A and C, and a second swing charger will be shared between DC Subsystems B and D. The second swing charger can be aligned to the non-safety-related bus D5. Each swing battery charger will have mechanically interlocked dedicated DC circuit breakers to allow it to feed only one subsystem at a time. An additional 600 Amp circuit breaker is interposed between the swing battery charger and the associated 1E battery bank for separation and isolation. SCE has installed a new Class 1E 1800 amp-hour rated spare battery bank (B00X) so that replacements of the existing batteries (e.g., at end of battery service life) can also be performed online. When B00X is no longer needed, it will be removed from the plant.

Condition A of TS 3.8.4 currently requires that one inoperable battery or associated control equipment or cabling be restored to operable status within 2 hours or be in Mode 3 within 6 hours and Mode 5 within 36 hours. Condition A

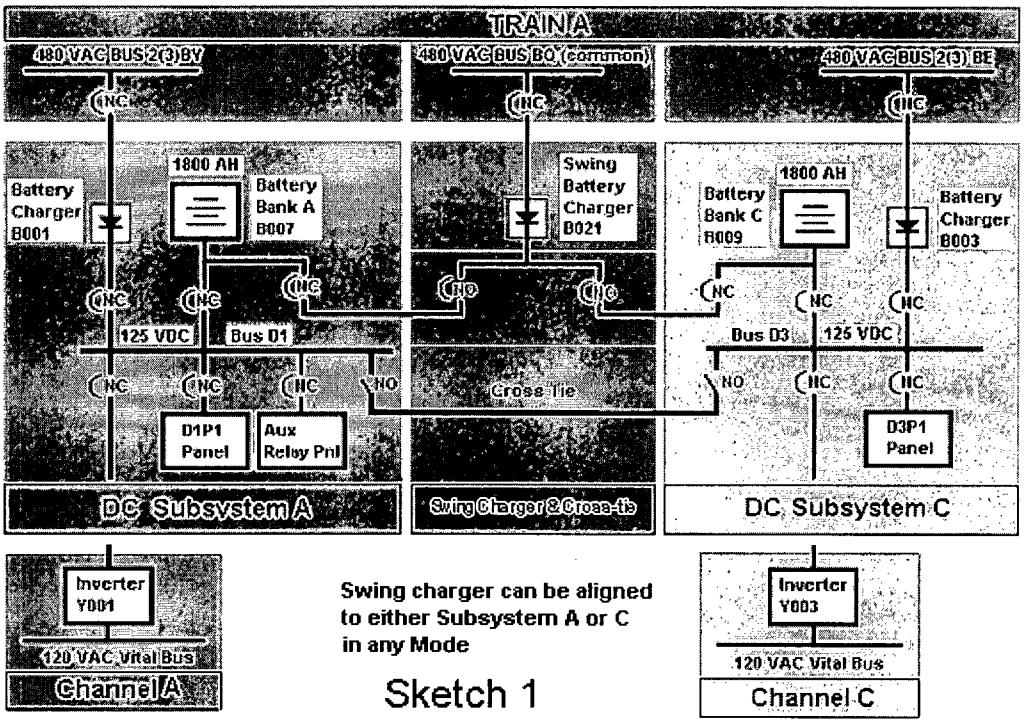
represents a subsystem with a loss of ability to completely respond to an event, and a potential loss of ability to remain energized during normal operation. The basis for the 2-hour completion time is consistent with Regulatory Guide (RG) 1.93, "Availability of Electric Power Sources," which has its emphasis on assessing unit status and stabilizing the unit to minimize the potential for complete loss of DC power to the affected train.

Current SR 3.8.4.6, battery charger operability limits, will be modified and relocated to the Licensee Controlled Specifications.

SR 3.8.4.7 currently requires a service test to be performed on a battery every 24 months to verify capability to meet the load profile (battery duty cycle) of the most limiting Design Basis Accident (DBA). The discharge rate and test length correspond to the design duty cycle requirements. There is a NOTE to this SR that allows substitution of the battery performance discharge test (SR 3.8.4.8) in lieu of the service test every 48 months to allow not having to perform both a service test and a performance discharge test in the same cycle.

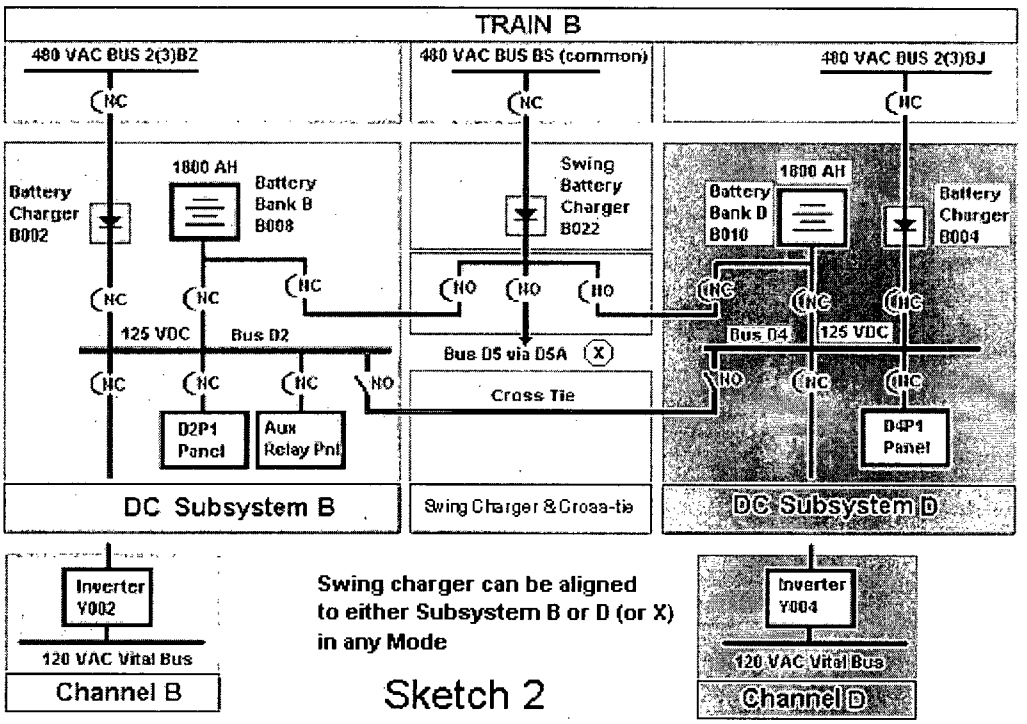
SR 3.8.4.8 currently requires a battery performance discharge test be performed at a constant current to determine the battery capacity and detect/determine overall battery degradation due to age and usage. The acceptance criteria for this surveillance are consistent with IEEE 450-2002 and IEEE 485-1997. These standards recommend that the battery be replaced if its capacity is below 80% of the manufacturer's rating. The frequency for this surveillance is every 60 months, or more frequently if the battery shows signs of degradation or has reached 85% of its expected life.

Proposed Train A DC System Reconfiguration



Sketch 1

Proposed Train B DC System Reconfiguration



Sketch 2

4. EVALUATION

The following discussion provides the engineering evaluation of the proposed changes as described in Section 2. (Strikeout shows deletion of existing text and underline shows addition of new text.)

Table of Contents

The title of TS 3.8.6 is revised from "Battery Cell Parameters" to "Battery Parameters." This is an administrative change.

TS 3.8.1

SR 3.8.1.1 The words in the NOTES "Buses 3A04 and 3D1 are" and "Buses 3A06 and 3D2 are" are simplified to "Bus 3A04 is" and "Bus 3A06 is," respectively (example for the Unit 2 TS).

These are administrative changes because they are a San Onofre specific clarification of which buses are required. Specification of the preferred DC subsystem is not required.

TS 3.8.4

A. Revise LCO, Modify and Relocate TS 3.8.4 Conditions and Required Actions

A.1. LCO 3.8.4 is revised from "The Train A, Train B, Train C, and Train D DC electrical power subsystems shall be OPERABLE" to "The Train A and Train B DC electrical power subsystems shall be OPERABLE." The SONGS-specific design terminology is more accurately reflected by presenting Train A and B, each with two subsystems, rather than as Trains A, B, C, and D. This is an administrative change.

A.2. New Condition A is existing Condition C relabeled and modified:

"One or two required battery charger(s) ~~or associated control equipment or cabling~~ on one train inoperable."

This Condition is modified by a new NOTE: Only applicable to 1800 amp-hour rated batteries.

Relabeling existing Condition C to create new Condition A makes the Condition more consistent with the Standard Technical Specifications (STS). The

Condition is modified to read "one or two" required battery charger(s) from "one" required battery charger. Each SONGS DC Train consists of two subsystems. Each subsystem has a full capacity dedicated battery charger. The Required Actions are conservative as the actions are taken even if "one" required charger becomes inoperable. "On one train" is added to clarify that the Condition applies to each train separately. The modified condition deletes "or associated control equipment or cabling" as these are included in the definition of OPERABILITY.

Condition A includes the following Required Actions and Completion Times (CTs) (the existing Required Action C.1 and its CT are deleted):

A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.
CT: 2 hours

AND

A.2 Verify battery float current $\leq$ 1.50 amps.
CT: Once per 12 hours

AND

A.3.1 Restore required battery charger(s) to OPERABLE status.
CT: 72 hours

OR

A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.
CT: 72 hours

AND

A.3.2.2 Restore required battery charger(s) to OPERABLE status.
CT: 7 days

Existing Table 3.8.6-1, Battery Surveillance Requirements, is deleted in its entirety while its requirements are included in new SRs in the TSs and LCS. The Category A and B values of TS Table 3.8.6-1 represent appropriate monitoring levels and preventive maintenance levels for long-term battery quality and extended battery life. The LCO category presented in 10 CFR 50.36 states that LCOs are "the lowest functional capability or performance levels of equipment required for safe operation of the facility." As such, the Category A and B values for cell voltage and electrolyte level do not reflect the 10 CFR 50.36 criteria for LCOs. Therefore, it is proposed that these values and the Required Actions associated with restoration be relocated to a licensee-controlled program. For more discussion, see TS 3.8.6.

Proposed Required Actions A.1 and A.2 address verification of the minimum established float voltage and battery float current. The battery charger, in addition to maintaining battery operability, 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 (SBO).

Required Action A.1 would provide assurance that a battery discharge is terminated by requiring that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage (129.0 V for a 58-cell battery) in 2 hours. This time period provides an allowance for returning an inoperable charger to operable status or for reestablishing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. This provides assurance that the battery will be restored to its fully charged condition from any discharge that might have occurred due to the battery charger being inoperable. 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.

The required battery charger(s) (i.e., the existing dedicated battery chargers and the new swing battery chargers associated with the Train A and B 125 VDC system) are fully qualified chargers that are powered from a diesel-backed Class 1E distribution system and are fully capable of supporting system design requirements. These 100 percent capacity battery chargers are the preferred means for supporting the Train A and B 125 VDC systems.

Required Action A.2 would require the battery float current be verified to be less than or equal to 1.50 amps for 1800 amp-hour rated batteries once per 12 hours. This provides an indication that if the battery has been discharged as the result of an inoperable battery charger, it has now been fully charged. If at the expiration of the 12-hour period, the battery float current is not less than or equal to 1.50 amps, there may be additional problems and the battery must be declared inoperable. This verification provides assurance that the battery has sufficient capacity to perform its safety function. Given that the DC bus remains energized, the battery discharge is terminated based on restoration of the battery terminal voltage (Required Action A.1) and the battery is fully recharged based upon battery float current (Required Action A.2), there is reasonable basis for the restoration time for an inoperable battery charger of 72 hours (Required Action A.3.1).

Required Action A.3.1 is a new requirement. Existing TS 3.8.4 does not include a specific TS requirement for restoring the required battery charger(s) to OPERABLE status. Required Action A.3.1 will restore required battery charger(s) to OPERABLE status within a CT of 72 hours. If the "required" battery charger is inoperable, a spare battery charger will be used to restore the associated 125 VDC battery terminal voltage within 2 hours. The 100 percent capacity spare battery charger, which is identical to the dedicated Class 1E charger, is normally powered from a non-1E source and requires a 72-hour CT for restoration of the "required" battery charger.

Required Actions A.3.2.1 and A.3.2.2 allow this completion time of 72 hours to be extended to 7 days if the ability to power the spare battery charger from a diesel-

backed source has been established within the 72-hour Completion Time. All preparations to be able to power the spare battery charger must be complete prior to 72 hours. The purpose of this provision is to connect the spare battery charger to a diesel-backed source in less than or equal to 4 hours if non-1E power is lost.

Adding a proposed completion time for an aligned spare battery charger that requires plant shutdown where one does not currently exist is a positive risk improvement. Currently, an alignment where the spare battery charger maintains the battery's cell parameters within acceptable limits is permitted indefinitely. Qualitatively, with the proposed CT, the risk improves because the spare battery charger must be capable of being powered from a diesel-backed source beyond 72 hours up to 7 days. Plant management awareness also increases since the normal plant battery charger alignment must be restored in the proposed CT to avoid shutting down the unit. These are positive risk improvement contributors. Other than the risk of shutting down the unit, there are no other identified negative risk contributors. Therefore, the overall risk impact is neutral. As such, this qualitative assessment is considered sufficient, and a quantitative risk evaluation has not been performed.

A.3. New Condition B is added:

"One or two required battery charger(s) on one train inoperable."

This Condition is modified by a NOTE: Only applicable to 1260 amp-hour rated batteries.

Condition B includes the following Required Actions and Completion Times (CTs):

B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.
CT: 2 hours

AND

B.2 Verify battery float current $\leq$ 0.75 amp.
CT: Once per 12 hours

AND

B.3.1 Restore required battery charger(s) to OPERABLE status.
CT: 72 hours

OR

B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.
CT: 72 hours

AND

B.3.2.2 Restore required battery charger(s) to OPERABLE status.
CT: 7 days

Condition B is the same as Condition A but is applicable to 1260 amp-hour rated batteries (float current ≤ 0.75 amp).

A.4. New Condition C is existing Condition D relabeled and modified:

"Required Action and associated Completion Time of Condition ~~C~~ A or B not met."

A.5. New Condition D is existing Condition A relabeled and modified:

"One DC electrical power subsystem ~~battery or associated control equipment or cabling~~ inoperable for reasons other than Condition A or B."

Relabeling existing Condition A to create new Condition D makes the Condition more consistent with the Standard Technical Specifications (STS).

The modified condition replaces "battery" with "DC electrical power subsystem," deletes "or associated control equipment or cabling" as these are included in the definition of OPERABILITY, and adds "for reasons other than Condition A or B." This administrative change provides clarity for new Condition D.

Condition D represents one or more required DC electrical power subsystem(s) on one train inoperable for reasons other than Condition A or B. The 2-hour limit allows sufficient time to effect restoration of an inoperable battery given that the majority of the conditions that lead to battery inoperability (e.g., loss of battery charger, battery cell voltage less than 2.07 V, etc.) are identified in TSs 3.8.4, 3.8.5, and 3.8.6 together with additional specific completion times.

Condition D also represents one train with a loss of ability to completely respond to an event and a potential loss of ability to remain energized during normal operation. The 2-hour limit is consistent with the allowed time for an inoperable DC distribution system.

Condition D includes the following Required Actions and Completion Times (CTs):

D.1 Restore DC electrical power subsystem to OPERABLE status.
CT: 2 hours

OR

D.2 Cross connect with same train DC subsystem (1800 amp-hour rated battery required).
CT: 2 hours

Existing Required Action A.1 is relabeled to D.1.

New Required Action D.2 is added to allow battery cross-connection within the same train (i.e., Subsystems A and C of Train A or Subsystems B and D of Train B). A subsystem battery can be cross-connected if the battery is rated at 1800 amp-hours.

Either of Required Actions D.1 or D.2 will restore the DC subsystem train to OPERABLE status. Required Action D.2 also ensures the battery aligned to support a cross-tied subsystem has adequate capacity.

Required Action D.2 is part of the revised SONGS design of the DC system upgrade. This is not included in TSTF-360, Rev. 1. Cross-connection of two subsystems on two trains simultaneously has not been analyzed and is therefore not permitted.

A.6. New Condition E is added:

"DC Subsystem Buses cross connected (1800 amp-hour rated battery required)."

Condition E includes the following Required Action and Completion Time (CT):

> E.1 Restore DC Subsystem Buses to non-cross-connected configuration.
> CT: 21 days
>
> This CT is modified by a NOTE: Completion Time is 30 days when cross connected to upgrade to 1800 amp-hour rated batteries.

The proposed change to TS 3.8.4 addresses the condition where DC Subsystem Buses A and C or B and D are cross connected. Required Action E.1 is added to restore the DC Subsystem Buses A and C or B and D to the preferred non-cross-connected configuration.

Condition E represents one train with one subsystem battery out of service and two subsystems cross-connected with one battery. This alignment will allow both subsystems to remain OPERABLE for 30 days during initial installation of the 1800 amp-hour rated battery and 21 days for in-kind battery replacements thereafter.

The 21-day CT also envelopes any routine online maintenance/testing activities and implementation of emerging corrective actions (e.g., bypass of individual degraded cells with qualified spares) of shorter durations.

The 30-day CT for the initial installation of the 1800 amp-hour rated battery for replacement of a battery bank and battery rack including battery room modifications and performance of battery discharge testing (online) in Modes 1-4 was determined by using actual installation history from replacing Subsystem C

and D batteries in 2005. Replacement of Subsystem C and D batteries was performed within 21 days using existing battery racks without requiring additional battery room modifications. Replacement of Subsystem A and B batteries can be performed within 30 days which allows for the installation of new battery racks and battery room modifications.

Condition E also ensures the battery aligned to the cross-tied subsystem buses has adequate capacity. Each proposed replacement battery has an 8-hour rating of 1800 amp-hours. The combined Subsystem A and C or B and D load demands on these batteries are significantly less than the battery rating. Table 1 below shows each battery's nominal rating and the amp-hours removed during a Design Basis Event (i.e., Loss of Voltage Signal (LOVS)/Safety Injection Actuation Signal (SIAS)) and a Station Blackout (SBO) event.

SONGS Class 1E batteries are sized in accordance with the guidelines of IEEE Standard 485 by using Design Basis Event (LOVS/SIAS) and Station Blackout (SBO) duty cycle profiles. The available capacity for the cross connected configuration is calculated using a Correction Factor of 1.02 for battery float current, 1.11 for 60°F battery electrolyte temperature, and 1.25 for battery aging. As shown in Table 1, all batteries have sufficient capacity for LOVS/SIAS and SBO events.

The proposed change would allow the manual cross-connect of the same train DC distribution subsystems to support operability of the associated DC loads based on a Probabilistic Risk Assessment (PRA) of the cross-connected configuration. See Attachment I.

A.7. New Condition F is existing Condition B relabeled and modified:

"Required Action and Associated Completion Time <u>of Condition D or E</u> not met."

Existing Required Actions B.1 and B.2 are relabeled to F.1 and F.2.

Modifying existing Condition B to new Condition F is considered administrative.

Table 1

SONGS Class 1E Battery Load Profiles, Correction Factors and Margins

1800 AH Batteries (Subsystem A & B batteries presently are 1260 AH):

90-minute LOVS/SIAS Profile										Battery Correction Factor and IEEE 485 Sizing Margin				
Subsystem	Amperes per Time (min)								Amp-Hours removed	Correction Factors (CF)			Calculated Margin (60F)	Calculated Margin (50F)
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8		Float Current CF	Electrolyte Temp CF	Battery Aging CF		
	0-1	1-29	29-30	30-89	89-90	90-120	120-239	239-240						
A	461.15	165.40	165.40	165.54	241.37	—	—	—	254.43	2.0%	11% for 60F 19% for 50F	25.0%	43.49%	39.42%
B	468.90	170.07	170.07	170.21	249.08	—	—	—	261.54				42.54%	38.40%
C	130.20	107.38	107.38	62.38	76.56	—	—	—	116.69				81.54%	80.21%
D	101.68	93.04	93.04	55.04	55.04	—	—	—	101.70				85.90%	84.89%
A-C Cross-tie* (MODE 1-4)	591.35	272.78	272.78	227.92	317.93	—	—	—	371.12	2.0%	11% for 60F	25.0%	10.49%	—
B-D Cross-tie* (MODE 1-4)	570.58	263.11	263.11	225.25	304.12	—	—	—	363.24				13.63%	—
4-hour SBO Profile										Battery Correction Factor and IEEE 485 Sizing Margin				
A	329.09	183.73	299.23	145.74	145.74	145.74	145.74	230.11	607.71	2.0%	11% for 60F 19% for 50F	25.0%	22.34%	16.74%
B	336.43	188.10	306.64	149.57	149.57	149.57	149.57	233.94	623.40				20.59%	14.86%
C	130.20	107.38	107.38	62.38	62.38	62.38	62.38	76.56	272.64				70.77%	68.66%
D	101.68	93.04	93.04	55.04	55.04	55.04	55.04	55.04	239.30				76.51%	74.81%
A-C Cross-tie* (MODE 1-4)	459.29	291.11	420.79	208.12	208.12	208.12	151.88	250.43	768.10	2.0%	11% for 60F	25.0%	8.66%	—
B-D Cross-tie* (MODE 1-4)	438.11	281.14	399.68	204.61	204.61	204.61	155.18	239.55	763.84				10.27%	—

1260 AH Batteries (Subsystem A & B):

90-minute LOVS/SIAS Profile										Battery Correction Factor and IEEE 485 Sizing Margin				
Subsystem	Amperes per Time (min)								Amp-Hours removed	Correction Factors (CF)			Calculated Margin (60F)	Calculated Margin (50F)
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8		Float Current CF	Electrolyte Temp CF	Battery Aging CF		
	0-1	1-29	29-30	30-89	89-90	90-120	120-239	239-240						
A	461.15	165.40	165.40	165.54	241.37	—	—	—	254.43	2.0%	11% for 60F	25.0%	9.48%	—
B	468.90	170.07	170.07	170.21	249.08	—	—	—	261.54				7.96%	—
4-hour SBO Profile										Battery Correction Factor and IEEE 485 Sizing Margin				
A	329.09	183.73	299.23	145.74	145.74	145.74	145.74	230.11	607.71	2.0%	11% for 60F	25.0%	2.59%	—
B	336.43	188.10	306.64	149.57	149.57	149.57	149.57	233.94	623.40				0.46%	—

For "Load Profile" and "Margin" details refer to Calculation E4C-017 Rev 19, CCN-93.
Increase in loads during period 5 for LOVS/SIAS and period 8 for SBO reflect random loads.
Asterisk (*) indicate that CPC calculator and inverter are isolated at 30 and 120 minutes respectively.

B. Modify and Relocate TS 3.8.4 Surveillance Requirements (SRs)

B.1. Existing SR 3.8.4.1 is modified:

"Verify battery terminal voltage is greater than or equal to the minimum established float voltage ~~≥ 129 V on float charge~~."

The minimum established float voltage of ≥ 129.0 V is included in the proposed TS Bases and LCS.

The purpose of SR 3.8.4.1 is to verify the battery terminal voltage while the system is on float charge which helps to ensure the effectiveness of the battery chargers. The battery manufacturer establishes the appropriate battery terminal voltage as the minimum established float voltage to provide optimum charge on the battery. The battery manufacturer defined the appropriate battery terminal voltage as 127.6 V to 132.2 V. This voltage will maintain the battery plates in a condition that supports maintaining the battery life. The minimum established float voltage of ≥ 129.0 V is defined in the proposed TS Bases and LCS. This value has been conservatively selected and represents the existing SONGS licensing bases. The minimum established float voltage values can be adequately controlled outside of the TSs.

B.2. Requirements of existing SRs 3.8.4.2, 3.8.4.3, 3.8.4.4, and 3.8.4.5 are removed and relocated to new LCS 3.8.106.

In accordance with SR 3.0.1, usually when an SR is not met, the LCO is not met. This is based on the SRs representing the minimum acceptable requirements for operability of the required equipment. However, for SRs 3.8.4.2, 3.8.4.3, 3.8.4.4, and 3.8.4.5, failure to meet the SR does not necessarily mean that the equipment is not capable of performing its safety function. Furthermore, the corrective action is generally a routine or preventive maintenance type activity. These activities are inappropriate for SRs and can be controlled in the maintenance program for batteries.

With regard to the resistance verifications of existing SRs 3.8.4.2 and 3.8.4.5, the values are nominal values and represent limits at which some action should be taken, not necessarily when the operability of the battery is in question. SONGS' safety analyses do not assume a specific battery resistance value, but typically assume that the batteries will supply adequate power. Therefore, the overall battery resistance is the key for assessing whether the batteries can supply adequate power to the DC buses. Between surveillances, the resistance of each battery cell connection varies independently from all the others. Some of these connection resistance values may be higher or lower than others, and the battery may still be able to perform its function and should not be considered inoperable. Overall resistance of the battery bank connections has a direct impact on

operability and its acceptability is adequately determined through completion of the battery service and discharge tests or modified performance discharge test. Therefore, these activities are more appropriately controlled under the maintenance program for batteries. SCE proposes that these surveillances be addressed by the new LCS. In addition, the 92-day frequency for existing SR 3.8.4.2 will be changed to 31 days which is more conservative.

B.3. Existing SR 3.8.4.6 is modified and renumbered to SR 3.8.4.2:

"Verify each battery charger supplies ≥ rated ~~300~~ amps at ≥ the minimum established float voltage ~~129 V~~ for ≥ 8 ~~12~~ hours."

The NOTE is deleted:
~~Credit may be taken for unplanned events that satisfy this SR.~~

Renumbering SR 3.8.4.6 to SR 3.8.4.2 is editorial.

The rated amps and minimum established float voltage values (operability limits) are relocated to the LCS.

SR 3.8.4.2 specifies battery charger test current requirements to verify the design capacity of each battery charger. SR 3.8.4.2 requires that each required Train A and B battery charger be capable of supplying greater than or equal to rated amps at greater than or equal to minimum established float voltage for greater than or equal to 8 hours.

The required duration for this surveillance is reduced from 12 hours to 8 hours. The current SR 3.8.4.6 requires this surveillance performance test be conducted at the charger's rated output at the float voltage for 12 hours. When at rated output, steady state maximum temperature of all components within a charger will be reached much sooner than the 12-hour interval. Continuous operation for two hours after reaching the maximum steady state temperature will demonstrate a charger's rated capability. A conservative estimate is that a battery charger would reach a maximum steady state temperature under rated output at a float voltage near its rated voltage in 6 hours or less. Therefore, testing for 8 hours is sufficient for the charger temperature to stabilize and be maintained for approximately 2 hours.

This SR is modified to be consistent with SR 3.8.4.1 by replacing the specific amps output and the specific voltage limits of the battery charger with "greater than or equal to rated amps at greater than or equal to minimum established float voltage" and relocating those limits to the LCS. The ampere requirements are based on the output rating of the chargers. The voltage requirements are based on the battery charger voltage level after a response to a loss of AC power.

As stated in the discussion of SR 3.8.4.1, the battery manufacturer establishes

this voltage limit to provide the optimum charge on the battery and to maintain the battery plates in a condition that supports maintaining the battery life which assures that the battery will be capable of providing its designed safety function. The rated amps (300 A and 400 A) of the required battery charger(s) and the minimum established float voltage of ≥129.0 V are defined in the TS Bases and LCS. These values represent the existing SONGS licensing bases. The battery charger rated amps and minimum established float voltage values can be adequately controlled outside of the TSs.

The NOTE is deleted. Due to limited resources to fulfill this SR's requirements online, unplanned events will not be credited for SONGS.

B.4. Existing SR 3.8.4.7 is modified and renumbered to SR 3.8.4.3:

"Verify ~~battery~~ capacity of the 1260 amp-hour rated battery 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."

Renumbering SR 3.8.4.7 to SR 3.8.4.3 is editorial.

NOTE 1 is modified: The battery performance discharge test in SR 3.8.4.~~8~~.6.7 may be performed in lieu of SR 3.8.4.~~7~~3 once per 48 months for batteries rated at 1260 amp-hours.

Modifying SR 3.8.4.7 and NOTE 1 are administrative.

NOTES 2 and 3 are deleted:
~~2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~
~~3. Credit may be taken for unplanned events that satisfy this SR.~~

Existing SR 3.8.4.7 NOTE 2 is no longer applicable to the proposed SR, and NOTE 3 is not needed. Due to limited resources to fulfill this SR's requirements online, unplanned events will not be credited for SONGS.

B.5. New SR 3.8.4.4 is added:

"Verify capacity of the 1800 amp-hour rated battery 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."
Frequency: 30 months

This SR is modified by a NOTE: The modified performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.4 for batteries rated at 1800 amp-hours.

This SR will be performed at a frequency of 30 months. This surveillance test and test interval are considered acceptable for the following reasons:

i. With the incorporation of the Class 1E battery cross-tie capability, battery modified performance testing can be performed online.
ii. Historically, battery maintenance on nuclear power plants has been performed during refueling outages not to exceed 24-month intervals. SONGS experience has indicated that there have been no battery failures using the 24-month test frequency for battery service tests. Therefore, the service test interval of 30 months is not expected to affect SCE's capability to detect battery health and capacity.
iii. Battery life expectancy can be optimized by using a less frequent test such as a 30-month modified performance test. SCE proposes not to use separate service and performance tests for the new 1800 amp-hour rated batteries. SCE intends to perform a modified performance discharge test at 30-month intervals to achieve the best trending results by using the same test method throughout the battery life.
iv. A routine test frequency of 30 months will better correspond with scheduling of the more rigorous 60-month interval battery performance tests.

B.6. Existing SR 3.8.4.8 is modified and relocated to new SR 3.8.6.7.

Relocating SR 3.8.4.8 to new SR 3.8.6.7 is administrative. This SR demonstrates the operability of the battery and is therefore more appropriate to be included in TS 3.8.6. See TS 3.8.6, Item C.7, for discussion of modifications.

TS 3.8.5

A. Revise LCO, Modify and Relocate TS 3.8.5 Conditions and Required Actions

A.1 LCO 3.8.5 is revised by adding "The" at the beginning of the existing statement. This is editorial.

A.2. New Condition A is existing Condition B relabeled and modified. For details and justification, see TS 3.8.4, Condition A.

A.3. New Condition B is added. For details and justification, see TS 3.8.4, new Condition B.

A.4. Existing Condition C is modified:

"Required Action and associated Completion Time of Condition A or B not met."

A.5. New Condition D is existing Condition A relabeled and modified:

"One or more required ~~battery or associated control equipment or cabling~~ DC electrical power subsystem(s) inoperable for reasons other than Condition A or B."

The modified condition replaces "battery" with "DC electrical power subsystem," deletes "or associated control equipment or cabling" as these are included in the definition of OPERABILITY, and adds "for reasons other than Condition A or B." This administrative change provides clarity for new Condition D.

A.6 A new NOTE is added under ACTIONS:

"LCO 3.0.3 is not applicable."

TS 3.8.5 is applicable in MODES 5 and 6 and during movement of irradiated fuel assemblies which could occur in MODE 1, 2, 3, or 4. This fuel movement is independent of reactor operations. Entering LCO 3.0.3 while in MODE 1, 2, 3, or 4 would require the unit to be shut down unnecessarily. This NOTE is added to prevent shutdown.

B. Modify and Relocate TS 3.8.5 Surveillance Requirements (SR)

SR 3.8.5.1 is modified to reflect changes previously described in TS 3.8.4, DC Sources – Operating:

"For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, ~~SR 3.8.4.2,~~ ~~SR 3.8.4.3,~~ ~~SR 3.8.4.4~~, ~~SR 3.8.4.5~~, SR 3.8.4.2~~6~~, SR 3.8.4.3~~7~~, ~~SR 3.8.4.8~~, and SR 3.8.4.4."

The NOTE is modified: The following SRs are not required to be performed: SR 3.8.4.2~~6~~, ~~and~~ SR 3.8.4.3~~7~~, and SR 3.8.4.4 ~~and SR 3.8.4.8~~.

The intent of these SRs is that they must still be capable of being met, but actual performance is not required. The NOTE precludes requiring the operable DC sources from being discharged below their capability to provide the required power supply or otherwise rendered inoperable during the performance of the SRs.

TS 3.8.6

A. Replace Battery Specific Gravity Monitoring with Float Current Monitoring for State-of-Charge (OPERABILITY) Determination

The specific gravity limits of existing Table 3.8.6-1 and the associated footnotes are being deleted. (Table 3.8.6-1 is being deleted.) Currently, verification of battery cell specific gravity is required by existing SR 3.8.6.1 and SR 3.8.6.2.

SCE proposes replacing the requirements to measure specific gravity with requirements to monitor float current to determine state-of-charge. The battery manufacturer, EnerSys, concurs with the use of float current monitoring for the purpose of determining the state-of-charge of the batteries [Ref. 7.13]. Measuring float current provides a more direct and expeditious method over specific gravity measurements.

Battery specific gravity monitoring will be performed periodically during battery maintenance and testing activities prior to performing a battery service test, battery performance discharge test, or modified performance discharge test in accordance with SONGS plant procedures and battery manufacturer's recommendations. Battery specific gravity monitoring is also performed on an annual basis in accordance with IEEE 450-2002 recommendations as proposed in LCS SR 3.8.106.8. The specific gravity monitoring is appropriate for troubleshooting activities and is used for periodic battery trending.

The accuracy and capability of the float current monitoring provides adequate assurance that the deletion of the requirement for specific gravity measurements from the TS will not have a significant impact on safety or the ability to accurately determine the operability of the batteries.

B. Revise LCO, Modify and Relocate TS 3.8.6 Conditions and Required Actions

B.1. The title of TS 3.8.6 is revised from "Battery Cell Parameters" to "Battery Parameters." A corresponding change to the TS Table of Contents is made to be consistent with the revised TS 3.8.6 title.

The TS title is changed to reflect the relocation of various Conditions and Required Actions from TS 3.8.4 which apply to the overall battery but not the individual battery cells.

B.2. LCO 3.8.6 is revised from "Battery cell parameters for the Train A, Train B, Train C, and Train D batteries shall be within the Category A and B limits of Table 3.8.6-1" to "Battery parameters for the Train A and Train B batteries shall be within limits."

The SONGS-specific design terminology is more accurately described as Train A and Train B, each with two subsystems, rather than as Trains A, B, C, and D. This is an administrative change.

B.3. Existing Table 3.8.6-1, Battery Surveillance Requirements, is deleted in its entirety while its requirements are included in new SRs in the TSs and LCS.

The LCO statement is revised to delete reference to the specific limits of Table 3.8.6-1. The following limits will be relocated to the Battery Monitoring and

Maintenance Program specified in new TS Section 5.5.2.17 and LCS 3.8.106:

Cell voltage (Category A and B limits: 2.13 V),
Electrolyte level (Category A and B limits: Minimum level indication mark),
Cell voltage (Category C limit: 2.07 V) (also included in proposed TS 3.8.6),
Electrolyte level (Category C limit: Above top of plates) (also included in proposed TS 3.8.6), and
Specific gravity monitoring (Category A, B and C limits: 1.200 and 1.195).

The Category A and B values of TS Table 3.8.6-1 represent appropriate monitoring levels and preventive maintenance levels for long-term battery quality and extended battery life. The LCO category presented in 10 CFR 50.36 states that LCOs are "the lowest functional capability or performance levels of equipment required for safe operation of the facility." As such, the Category A and B values for cell voltage and electrolyte level do not reflect the 10 CFR 50.36 criteria for LCOs. Therefore, it is proposed that these values and the Required Actions associated with restoration be relocated to a licensee-controlled program.

SCE is providing a regulatory commitment to relocate the current battery parameters (i.e., specific gravity, cell voltage, electrolyte level, electrolyte temperature, float voltage, connection resistance, and physical condition) to a new battery monitoring and maintenance program. This program will be located in the LCS and described in new TS Section 5.5.2.17.

The battery and its preventive maintenance and monitoring program are also under the regulatory requirements of 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." This relocation will continue to assure the battery is maintained at current levels of performance and allows focus on the monitoring of battery parameter degradations.

The Category C specific limiting values of TS Table 3.8.6-1 for the battery electrolyte levels have also been proposed to be relocated to a licensee-controlled program. However, proposed TS 3.8.6 Conditions D and E will require the electrolyte level (any battery cell) and temperature (pilot cell only) to be greater than or equal to minimum established design limits. SCE proposes to relocate the electrolyte temperature and level values (i.e., the minimum established design limits) to the LCS and TS Bases. Depending on the available excess capacity of the associated battery, the minimum temperature necessary to support operability of the battery can vary. Relocating these values to a licensee-controlled program will provide added flexibility to monitor and control this limit at values directly related to the battery's ability to perform its function when additional loads are added to the DC system.

SCE proposes replacing the requirements to measure specific gravity with

requirements to monitor float current. The letter from the battery manufacturer, EnerSys, [Ref. 7.13] concurred with the use of float current monitoring for the purpose of determining the state-of-charge of the SONGS batteries. More specifically, EnerSys identified that float current values are normally indicative of the battery's state-of-charge when the pilot cell parameters of voltage, temperature, and level are within bounds. The accuracy and reliability of this reading will generally hold true over the expected life of these batteries (i.e., 20 years), and the float current value will only increase slightly as the batteries age. Aging does impact the float current but is expected to be within the noted ranges for the batteries serviceable life. A slight increase in the float current value over the life of the batteries used at SONGS would not change the ability of the batteries to meet their safety function.

EnerSys determined when the battery is > 98% charged that the battery float charging current range is ≤ 0.75 amp for 1260 amp-hour rated batteries and ≤ 1.50 amps for 1800 amp-hour rated batteries. Recognizing that the individual float current values provided by EnerSys are an indication that the battery is at least 98 percent charged, SCE is providing a regulatory commitment to maintain a 2 percent capacity margin for the Subsystem A, B, C, and D batteries. The 2 percent value will be included in the SONGS TS Bases.

SCE recognizes that the instrumentation used to monitor float current must have the necessary accuracy and capability to measure electrical currents in the expected range to determine OPERABILITY. Therefore, a digital multimeter of high accuracy in an average function mode is required to measure the steady state float charging current.

Battery specific gravity monitoring will continue to be performed periodically during battery maintenance and testing activities prior to performing a battery service test, battery performance discharge test, or modified performance discharge test in accordance with SONGS plant procedures and the battery manufacturer's recommendations. Battery specific gravity monitoring is also performed on an annual basis in accordance with IEEE 450-2002 requirements as required by the Licensee Controlled Specification SR 3.8.106.8. The specific gravity data is appropriate for troubleshooting activities and is used for periodic battery trending. Accurate float current monitoring provides adequate assurance that the deletion of the requirement for specific gravity measurements from the Technical Specification will not have a significant impact on safety or the ability to accurately determine the operability of the SONGS batteries.

Existing TS Table 3.8.6-1 specifies the battery cell parameter requirements, including electrolyte level, float voltage, and specific gravity. Since Table 3.8.6-1 is being deleted, deleting references to Table 3.8.6-1 are administrative changes.

The proposed changes described above ensure the battery parameters will continue to be monitored in accordance with the "Battery Monitoring and

Maintenance Program" as specified in new TS Section 5.5.2.17.

B.4. New Condition A is added:

"One or two batteries on one train with one or more battery cells with float voltage < 2.07 V."

Existing Condition A (and its associated Required Actions and CTs) is deleted: "~~One or more batteries with one or more battery cell parameters not within limits.~~" The existing Condition A refers to limits in Table 3.8.6-1, which is being deleted, and the needed requirements are being relocated.

SONGS DC system is comprised of two independent trains. Each train consists of two subsystems, each with one dedicated battery. Since each train has a maximum of two batteries, the wording states "one or two batteries." The operability of the DC subsystems is consistent with assumptions of the accident analysis of the Updated Final Safety Analysis Report (UFSAR) Chapters 6 and 15 which assume the required Engineered Safety Systems are OPERABLE. This includes maintaining at least one train of the DC sources OPERABLE during a postulated accident condition, concurrent with a worst case single failure.

New Condition A includes the following new Required Actions and Completion Times (CTs):

A.1 Perform SR 3.8.4.1.
CT: 2 hours
AND
A.2.1 Perform SR 3.8.6.1.
CT: 2 hours
OR
A.2.2 Perform SR 3.8.6.2.
CT: 2 hours
AND
A.3 Restore affected cell voltage ≥ 2.07 V.
CT: 24 hours

SCE proposes adding new Condition A to address the existing Category C limit for float voltage in TS Table 3.8.6-1. This new Condition would be applicable when one or two batteries are found with one or more battery cells with a float voltage less than 2.07 V. Once Condition A has been entered, the battery cell is considered degraded and the Required Actions are to verify: (a) the battery terminal voltage to be greater than or equal to the minimum established float voltage (SR 3.8.4.1), and (b) that each battery's float current is less than or equal to 1.50 amps for 1800 amp-hour rated batteries (SR 3.8.6.1) or 0.75 amp for 1260 amp-hour rated batteries (SR 3.8.6.2). The above actions assure that there is still sufficient battery capacity to perform its intended function without

considering the battery inoperable. Continued operation up to 24 hours is proposed to allow the restoration of the affected cell(s) voltage to greater than or equal to 2.07 volts. The 24-hour restoration time maintains safe conditions. The threshold of ≥ 2.07 V has been verified with the battery manufacturer, EnerSys, as an appropriate threshold for determining OPERABILITY.

B.5. New Condition B is added (existing Condition B is modified and relabeled as Condition G):

"One or two batteries on one train with float current > 1.50 amps."

This Condition is modified by a NOTE: Only applicable to 1800 amp-hour rated batteries.

Condition B includes the following Required Actions and Completion Times (CTs):

B.1	Perform SR 3.8.4.1. CT: 2 hours
AND	
B.2	Restore battery float current to ≤ 1.50 amps. CT: 12 hours

New Condition B addresses the condition where one or two batteries with float current greater than 1.50 amps for 1800 amp-hour rated batteries.

SCE proposes adding new Condition B to address battery state-of-charge. This new Condition B would be applicable when one or two batteries are found with a float current greater than 1.50 amps. A float current of greater than 1.50 amps provides an indication that a partial discharge has occurred. The Required Action is to verify within 2 hours that the battery terminal voltage is greater than or equal to the minimum established float voltage (SR 3.8.4.1), thus confirming battery charger operability. If the terminal voltage is satisfactory and there are no cells with a voltage less than 2.07 V, Required Action B.2 of Condition B assures that within 12 hours the battery will be restored to its fully-charged condition from any discharge that might have occurred due to a temporary loss of the battery charger.

If the terminal voltage is found to be less than the minimum established float voltage, it indicates that the battery charger is either inoperable or is operating in the current limit mode. If the battery charger is operating in the current limit mode for 2 hours, it is an indication that the battery has been substantially discharged and likely cannot perform its required design functions.

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 the

revised Condition G of TS 3.8.6 would be applicable and the battery must be declared inoperable immediately.

If float voltage is satisfactory and there are no cells less than 2.07 V and the out-of-limit float current condition is due to one or more battery cells with low voltage, the battery is not substantially discharged and the 12-hour CT to restore battery float current to within limit is reasonable.

B.6. New Condition C is added:

"One or two batteries on one train with float current > 0.75 amp."

This Condition is modified by a NOTE: Only applicable to 1260 amp-hour rated batteries.
Condition C includes the following Required Actions and Completion Times (CTs):

C.1 Perform SR 3.8.4.1.
CT: 2 hours

AND

C.2 Restore battery float current to ≤ 0.75 amp.
CT: 12 hours

Condition C is the same as Condition B but is applicable to 1260 amp-hour rated batteries (float current ≤ 0.75 amp).

B.7. New Condition D is added:

"One or two batteries on one train with one or more cells with electrolyte level less than minimum established design limits."

Condition D includes the following Required Actions and Completion Times (CTs):

D.1 Restore electrolyte level to above the top of the plates.
CT: 8 hours

AND

D.2 Verify no evidence of leakage.
CT: 12 hours

AND

D.3 Restore electrolyte level to greater than or equal to minimum established design limits.
CT: 31 days

The Required Actions are modified by two NOTES: 1) Required Actions D.1 and D.2 are only applicable if electrolyte level is below the top of the plates, and 2)

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

New Condition D addresses the condition where one or two batteries with one or more cells electrolyte level less than the minimum established design limits.

If the level is above the top of the battery plates but below the minimum limit (i.e., minimum level indication mark on the battery cell jar provided by the battery manufacturer), the battery still has sufficient capacity to perform its intended safety function and is not considered inoperable. Battery cells maintained at the recommended electrolyte level retain the maximum capacity which provides a qualitative margin.

With the cell electrolyte level below the top of the plates, there is a potential for dry-out and plate degradation. If cells have been discovered with an electrolyte level below the top of the plates, these battery cells will be equalized and tested as stated in the LCS.

New Required Actions D.1, D.2, and D.3 (as well as provisions in new TS Section 5.5.2.17) restore the electrolyte level, ensure that the cause of the loss of electrolyte level is not due to a leak in the battery cell jar, and equalize and test battery cells that have been discovered with an electrolyte level below the top of the plates. The battery manufacturer, EnerSys, has concurred with the electrolyte level limits specified in these Required Actions ("above the top of the plates" in 8 hours and "greater than or equal to minimum established design limits" in 31 days) as appropriate measures to minimize possible damage and restore OPERABILITY for the affected battery [Ref. 7.14].

B.8. New Condition E is added:

"One or two batteries on one train with pilot cell electrolyte temperature less than minimum established design limits."

Condition E includes the following Required Action and Completion Time (CT):

E.1. Restore battery pilot cell temperature to greater than or equal to minimum established design limits.
CT: 12 hours

New Condition E addresses the condition where one or two batteries with pilot cell electrolyte temperature less than minimum established design limits. The minimum established design limits are included in Licensee Controlled Specifications.

A low electrolyte temperature limits the current and power available from the battery. The limiting design temperature for the SONGS battery cells when cross-tied is 60 degrees F. Each Class 1E battery is sized with correction factors

that include temperature and aging.

The SONGS battery rooms' temperature is alarmed and periodically monitored by SONGS Operations as part of the operator's rounds. The battery rooms are contained in a separate environmentally controlled area outside the ESF switchgear rooms. The first indication of a problem with battery temperature would be the room temperature approaching 66 degrees F and actuating a Control Room alarm. Operator actions implement corrective measures in accordance with plant procedures and operating instructions. Since batteries have very large thermal inertia, it is highly probable that the room temperature excursion would be corrected prior to the battery electrolyte reaching its minimum temperature. SONGS operating experience has demonstrated a negligible difference in operating temperature (i.e., well within the 5-degree F bounds guidelines for temperature stability per IEEE 450-2002) between the different battery cells. Therefore, the use of a pilot cell is considered appropriate for demonstrating the temperature of the entire battery.

The pilot cell temperature is a sufficiently accurate representation of the temperature of the battery bank because: 1) the batteries have very large thermal inertia; 2) the SONGS batteries are designed with sufficient margins (i.e., temperature, aging, and design); and 3) procedures are available to monitor and correct the cause of low battery room temperature. The 12-hour CT provides a reasonable time to restore the electrolyte temperature within established limits.

B.9. New Condition F is added:

"One or more batteries in redundant trains with battery parameters not within limits."

Condition F includes the following Required Action and Completion Time (CT):

F.1 Restore battery parameters for batteries in one train to within limits. CT: 2 hours

SCE proposes adding new Condition F to address the condition where one or more batteries in redundant trains have battery parameters not within established limits. If this condition exists, there is not sufficient assurance that the batteries will be capable of performing their intended safety function. With redundant batteries involved, loss of function is possible for multiple systems that depend upon the batteries. SCE proposes that battery parameters for the affected battery(ies) in one train be restored to within limits within 2 hours.

B.10. New Condition G is existing Condition B modified and relabeled:

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

OR
One or two ~~more~~ batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 1.50 amps ~~with average electrolyte temperature of the representative cells < 60°F~~.
~~OR~~
~~One or more batteries with one or more battery cell parameters not within Category C values.~~"

This Condition is modified by a new NOTE: Only applicable to 1800 amp-hour rated batteries.

Current Condition B is relabeled as new Condition G. The current Condition B consists of three separate entry conditions. As part of this proposed change, the last two entry conditions will be deleted. The deleted conditions will be replaced with a new condition requiring entry when one or two batteries with one or more battery cells float voltage of less than 2.07 V and float current greater than 1.50 amps for 1800 amp-hour rated batteries.

New Condition G provides a default condition for battery parameters that fall outside the allowance of the Required Actions for Condition A, B, D, E, or F. Under this condition, it is assumed that there is not sufficient capacity to supply the maximum expected load requirements. New Condition G also addresses the case where one or two batteries are found with one or more battery cells having a float voltage less than 2.07 V and a float current greater than 1.50 amps for 1800 amp-hour rated batteries. "One or more batteries" is changed to "One or two batteries" to limit the Condition to only one train which comprises a maximum of two batteries.

B.11. New Condition H is added:

"Required Action and associated Completion Time of Condition A, C, D, E, or F not met.
OR
One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 0.75 amp."

This Condition is modified by a NOTE: Only applicable to 1260 amp-hour rated batteries.

Condition H includes the following Required Action and Completion Time (CT):

H.1 Declare associated battery inoperable.
CT: Immediately

Condition H is the same as Condition G but is applicable to 1260 amp-hour rated batteries (float current > 0.75 amp).

C. Modify and Relocate TS 3.8.6 Surveillance Requirements

SCE proposes to delete the existing SRs and TS Table 3.8.6-1 and replace it with SR 3.8.6.1 and SR 3.8.6.2 for float current, SR 3.8.6.3 for pilot cell voltage, SR 3.8.6.4 for electrolyte level, SR 3.8.6.5 for pilot cell temperature, and SR 3.8.6.6 for connected cell voltage.

C.1. New SR 3.8.6.1 is added (existing SR 3.8.6.1 is deleted):

"Verify each battery float current is ≤ 1.50 amps for batteries rated at 1800 amp-hours.
~~Verify battery cell parameters meet Table 3.8.6-1 Category A limits.~~"
Frequency: 7 days

Existing SR 3.8.6.1 requirements are deleted as previously discussed in TS 3.8.6, Item B.3.

The new SR is modified by a NOTE: Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1.

SCE proposes adding new SR 3.8.6.1 which will require verification that the float current for each battery is less than or equal to 1.50 amps every 7 days. 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 1.50 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. The use of float current to determine the state-of-charge of the battery has been endorsed by the battery manufacturer, EnerSys.

C.2. New SR 3.8.6.2 is added (existing SR 3.8.6.2 is deleted):

"Verify each battery float current is ≤ 0.75 amp for batteries rated at 1260 amp-hours.
~~Verify battery cell parameters meet Table 3.8.6-1 Category B limits.~~"
Frequency: 7 days

Existing SR 3.8.6.2 requirements are deleted. A battery low voltage condition is covered by proposed TS 3.8.4, Conditions A and B. A high voltage condition does not make the DC subsystem inoperable, and no corresponding LCO action is required.

The new SR is modified by a NOTE: Not required to be met when battery terminal voltage is less than the minimum established float voltage of SR 3.8.4.1.

SR 3.8.6.2 is the same as SR 3.8.6.1 but is applicable to 1260 amp-hour rated batteries (float current ≤ 0.75 amp).

C.3. New SR 3.8.6.3 is added:

"Verify each battery pilot cell voltage is ≥ 2.07 V."
Frequency: 31 days

SCE proposes adding new SR 3.8.6.3 which will require verification that the float voltage of pilot cells is greater than or equal to 2.07 V every 31 days. This voltage level represents the point where battery operability is in question. The Battery Monitoring and Maintenance Program in new TS Section 5.5.2.17 requires actions to restore battery cells with float voltage less than 2.13 V and actions to verify that the remaining cells are greater than or equal to 2.07 V when a cell or cells have been found to be less than 2.13 V. The battery terminal voltage is normally maintained at a float voltage of 131.5 V (2.267 Vpc) that keeps the battery cells at the maximum state-of-charge and capacity which provides a qualitative margin.

C.4. New SR 3.8.6.4 is added:

"Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits."
Frequency: 31 days

SCE proposes adding new SR 3.8.6.4 which will require verification that the connected cell electrolyte level of each battery is greater than or equal to the minimum established design limits every 31 days. 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.

C.5. Existing SR 3.8.6.3 is modified and renumbered to SR 3.8.6.5:

"Verify each battery pilot cell ~~average electrolyte~~ temperature is greater than or equal to minimum established design limits ~~of representative cells is >60°F~~."
Frequency: 31 days (revised from 92 days)

Renumbering SR 3.8.6.3 to SR 3.8.6.5 is editorial.

SR 3.8.6.5 will require verification that the temperature of each battery pilot cell is greater than or equal to the minimum established design limits every 31 days per IEEE 450-2002.

C.6. New SR 3.8.6.6 is added:

"Verify each battery connected cell voltage is ≥ 2.07 V."
Frequency: 92 days

SCE proposes adding new SR 3.8.6.6 which will require verification that the float voltage of all connected cells is greater than or equal to 2.07 V every 92 days. This voltage level represents the point where battery operability is in question. The Battery Monitoring and Maintenance Program in new TS Section 5.5.2.17 requires actions to restore battery cells with float voltage less than 2.13 V and actions to verify that the remaining cells are greater than or equal to 2.07 V when a cell or cells have been found to be less than 2.13 V.

C.7. New SR 3.8.6.7 is existing SR 3.8.4.8 modified, renumbered, and relocated:

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

NOTES 1 and 2 are deleted:
~~1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~
~~2. Credit may be taken for unplanned events that satisfy this SR.~~

The Frequency is modified:
60 months
AND
12 months ~~---NOTE---Only applicable~~ when the battery shows degradation or has reached 85% of the expected life with capacity < 100% of the manufacturer's rating
AND
24 months when the battery has reached 85% of the expected life with capacity ≥ 100% of the manufacturer's rating

Relocating SR 3.8.4.8 to new SR 3.8.6.7 is administrative. This SR demonstrates the operability of the battery and is therefore more appropriate to be included in TS 3.8.6.

Modifying the existing wording of SR 3.8.4.8 provides additional duration for the performance discharge test identified in new SR 3.8.6.7. NOTE 1 is deleted because it is no longer applicable to SONGS. NOTE 2 is deleted. Due to limited resources to fulfill this SR's requirements online, unplanned events will not be credited for SONGS.

The acceptance criteria for this Surveillance are consistent with industry standards endorsed by the NRC. These standards recommend that the battery be replaced if its capacity is below 80% of the manufacturer rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this 80% limit.

The Surveillance Frequency for this test is normally 60 months. If the battery

shows degradation, or if the battery has reached 85% of its expected life and capacity is < 100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that have capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE 450-2002, when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is ≥ 10% below the manufacturer's rating.

TS 3.8.7

LCO 3.8.7 is revised from "The required Train A, Train B, Train C, and Train D inverters shall be OPERABLE" to "The required Channel A, B, C, and D AC inverters shall be OPERABLE."

The SONGS-specific design terminology is more accurately reflected by Channel rather than Train. This change is administrative.

TS 3.8.9

LCO 3.8.9 is revised from "Train A and Train B AC; Trains A, B, C, and D DC; and Trains A, B, C, and D AC vital bus electrical power distribution subsystems shall be OPERABLE" to "Train A and Train B AC, Subsystems A, B, C, and D DC, and Channels A, B, C, and D AC vital bus electrical power distribution systems shall be OPERABLE."

The SONGS-specific design terminology is more accurately reflected by channels rather than trains for vital buses and by subsystems rather than trains for DC buses. This change is administrative.

Condition A, Required Action A.1, and SR 3.8.9.1 are revised to change "electrical power distribution subsystem" to "electrical power distribution system." Required Action B.1 is revised as follows: "Restore AC vital bus ~~subsystem~~ to OPERABLE status."

These changes are made to be consistent with the changes to the LCO terminology and are administrative.

TS 3.8.10

LCO 3.8.10 is revised to change "electrical power distribution subsystems" to "electrical power distribution systems."

Condition A, Required Action A.2.4, and SR 3.8.10.1 are revised to change "electrical power distribution subsystem" to "electrical power distribution system."

These changes are made to be consistent with the SONGS-specific terminology changes made in TS 3.8.9 and are administrative.

Required Action A.2.5 is revised to change "shutdown cooling subsystem(s)" to "shutdown cooling system(s)."

This change more accurately reflects SONGS-specific terminology and is administrative.

Section 5.5 Procedures, Programs, and Manuals

SCE proposes adding new Battery Monitoring and Maintenance Program, TS Section 5.5.2.17. This program will have elements relocated from several TSs. New TS Section 5.5.2.17 will state:

"This Program provides for battery restoration and maintenance, which includes the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and
b. Actions to verify that the remaining cells are above 2.07 V when a battery cell or cells have been found less than 2.13 V, and
c. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates."

This program will be implemented through the Procedures, Programs, and Manuals Section of the Technical Specifications, Licensee Controlled Specifications, and plant procedures. The battery and its preventive maintenance and monitoring program are also under the regulatory requirements of 10 CFR 50.65.

This change allows the licensed operators to focus on the monitoring of battery parameter degradations and continues to assure the battery is maintained at required levels of performance.

ELECTRICAL DESIGN CHANGES

To be able to fully utilize the flexibility provided by the proposed TS, design changes are currently being made to the electrical system to provide the ability to manually cross-connect DC subsystems during operating Modes 1-4 and continue to meet General Design Criteria (GDC) 17, GDC 18, Regulatory Guide (RG) 1.6, and IEEE 308. These design changes include one new swing battery charger to be shared by subsystems A and C and another by subsystems B, D, and non-1E bus D5. Electrical isolation and independence between subsystems required by RG 1.75 is maintained by the isolation capability of the battery charger itself and the key interlocked output circuit breakers. The existing batteries for each train are being replaced with batteries with 1800 amp-hour ratings. Refer to Sketches 1 and 2 in Section 3. Currently, the subsystems A and B batteries are rated 1260 amp-hours at 8 hours, and the subsystems C and D batteries are rated 1800 (previously 1500) amp-hours at 8 hours.

Each additional swing charger will be powered from the train aligned common Emergency Safety Feature (ESF) Motor Control Center that can be powered from either Unit 2 or Unit 3 ESF buses. Refer to Sketches 1 and 2 in Section 3. The output of one swing charger will have provisions, via separate output breakers, for alignment to either subsystem A or C. The output of the other swing battery charger could be aligned to the subsystem B, D, or non-1E bus D5 battery DC system via the supply breakers for each bus. There will be key interlocks to prevent closure of multiple output breakers to ensure that a swing charger will be connected to only one DC bus at a time. This ensures that subsystems are not cross connected through a swing charger. Additional isolation circuit breakers are provided in each feed from the swing battery charger to the associated 1E batteries. During cross-connected configuration battery chargers may be paralleled to share the load. Each charger has a current limit feature and consequently will not challenge interrupting duties of the protective devices during parallel operations.

Permanent cables have been upgraded between the molded case isolation switches used for the cross-connect configuration. Distribution system panels and breakers have been increased in size and capacity to handle the increased load requirements and short circuit current.

During Mode 1-4 cross-connect configurations, as needed by maintenance activities or for corrective activities, administrative controls will be in place to ensure that the required battery chargers are operable. The new swing charger will provide added flexibility to either recharge a discharged battery or to supply the cross-connected distribution systems or to replace a normal battery charger should the normal battery charger become unavailable. To create an uninterruptible transfer of power, two subsystem batteries on a train will be paralleled for a short duration. This is an accepted practice during transfer of power sources and is considered to be an acceptable minimal risk. These two

batteries will not continuously operate in parallel supplying the cross-connected distribution system because interrupting duty of the protective devices (circuit breakers) will be exceeded due to fault current contributed by two batteries.

Each of the subsystems A, B, C, and D distribution buses are located in separate rooms to meet Appendix R and RG 1.75 requirements for system separation and redundancy. Each distribution room contains the associated distribution switchboard, associated battery charger, inverter, distribution panel, and molded case isolation switches and circuit breakers for the cross-connect configuration. The new swing charger for each Train will be located in the subsystem A distribution room and subsystem B distribution room, respectively.

PROBABILISTIC RISK ASSESSMENT (PRA)

The SONGS 2/3 Living PRA was used to assess the risk impact of entering TS 3.8.4 for an extended period of 30 days for the configuration where two same train DC subsystems are cross-connected with one battery supporting both buses. The analysis was performed consistent with the guidelines of Regulatory Guides 1.174, "An Approach For Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes To The Licensing Basis," [Ref. 7.9] and 1.177, "An Approach For Plant-Specific, Risk-Informed Decision making: Technical Specifications" [Ref. 7.10].

Methodology:

The SONGS 2/3 Living PRA Models and the Safety Monitor were used to assess the core damage and large early release frequencies (CDF and LERF) for two cases: 1) base case – nominal maintenance for all components, and 2) a battery removed from service with the associated bus cross-connected to another bus from the same train. The results from these calculations are combined with additional data to yield results that are measured against PRA acceptance guidelines from Regulatory Guides 1.174 and 1.177. A full PRA discussion is provided in Attachment I.

PRA Quality:

The SONGS PRA has been subjected to extensive peer and regulatory review. The PRA Model, assumptions, database changes, improvements, and computer code are controlled and documented by administrative procedure. The Model and database reflect the as-built design with enhancements that reflect design changes to the 1E DC system and the most recent historical data. Therefore, the SONGS 2/3 Living PRA is of a quality consistent with that required to perform accurate, thorough, and comprehensive evaluations for this application.

Conclusions:

The increases in core damage and large early release frequencies with two same train DC buses cross connected for 30 days are less than 1E-7/year and 1E-8/year, respectively. The changes in risk are small because a fully qualified alternate power source is aligned when a battery is removed for maintenance. The calculated incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP) are less than the acceptance guidelines from NRC Regulatory Guide 1.177 of 5E-7 and 5E-8, respectively.

The expected frequency of TS 3.8.4 usage and duration are combined with the core damage frequency while in the TS to assess the expected annual risk impact of the TS change. The expected annual risk impact is measured against NRC Regulatory Guide 1.174. The expected annual increase in risk is << 1E-7/year for CDF and <<1E-8/year for LERF, which are less than the RG 1.174 acceptance guidelines.

Therefore, the flexibility of the enhanced DC system to allow cross-connection to the other subsystem on the same train supports a TS 3.8.4 allowed outage time extension to 30 days as measured against the risk acceptance guidelines of References 7.9 and 7.10.

PRA Summary:

The PRA results compare favorably against Regulatory Guides 1.174 and 1.177 in large part because a qualified alternate source of power is aligned prior to removing a battery. When aligned to the alternate power source, each DC bus remains energized with a highly reliable source. If a battery is removed from service without the alternate power source aligned, the associated sub-channel reliability is reduced. This is outside the scope of the PRA for this PCN since shutdown is required if the alternate power source is not aligned in 2 hours. The action to initiate shutdown in 2 hours is the same as the current TS where the allowed outage time is 2 hours when a battery is removed from service.

5. REGULATORY SAFETY ANALYSIS

The proposed change to Technical Specification (TS) 3.8.4, "DC Sources – Operating," would extend the Completion Time (CT) for an inoperable Direct Current (DC) subsystem, exclusive of the battery charger which has its own Limiting Condition for Operation (LCO), by adding required actions to allow manual cross-connect of distribution subsystems A and C or B and D for a period of 21 days (30 days for upgrade to 1800 amp-hour rated batteries) during Modes 1-4. These changes will be allowed provided the following conditions are met:

1. The inoperable subsystem can be cross-connected within 2 hours.
2. Required battery chargers are operable.
3. Batteries are sized and tested to accommodate the combined connected loads.

The regulatory basis for TS 3.8.4 is to assure, as required by 10CFR50, Appendix A, General Design Criterion (GDC) 17, the DC electrical power system will provide sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. This ensures the DC system is capable of supporting systems critical to precluding or mitigating the release of fission product radioactivity.

The purpose of the LCO is to minimize the impact of loss of a DC safety train on the required Engineered Safety Feature (ESF) equipment needed to ensure that:

1. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of Anticipated Operational Occurrences (AOOs) or abnormal transients; and

2. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated Design Basis Accident (DBA).

Complying with the LCO assures that the assumptions reflected in the analysis for DBAs as documented in San Onofre Nuclear Generating Station (SONGS) 2 and 3 Updated Final Safety Analysis Report (UFSAR) Chapter 15, Accident Analysis are met.

The proposed change will extend the CT for inoperable DC subsystems to allow for effective assessment of corrective actions during Modes 1-4 by cross-connecting DC subsystems A and C or subsystems B and D. Use of the cross-connect option of the DC subsystems will be allowed for 21 days (30 days for upgrade to 1800 amp-hour rated batteries) provided the required battery chargers are operable and required batteries have met the service, performance, or modified performance test profiles.

The capability of the DC subsystems to be effectively cross-connected in a safe and timely manner is contingent upon the completion of the design changes discussed above.

The proposed changes to existing Surveillance Requirements (SRs) 3.8.4.7 and 3.8.4.8 eliminate the service profile test and performance tests in their entirety after new batteries are installed. The modified performance discharge test combines aspects of the service test and performance test into one test profile. The modified performance discharge test assures the batteries are capable of meeting the design bases duty cycles.

The revised calculations, Probabilistic Risk Assessment (PRA), proposed surveillance testing, and safety analysis indicate the basis for the Technical Specification requirements will be met during the extended period in which a DC subsystem is found inoperable and during the period DC distribution buses subsystems A and C or B and D are cross-connected.

EVALUATION

Battery and Charger Sizing

The results of the sizing calculation to support this amendment request indicate the larger capacity 1800 amp-hour rated battery will meet the design bases load requirements when supplying cross-connected DC subsystems.

The new 400A swing chargers and existing 300A chargers are adequate to support the design bases load requirements for various operating scenarios. In all cross-connect scenarios the required charger(s) can supply the buses' steady state loads and recharge the battery from a design minimum state within 24 hours. Following NRC approval of this amendment, the Updated Final Safety Analysis Report (UFSAR) will be revised from 12 hours to 24 hours recharging time.

Power is maintained to DC equipment during recharging of the batteries by the connected battery charger(s). Since there is continuous DC power available to the required equipment, the extended duration of the recharge does not impact availability or operability of electrical or mechanical equipment credited in the safety analyses.

Protection (Breakers, Fuses, Switches)

The results of circuit protection and coordination analysis to support the design change indicated that the larger capacity battery required improvements / upgrades in the protective devices and distribution panels provided in the DC subsystems. Upgrades in breakers to accommodate increased short circuit currents and setpoint changes for improved coordination have been

implemented. With the protection upgrade implemented, DC cables and distribution equipment will provide adequate protection to support the proposed changes.

During cross connecting of subsystem buses A and C or B and D, two batteries will be paralleled for a short duration. An electrical fault during that duration could exceed the interrupting duties of the protective devices. This is an accepted practice during transfer of power sources and is considered to be an acceptable minimal risk. Failure of the cross-tied DC buses and/or associated battery(ies) is bounded by the failure of a 4kV bus (an entire train) which is evaluated in UFSAR Table 8.3-8, "FMEA U2 Class 1E AC and DC power systems."

Separation Requirements (Regulatory Guide (RG) 1.75, "Physical Independence of Electric Systems")

The new design complies with the separation requirements of IEEE 384 and RG 1.75 as follows:

i. The replacement batteries will be installed at the same location as the existing batteries located in dedicated battery rooms, thus maintaining the original separation and isolation requirements.
ii. Swing battery chargers will be installed in separate distribution rooms. Swing battery chargers have dedicated output circuit breakers located in separate compartments. The output circuit breakers are interlocked to restrict swing battery charger alignment to only one subsystem at a time. A redundant circuit breaker, external to the swing battery charger, is installed for isolation of each 1E battery from the swing battery charger.
iii. The swing charger itself is a qualified isolation device.

5.1 No Significant Hazards Consideration

The proposed changes are to Technical Specifications (TSs) 3.8.1, "AC Sources – Operating," 3.8.4, "DC Sources – Operating," 3.8.5, "DC Sources – Shutdown," 3.8.6, "Battery Cell Parameters," 3.8.7, "Inverters – Operating," 3.8.9, "Distribution Systems – Operating," and 3.8.10, "Distribution Systems – Shutdown." This change will also add new Battery Monitoring and Maintenance Program, TS Section 5.5.2.17. The proposed changes request new actions for an inoperable battery for Limiting Condition for Operation (LCO) 3.8.4 and LCO 3.8.5. The proposed changes also include the relocation of a number of surveillance requirements (SRs) in TS 3.8.4 that perform preventive maintenance on the safety related batteries, to a licensee-controlled program. It is proposed that the requirements of TS Table 3.8.6-1, "Battery Cell Parameter Requirements," be relocated to a licensee controlled program, and specific Required Actions with associated Completion Times for out-of limits conditions for battery cell voltage, electrolyte level, and electrolyte temperature be added to

TS 3.8.6. In addition, specific SRs are being proposed for verification of these parameters.

A new program is being proposed for the maintenance and monitoring of station batteries. This program will be described in new TS Section 5.5.2.17, "Battery Monitoring and Maintenance Program." The items proposed to be relocated will be contained within this new program.

Southern California Edison (SCE) has evaluated the proposed changes to the TS for SONGS Units 2 and 3 using the criteria in 10 CFR 50.92 and has determined that the proposed changes do not involve a significant hazards consideration. The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10CFR50.92(c). A proposed amendment to an operating license for a facility involves no significant hazards consideration if operation of the facility in accordance with a proposed amendment would not: (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) Involve a significant reduction in a margin of safety.

The following information is provided to support a finding of no significant hazards consideration. A discussion of these standards as they relate to this amendment request follows:

i. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed changes to Technical Specifications (TS) 3.8.4 and 3.8.6 would allow extension of the Completion Time (CT) for inoperable Direct Current (DC) distribution subsystems to manually cross-connect DC distribution buses of the same safety train of the operating unit for 21 days (30 days for upgrade to 1800 amp-hour rated batteries). Currently the CT only allows for 2 hours to ascertain the source of the problem before a controlled shutdown is initiated. Loss of a DC subsystem is not an initiator of an event. However, complete loss of a Train A (subsystems A and C) or Train B (subsystems B and D) DC system would initiate a plant transient/plant trip.

Operation of a DC Train in cross-connected configuration does not affect the quality of DC control and motive power to any system. Therefore, allowing the cross-connect of DC distribution systems does not significantly increase the probability of an accident previously evaluated in Chapter 15 of the Updated Final Safety Analysis Report (UFSAR).

The above conclusion is supported by Probabilistic Risk Assessment (PRA) evaluation which encompasses all accidents, including UFSAR Chapter 15.

New TS Surveillance Requirement (SR) 3.8.4.4 is added to allow the application of the modified performance discharge testing on batteries rated at 1800 amp-hour using a frequency of 30 months. The application of the modified performance test is the preferred choice at SONGS for Class 1E 1800 amp-hour rated batteries. Therefore, only the modified performance discharge test will be used which uses the combined duty cycle of the cross-connected subsystems A-C or B-D. Battery life expectancy is optimized by using a 30-month modified performance test (service and performance test combined). The more rigorous modified performance discharge test will be applied in intervals of 30 months over the entire battery life. Using the same test method and test frequency throughout the battery life ensures that best trending results are achieved. The test frequency of 30 months will better correspond with scheduling of the more rigorous 60-month interval battery performance of modified performance discharge tests. Based on operating experience, the interval of 30 months is not expected to affect SONGS' capability to detect battery health and capacity.

The relocation of preventive maintenance surveillances and certain operating limits and actions to the Licensee Controlled Specifications and new Battery Monitoring and Maintenance Program will not challenge the ability of the DC electrical power system to perform its design function. Appropriate monitoring and maintenance consistent with industry standards will continue to be performed. In addition, the DC electrical power system is within the scope of 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," which will ensure the control of maintenance activities associated with the DC electrical power system. Enhancements from TSTF-360, Rev. 1 and IEEE 450-2002 have been incorporated into TSs 3.8.4, 3.8.5, and 3.8.6. These changes do not impact the probability or consequences of an accident previously evaluated.

Further, changes are made of an editorial nature or provide clarification regarding electrical 'Trains' and 'Subsystems' by using a more conventional terminology. TSs affected by editorial changes include 3.8.1, 3.8.4, 3.8.5, 3.8.6, 3.8.7, 3.8.9, and 3.8.10. The changes being proposed in the TS do not affect assumptions contained in other safety analyses or the physical design of the plant, nor do they affect other Technical Specifications that preserve safety analysis assumptions.

Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously analyzed.

ii. Will operation of the facility in accordance with this proposed change create the possibility of new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed changes involve restructuring the TS for the DC electrical power system. The DC electrical power system, including associated battery chargers, is not an initiator to any accident sequence analyzed in the UFSAR. Rather, the DC electrical power system is used to supply equipment used to mitigate an accident.

The proposed change modifies TSs and surveillances for batteries and chargers to meet the improvements of TSTF-360, Rev. 1 and IEEE 450-2002 whose intent is to maintain the same equipment capability as previously assumed in Southern California Edison's (SCE's) commitment to IEEE 450-1980.

The proposed change will allow the cross-tie of DC subsystems and allow extension of the CT for an inoperable subsystem to 21 days (30 days for upgrade to 1800 amp-hour rated batteries). Failure of the cross-tied DC buses and/or associated battery(ies) is bounded by existing evaluations for the failure of an entire electrical train.

Swing battery chargers are added to increase the overall DC system reliability. Administrative and mechanical controls are in place to ensure the design and operation of the DC systems continue to meet the UFSAR design basis.

Therefore, operation of the facility in accordance with this proposed change will not create the possibility of new or different kind of accident from any accident previously evaluated.

iii. Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?

Response: No.

The margin of safety is established through equipment design, operating parameters, and the setpoints at which automatic actions are initiated. The proposed changes will not adversely affect operation of plant equipment. These changes will not result in a change to the setpoints at which protective actions are initiated. Sufficient DC capacity to support operation of mitigation equipment is ensured. The changes associated with the new battery maintenance and monitoring program will ensure that the station batteries are maintained in a highly reliable manner. The equipment fed by the DC electrical sources will continue to provide adequate power to safety related loads in accordance with analysis assumptions.

Improvements in accordance with IEEE 450-2002 and TSTF-360, Rev. 1 maintain the same level of equipment performance stated in the UFSAR and the current Technical Specifications.

The addition of swing battery chargers increases the overall DC system reliability. Administrative and mechanical controls will be in place to ensure that the design and operation of the DC systems continue to meet the UFSAR design basis.

The addition of the DC cross-tie capability proposed for TS 3.8.4 has been evaluated, as described previously, using PRA and determined to be of acceptable risk as long as the duration while cross-tied is limited to 30 days. A new Condition has been included as part of this proposed change to ensure that plant operation, with DC buses cross-tied, will not exceed 21 days (30 days for upgrade to 1800 amp-hour rated batteries).

Revising the LCO statement to reflect the SONGS-specific design terminology and renaming existing conditions to make the Condition more consistent with the Standard Technical Specifications (STS) is considered administrative.

Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

Summary

Based on the above discussion, Southern California Edison has concluded that: (1) that the proposed amendment request does not constitute a significant hazards consideration as defined by 10 CFR 50.92 and (2) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed change.

5.2 Applicable Regulatory Requirements/Criteria

NUREG-0800, "Standard Review Plan," Section 8.3.2, "DC Power Systems (Onsite)," describes the acceptance criteria and determines if the DC onsite power system satisfies the requirements of General Design Criteria (GDC) 2, 4, 5, 17, 18, and 50 and will perform its intended functions during all plant operating, accident, and station blackout conditions. A discussion of continued compliance with the requirements is discussed in the following paragraphs.

U.S. NRC Regulatory Guide 1.75, "Physical Independence of Electric Systems," describes a method acceptable to the NRC staff of complying with IEEE 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations," and Criteria 3, 17, and 21 of Appendix A to 10 CFR 50, with respect to the physical independence of the circuits and electric equipment comprising or associated with the Class 1E power system, the protection system, systems actuated or controlled by the protection system, and auxiliary or supporting systems that must be operable for the protection system. The new system configurations allowed by the proposed TS changes will continue to meet the physical independence requirements of these systems.

U.S. NRC Regulatory Guide 1.93 "Availability of Electric Power Sources" describes operating procedures and restrictions acceptable to the Regulatory staff which should be implemented if the available electric power sources are less than the LCO. The new system configurations allowed by the proposed changes will continue to meet the availability requirements of the system.

10 CFR 50, Appendix A, General Design Criteria:

Compliance with GDC 2 requires that nuclear power plant structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as earthquake, tornado, hurricane, flood, tsunami, or seiche without loss of capability to perform their intended safety functions. Therefore, the DC power system and its components must normally be located in Seismic Category I structures that provide protection from the effects of tornadoes, tornado missiles, and floods. The new system configurations allowed by the proposed TS changes will continue to meet the requirements of GDC 2.

Compliance with GDC 4 requires that structures, systems, and components important to safety (a) be designed to accommodate the effects of, and be compatible with, the environmental conditions associated with normal operations, maintenance, testing, and postulated accidents and (b) be appropriately protected against dynamic effects that result from equipment failures, including missiles. The new system configurations allowed by the proposed TS changes will continue to meet the requirements of GDC 4.

Compliance with GDC 5 requires that structures, systems, and components important to safety shall not be shared among nuclear power units, unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units. The new system configuration allowed by the proposed TS changes will continue to meet the requirements of GDC 5. The new swing chargers will have the capability of being powered from either of the two operating SONGS units through train separated motor control centers (MCCs) common to both units. These MCCs can receive power from the associated safety trains of both units. Use of the above options to power common MCCs will continue to adhere to existing procedures with appropriate updates to ensure reliability of the DC systems.

Compliance with GDC 17 requires that onsite and offsite electrical power be provided to facilitate the functioning of structures, systems, and components important to safety. Each electric power system, assuming the other system is not functioning, must provide sufficient capacity and capability to ensure that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and that the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents. In

addition, these onsite power supplies and onsite electrical distribution systems have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure. The proposed changes to the TS do not alter the basic alignment and operation of the existing Class 1E 4kV, 480V, and 120VAC systems nor the 125VDC systems.

Compliance with GDC 18 requires that electric power systems important to safety be designed to permit appropriate periodic inspection and testing of key areas and features to assess their continuity and the condition of their components. The proposed changes to the TS continue to allow the flexibility and testability of the systems both during power and shutdown operations in order to meet the requirements of GDC 18.

Compliance with GDC 50 requires that the reactor containment structure, including access openings, penetrations, and containment heat removal systems, be designed so that the containment structure and its internal compartments can accommodate, without exceeding the design leakage rate and with sufficient margin, the calculated pressure and temperature conditions resulting from any Loss of Coolant Accident (LOCA). The proposed changes to the TS continue to ensure systems and components required to support safety systems during a LOCA will be available.

Compliance with 10 CFR 50.63 requires that each light-water-cooled nuclear power plant be able to withstand and recover from a station blackout of specified duration. As required by 10 CFR 50.63, electrical systems must be of sufficient capacity and capability to ensure that the core is cooled and that appropriate containment integrity is maintained in the event of a station blackout. The capacity of the DC sources required for station blackout must therefore be verified to be adequate with respect to the worst-case station blackout load profile and specified duration. DC system and battery sizing analysis to support the proposed TS changes ensure the batteries are designed and analyzed to meet station blackout load profile requirements under all postulated operating conditions.

EVALUATION CONCLUSIONS

10 CFR 50.36, "Technical specifications," provides the regulatory requirements for the content required in a licensee's TS. Criterion 3 of 10 CFR 50.36(c)(2)(ii) requires a limiting condition for operation to be established for a structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier. The DC sources satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

Portions of the proposed license amendment request result in relocating certain surveillances, surveillance acceptance criteria, and Required Actions that do not

meet the criteria of 10 CFR 50.36(c)(2)(ii). Existing TS Table 3.8.6-1 limits reflect nominal fully charged battery parameter values, with margin above that required for declaration of an operable battery. These limits represent appropriate monitoring levels and appropriate preventive maintenance criteria for long-term battery quality and extended battery life. As such, they do not reflect the 10 CFR 50.36 criteria for LCOs of the lowest functional capability or performance levels of equipment required for safe operation of the facility. The proposed changes relocate these values and actions associated with restoration to a licensee-controlled program under the control of 10 CFR 50.59, "Changes, tests, and experiments."

The proposed items to be relocated to a licensee-controlled program will have changes subject to review under 10 CFR 50.59 to determine if the proposed changes will require prior NRC review and approval and will require reporting of all changes to the NRC in accordance with 10CFR50.71(e). This provides sufficient control of the requirements to assure the batteries are maintained in a highly reliable condition.

The restoration times and revised criteria for monitoring the capacity of the batteries and battery chargers to perform their intended functions are reasonable and consistent with approved standards, guidance, and regulations. The revised testing criteria ensure that full functionality is maintained and that Criterion 3 of 10 CFR 50.36(c)(2)(ii) is met.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

The NRC has granted a similar license amendment for La Salle County Station, Units 1 and 2.

6. ENVIRONMENTAL CONSIDERATION

Southern California Edison (SCE) has determined that the proposed amendment involves no changes in the amount or type of effluent that may be released offsite and results in no increase in individual or cumulative occupational radiation exposure. As described above, the proposed TS amendment involves no significant hazards consideration and, as such, meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9).

7. REFERENCES

7.1 Industry / TSTF Standard Technical Specification Change Traveler TSTF-360, Rev. 1, "DC Electrical Rewrite"

7.2 SONGS 2 and 3, Updated Final Safety Analysis Report

7.3 SONGS 2 and 3, Technical Specifications

7.4 NUREG-0800, U.S. NRC Standard Review Plan Section 8.3.2

7.5 Regulatory Guide 1.93, Availability of Electric Power Sources

7.6 IEEE 308, Standard Criteria for Class 1E Power Systems For Nuclear Power Generating Stations

7.7 IEEE 450, Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications

7.8 Standard Technical Specifications, Combustion Engineering Plants, Rev. 0 (NUREG 1432)

7.9 Regulatory Guide 1.174, An Approach for using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis

7.10 Regulatory Guide 1.177, An Approach for Plant-Specific, Risk-Informed Decision making: Technical Specifications

7.11 Pilot Application of ASME PRA Standard Peer Review Process for the San Onofre Nuclear Generating Station Units 2 and 3 PRA, WCAP-16165 Rev. 0, CEOG Task 1037, November 2003

7.12 Regulatory Guide 1.75, Physical Independence of Electric Systems

7.13 June 4, 2007 letter from Jan G. Reber (EnerSys) to Ashok Wadhwa (SCE), Subject: Float Current's Relationship to Battery State of Charge

7.14 December 15, 2006 letter from Jan G. Reber (EnerSys) to Ami Samanta (SCE), Subject: Review of Tech Specifications Items

ATTACHMENT A

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Existing Technical Specifications pages, Unit 2

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.1.1 ----------NOTES---------- 1. Buses 3A04 and 3D1 are required when unit crosstie breaker 3A0416 is used to provide a source of AC power. 2. Buses 3A06 and 3D2 are required when unit crosstie breaker 3A0603 is used to provide a source of AC power. ---------- Verify correct breaker alignment and power availability for each required offsite circuit.	7 days

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

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

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1 Restore DC electrical power subsystem to OPERABLE status.	2 hours
B. Required Action and Associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours
C. One required battery charger or associated control equipment or cabling inoperable.	C.1 Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	1 hour AND Once per 8 hours thereafter

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition C not met.	D.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is ≥ 129 V on float charge.	7 days
SR 3.8.4.2	Verify no visible corrosion at terminals and connectors. OR Verify connection resistance is ≤ 150×10^{-6} ohm for inter-cell connections, ≤ 150×10^{-6} ohm for inter-rack connections, ≤ 150×10^{-6} ohm for inter-tier connections, and ≤ 150×10^{-6} ohm for terminal connections.	92 days
SR 3.8.4.3	Verify cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration.	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.4.4	Remove visible terminal corrosion, verify cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	24 months
SR 3.8.4.5	Verify connection resistance is $\leq 150x10^{-6}$ ohm for inter-cell connections, $\leq 150x10^{-6}$ ohm for inter-rack connections, $\leq 150x10^{-6}$ ohm for inter-tier connections, and $\leq 150x10^{-6}$ ohm for terminal connections.	24 months
SR 3.8.4.6	----------NOTE---------- Credit may be taken for unplanned events that satisfy this SR. ---------- Verify each battery charger supplies $\geq$ 300 amps at $\geq$ 129 V for $\geq$ 12 hours.	24 months
SR 3.8.4.7	----------NOTES---------- 1. SR 3.8.4.8 may be performed in lieu of SR 3.8.4.7 once per 48 months. 2. This Surveillance shall not be performed in MODE 1,2,3, or 4. 3. 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.	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	----------NOTES---------- 1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. 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.	60 months AND -----NOTE------ Only applicable when battery shows degradation or has reached 85% of the expected life ---------- 12 months

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
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.4	Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately
B. One required battery charger or associted control equipment or cabling inoperable.	B.1	Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	1 hour AND Once per 8 hours thereafter
C. Required Action and associated Completion Time of Condition B not met.	C.1	Declare associated battery inoperable.	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, SR 3.8.4.7, and SR 3.8.4.8. ---------- For DC sources required to be OPERABLE, 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 3.8.4.6	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

LCO 3.8.6 Battery cell parameters for the Train A, Train B, Train C, and Train D batteries shall be within the Category A and B 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 limits.	A.1	Verify pilot cells electrolyte level and float voltage meet Table 3.8.6-1 Category C values.	1 hour
	AND		
	A.2	Verify battery cell parameters meet Table 3.8.6-1 Category C values.	24 hours
	AND		
	A.3	Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR One or more batteries with average electrolyte temperature of the representative cells < 60°F. OR One or more batteries with one or more battery cell parameters not within Category C values.	B.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

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

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.2	Verify battery cell parameters meet Table 3.8.6-1 Category B limits.	92 days AND Once within 7 days after battery discharge < 110 V AND Once within 7 days after battery overcharge > 150 V
SR 3.8.6.3	Verify average electrolyte temperature of representative cells is > 60°F.	92 days

Table 3.8.6-1 (page 1 of 1)
Battery Surveillance Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ 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)	≥ 1.200	≥ 1.195 AND Average of all connected cells ≥ 1.205	Not more than 0.020 below the average of all connected cells AND Average of all connected cells ≥ 1.195

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum 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) Specific gravity measurement may be substituted with the stabilized battery charging or float current for determining the state of charge of the designated pilot cell. This is acceptable only during a maximum of 7 days following a battery charge.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters – Operating

LCO 3.8.7 The required Train A, Train B, Train C, and Train D inverters shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9 with one AC vital bus de-energized. ----------		
A. One required inverter inoperable.	A.1	Power AC vital bus from its Class 1E constant voltage source transformer.	2 hours
	AND		
	A.2	Restore inverter to OPERABLE status.	24 hours
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems – Operating

LCO 3.8.9 Train A and Train B AC; Trains A, B, C, and D DC; and Trains A, B, C, and D AC vital bus electrical power distribution subsystems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One AC electrical power distribution subsystem inoperable.	A.1 Restore AC electrical power distribution subsystem to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One or more AC vital bus inoperable.	B.1 Restore AC vital bus subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One or more DC electrical power distribution subsystem inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable. OR	Immediately
	A.2.1 Suspend CORE ALTERATIONS. AND	Immediately
	A.2.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution subsystems to OPERABLE status. AND	Immediately
	A.2.5 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems.	7 days

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.15 Containment Leakage Rate Testing Program (Continued)

The provisions of Surveillance Requirement 3.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program. However, test frequencies specified in this Program may be extended consistent with the guidance provided in NEI 94-01, "Industry Guideline For Implementing Performance-Based Option Of 10CFR 50, Appendix J," as endorsed by Regulatory Guide 1.163. Specifically, NEI 94-01 has these provisions for test frequencies extension:

1. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for recommended Type A testing may be extended by up to 15 months. This option should be used only in cases where refueling schedules have been changed to accommodate other factors.

2. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for the recommended surveillance frequency for Type B and Type C testing may be extended by up to 25 percent of the test interval, not to exceed 15 months.

The provisions of Surveillance Requirement 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

(continued)

ATTACHMENT B

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Existing Technical Specifications pages, Unit 3

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.1.1 ----------NOTES---------- 1. Buses 2A04 and 2D1 are required when unit crosstie breaker 2A0417 is used to provide a source of AC power. 2. Buses 2A06 and 2D2 are required when unit crosstie breaker 2A0619 is used to provide a source of AC power. ---------- Verify correct breaker alignment and power availability for each required offsite circuit.	7 days

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources – Operating

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

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

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One battery or associated control equipment or cabling inoperable.	A.1	Restore DC electrical power subsystem to OPERABLE status.	2 hours
B. Required Action and Associated Completion Time not met.	B.1 AND B.2	Be in MODE 3. Be in MODE 5.	6 hours 36 hours
C. One required battery charger or associated control equipment or cabling inoperable.	C.1	Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	1 hour AND Once per 8 hours thereafter

(continued)

SURVEILLANCE REQUIREMENTS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition C not met.	D.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is $\geq$ 129 V on float charge.	7 days
SR 3.8.4.2	Verify no visible corrosion at terminals and connectors. OR Verify connection resistance is $\leq 150 \times 10^{-6}$ ohm for inter-cell connections, $\leq 150 \times 10^{-6}$ ohm for inter-rack connections, $\leq 150 \times 10^{-6}$ ohm for inter-tier connections, and $\leq 150 \times 10^{-6}$ ohm for terminal connections.	92 days
SR 3.8.4.3	Verify cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration.	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.4	Remove visible terminal corrosion, verify cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.	24 months
SR 3.8.4.5	Verify connection resistance is $\leq 150x10^{-6}$ ohm for inter-cell connections, $\leq 150x10^{-6}$ ohm for inter-rack connections, $\leq 150x10^{-6}$ ohm for inter-tier connections, and $\leq 150x10^{-6}$ ohm for terminal connections.	24 months
SR 3.8.4.6	----------NOTE---------- Credit may be taken for unplanned events that satisfy this SR. ---------- Verify each battery charger supplies $\geq$ 300 amps at $\geq$ 129 V for $\geq$ 12 hours.	24 months
SR 3.8.4.7	----------NOTES---------- 1. SR 3.8.4.8 may be performed in lieu of SR 3.8.4.7 once per 48 months. 2. This Surveillance shall not be performed in MODE 1,2,3, or 4. 3. 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.	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.8	----------NOTES---------- 1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. 2. 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.	60 months AND -----NOTE------ Only applicable when battery shows degradation or has reached 85% of the expected life ---------- 12 months

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
A. One battery or associated control equipment or cabling inoperable.	A.1 Declare affected required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.2.4	Initiate action to restore required DC electrical power subsystems to OPERABLE status.	Immediately
B. One required battery charger or associted control equipment or cabling inoperable.	B.1	Verify battery cell parameters meet Table 3.8.6-1 Category A limits.	1 hour AND Once per 8 hours thereafter
C. Required Action and associated Completion Time of Condition B not met.	C.1	Declare associated battery inoperable.	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, SR 3.8.4.7, and SR 3.8.4.8. ---------- For DC sources required to be OPERABLE, 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 3.8.4.6	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Cell Parameters

LCO 3.8.6 Battery cell parameters for the Train A, Train B, Train C, and Train D batteries shall be within the Category A and B 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 limits.	A.1	Verify pilot cells electrolyte level and float voltage meet Table 3.8.6-1 Category C values.	1 hour
	AND		
	A.2	Verify battery cell parameters meet Table 3.8.6-1 Category C values.	24 hours
	AND		
	A.3	Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.	31 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR One or more batteries with average electrolyte temperature of the representative cells < 60°F. OR One or more batteries with one or more battery cell parameters not within Category C values.	B.1 Declare associated battery inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

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

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.2	Verify battery cell parameters meet Table 3.8.6-1 Category B limits.	92 days AND Once within 7 days after battery discharge < 110 V AND Once within 7 days after battery overcharge > 150 V
SR 3.8.6.3	Verify average electrolyte temperature of representative cells is > 60°F.	92 days

Table 3.8.6-1 (page 1 of 1)
Battery Surveillance Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ 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)	≥ 1.200	≥ 1.195 AND Average of all connected cells ≥ 1.205	Not more than 0.020 below the average of all connected cells AND Average of all connected cells ≥ 1.195

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum 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) Specific gravity measurement may be substituted with the stabilized battery charging or float current for determining the state of charge of the designated pilot cell. This is acceptable only during a maximum of 7 days following a battery charge.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters – Operating

LCO 3.8.7 The required Train A, Train B, Train C, and Train D inverters shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9 with one AC vital bus de-energized. ----------	
A. One required inverter inoperable.	A.1 Power AC vital bus from its Class 1E constant voltage source transformer. AND A.2 Restore inverter to OPERABLE status.	2 hours 24 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems – Operating

LCO 3.8.9 Train A and Train B AC; Trains A, B, C, and D DC; and Trains A, B, C, and D AC vital bus electrical power distribution subsystems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One AC electrical power distribution subsystem inoperable.	A.1 Restore AC electrical power distribution subsystem to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One or more AC vital bus inoperable.	B.1 Restore AC vital bus subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One or more DC electrical power distribution subsystem inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems – Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution subsystems shall be OPERABLE to support equipment required to be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution subsystems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution subsystems to OPERABLE status. AND	Immediately
	A.2.5 Declare associated required shutdown cooling subsystem(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution subsystems.	7 days

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.15 Containment Leakage Rate Testing Program (Continued)

The provisions of Surveillance Requirement 3.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program. However, test frequencies specified in this Program may be extended consistent with the guidance provided in NEI 94-01, "Industry Guideline For Implementing Performance-Based Option Of 10CFR 50, Appendix J," as endorsed by Regulatory Guide 1.163. Specifically, NEI 94-01 has these provisions for test frequencies extension:

1. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for recommended Type A testing may be extended by up to 15 months. This option should be used only in cases where refueling schedules have been changed to accommodate other factors.

2. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for the recommended surveillance frequency for Type B and Type C testing may be extended by up to 25 percent of the test interval, not to exceed 15 months.

The provisions of Surveillance Requirement 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

(continued)

ATTACHMENT C

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Proposed Technical Specifications pages, Underline and Strikeout, Unit 2

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	----------NOTES---------- 1. Bus~~es~~ 3A04~~and 3D1~~ is ~~are~~ required when unit crosstie breaker 3A0416 is used to provide a source of AC power. 2. Bus~~es~~ 3A06~~and 3D2~~ is ~~are~~ required when unit crosstie breaker 3A0603 is used to provide a source of AC power. ----------	
	Verify correct breaker alignment and power availability for each required offsite circuit.	7 days

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The Train A and~~,~~ Train B~~, Train C, and Train D~~ DC electrical power subsystems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A.~~C~~ --------NOTE-------- Only applicable to 1800 amp-hour rated batteries. ---------- One or two required battery charger(s) ~~or associated control equipment or cabling~~ on one train inoperable.	~~C.1 Verify battery cell parameters meet Table 3.8.6-1 category A limits.~~	~~1 hour~~ ~~AND~~ ~~Once per 8 hours thereafter~~
	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 ≤ 1.50 amps.	Once per 12 hours
	AND	
	A.3.1 Restore required battery charger(s) to OPERABLE status.	72 hours
	OR	
	A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.	72 hours
	AND	
	A.3.2.2 Restore required battery charger(s) to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. --------NOTE-------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	AND	
	B.2 Verify battery float current ≤ 0.75 amp.	Once per 12 hours
	AND	
	B.3.1 Restore required battery charger(s) to OPERABLE status.	72 hours
	OR	
	B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.	72 hours
	AND	
	B.3.2.2 Restore required battery charger(s) to OPERABLE status.	7 days
C.~~B~~ Required Action and associated Completion Time of Condition ~~C~~A or B not met.	C~~B~~.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D~~A~~. One DC electrical power subsystem ~~battery or associated control equipment or cabling~~ inoperable for reasons other than Condition A or B.	D~~A~~.1 Restore DC electrical power subsystem to OPERABLE status. OR D.2 Cross connect with same train DC subsystem (1800 amp-hour rated battery required).	2 hours 2 hours
E. DC Subsystem Buses cross connected (1800 amp-hour rated battery required).	E.1 Restore DC Subsystem Buses to non-cross-connected configuration.	-----NOTE------ Completion Time is 30 days when cross connected to upgrade to 1800 amp-hour rated batteries. --------- 21 days
F~~B~~. Required Action and Associated Completion Time of Condition D or E not met.	F~~B~~.1 Be in MODE 3. AND F~~B~~.2 Be in MODE 5.	6 hours 36 hours

~~(continued)~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage ~~≥ 129 V on float charge.~~	7 days
~~SR 3.8.4.2~~	~~Verify no visible corrosion at terminals and connectors.~~ ~~OR~~ ~~Verify connection resistance is ≤ 150×10^{-6} ohm for inter-cell connections, ≤ 150×10^{-6} ohm for inter-rack connections, ≤ 150×10^{-6} ohm for inter-tier connections, and ≤ 150×10^{-6} ohm for terminal connections.~~	~~92 days~~
~~SR 3.8.4.3~~	~~Verify cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration.~~	~~24 months~~

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
~~SR 3.8.4.4 Remove visible terminal corrosion, verify cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.~~	~~24 months~~
~~SR 3.8.4.5 Verify connection resistance is $\leq 150x10^{-6}$ ohm for inter-cell connections, $\leq 150x10^{-6}$ ohm for inter-rack connections, $\leq 150x10^{-6}$ ohm for inter-tier connections, and $\leq 150x10^{-6}$ ohm for terminal connections.~~	~~24 months~~
SR 3.8.4.2~~6~~ ~~NOTE Credit may be taken for unplanned events that satisfy this SR.~~ Verify each battery charger supplies ≥ rated ~~300~~ amps at ≥ the minimum established float voltage ~~129 V~~ for ≥ 8~~12~~ hours.	24 months
SR 3.8.4.3~~7~~ ~~NOTES 1. The battery performance discharge test in SR 3.8.4.8~~6~~.7 may be performed in lieu of SR 3.8.4.~~7~~3 once per 48 months for batteries rated at 1260 amp-hours. 2. This Surveillance shall not be performed in MODE 1,2,3, or 4. 3. Credit may be taken for unplanned events that satisfy this SR.~~ Verify ~~battery~~ capacity of the 1260 amp-hour rated battery 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.	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.4.4	----------NOTE---------- The modified performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.4 for batteries rated at 1800 amp-hours. ---------- Verify capacity of the 1800 amp-hour rated battery 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.	30 months
~~SR 3.8.4.8~~	~~----------NOTES----------~~ ~~1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~ ~~2. Credit may be taken for unplanned events that satisfy this SR.~~ ~~----------~~ ~~Verify battery capacity is $\geq$ 80% of the manufacturer's rating when subjected to a performance discharge test.~~	~~60 months~~ ~~AND~~ ~~-----NOTE-----~~ ~~Only applicable when battery shows degradation or has reached 85% of the expected life~~ ~~----------~~ ~~12 months~~

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 The 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

NOTE

LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A.~~B~~ ---------NOTE--------- Only applicable to 1800 amp-hour rated batteries. ---------- One or two required battery charger(s) ~~or associated control equipment or cabling~~ on one train inoperable.	~~B.1 Verify battery cell parameters meet Table 3.8.6-1 Category A limits.~~	~~1 hour~~ AND ~~Once per 8 hours thereafter~~
	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 ≤ 1.50 amps.	Once per 12 hours
	AND	
	A.3.1 Restore required battery charger(s) to OPERABLE status.	72 hours
	OR	
	A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.	72 hours
	AND	
	A.3.2.2 Restore required battery charger(s) to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND B.2 Verify battery float current ≤ 0.75 amp. AND B.3.1 Restore required battery charger(s) to OPERABLE status. OR B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND B.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D~~A~~. One or more required ~~battery or associated control equipment or cabling~~ DC electrical power subsystem(s) inoperable for reasons other than Condition A or B.	D~~A~~.1 Declare affected required feature(s) inoperable. OR	Immediately
	D~~A~~.2.1 Suspend CORE ALTERATIONS. AND	Immediately
	D~~A~~.2.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	D~~A~~.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately
	D~~A~~.2.4 Initiate action to restore required DC electrical power subsystem(s) to OPERABLE status.	Immediately

~~(continued)~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.4.2~~6~~, ~~and~~ SR 3.8.4.3~~7~~, and SR 3.8.4.4 ~~and SR 3.8.4.8~~. ---------- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, ~~SR 3.8.4.4~~ SR 3.8.4.3~~7~~ ~~SR 3.8.4.2~~ ~~SR 3.8.4.5~~ ~~SR 3.8.4.8~~. ~~SR 3.8.4.3~~ SR 3.8.4.2~~6~~, and SR 3.8.4.4	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery ~~Cell~~ Parameters

LCO 3.8.6 Battery ~~cell~~ parameters for the Train A and~~,~~ Train B~~, Train C, and Train D~~ batteries shall be within limits. ~~the Category A and B 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 limits.~~	~~A.1 Verify pilot cells electrolyte level and float voltage meet Table 3.8.6-1 Category C values.~~	~~1 hour~~
	~~AND~~	
	~~A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C values.~~	~~24 hours~~
	~~AND~~	
	~~A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.~~	~~31 days~~

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two batteries on one train with one or more battery cells with float voltage <2.07 V.	A.1 Perform SR 3.8.4.1. AND A.2.1 Perform SR 3.8.6.1. OR A.2.2 Perform SR 3.8.6.2. AND A.3 Restore affected cell voltage ≥ 2.07 V.	2 hours 2 hours 2 hours 24 hours
B. ---------NOTE--------- Only applicable to 1800 amp-hour rated batteries ---------- One or two batteries on one train with float current > 1.50 amps.	B.1 Perform SR 3.8.4.1. AND B.2 Restore battery float current to ≤ 1.50 amps.	2 hours 12 hours
C. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries ---------- One or two batteries on one train with float current > 0.75 amp.	C.1 Perform SR 3.8.4.1. AND C.2 Restore battery float current to ≤ 0.75 amp.	2 hours 12 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or two batteries on one train with one or more cells with electrolyte level less than minimum established design limits.	----------NOTES---------- 1. Required Actions D.1 and D.2 are only applicable if electrolyte level is below the top of the plates. 2. Required Action D.2 shall be completed if electrolyte level was below the top of the plates. ---------- D.1 Restore electrolyte level to above the top of the plates. AND D.2 Verify no evidence of leakage. AND D.3 Restore electrolyte level to greater than or equal to minimum established design limits.	8 hours 12 hours 31 days
E. One or two batteries on one train with pilot cell electrolyte temperature less than minimum established design limits.	E.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
F. One or more batteries in redundant trains with battery parameters not within limits.	F.1 Restore battery parameters for batteries in one train to within limits.	2 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~G~~B. ---------NOTE--------- Only applicable to 1800 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, B, D, E, or F not met. OR One or two ~~more~~ batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 1.50 amps. ~~with average electrolyte temperature of the representative cells < 60°F.~~ ~~OR~~ ~~One or more batteries with one or more battery cell parameters not within Category C values.~~	~~G~~B.1 Declare associated battery inoperable.	Immediately
H. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, C, D, E, or F not met. OR One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 0.75 amp.	H.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 ≤ 1.50 amps for batteries rated at 1800 amp-hours.	7 days
SR 3.8.6.2	----------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 ≤ 0.75 amp for batteries rated at 1260 amp-hours.	7 days
SR 3.8.6.3	Verify each battery pilot cell voltage is ≥ 2.07 V.	31 days
SR 3.8.6.4	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.5~~3~~	Verify each battery pilot cell ~~average electrolyte~~ temperature is greater than or equal to minimum established design limits. ~~of representative cells is > 60°F.~~	31~~-92~~ days
SR 3.8.6.6	Verify each battery connected cell voltage is ≥ 2.07 V.	92 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8. ~~4.8~~6.7	~~----------NOTES----------~~ ~~1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~ ~~2. 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 ~~-----NOTE-----~~ ~~Only applicable~~ when the battery shows degradation or has reached 85% of the expected life with capacity < 100% of the manufacturer's rating AND 24 months when the battery has reached 85% of the expected life with capacity ≥ 100% of the manufacturer's rating
~~SR 3.8.6.1~~	~~Verify battery cell parameters meet Table 3.8.6-1 Category A limits.~~	~~7 days~~
~~SR 3.8.6.2~~	~~Verify battery cell parameters meet Table 3.8.6-1 Category B limits.~~	~~92 days~~ ~~AND~~ ~~Once within 7 days after battery discharge < 110 V~~ ~~AND~~ ~~Once within 7 days after battery overcharge > 150 V~~

~~Table 3.8.6-1 (page 1 of 1)~~
~~Battery Surveillance Requirements~~

~~PARAMETER~~	~~CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL~~	~~CATEGORY B: LIMITS FOR EACH CONNECTED CELL~~	~~CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL~~
~~Electrolyte Level~~	~~> Minimum level indication mark, and 3 inch above maximum level indication mark(a)~~	~~> Minimum level indication mark, and 3 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)~~	~~1.200~~	~~1.195~~ ~~AND~~ ~~Average of all connected cells 1.205~~	~~Not more than 0.020 below the average of all connected cells~~ ~~AND~~ ~~Average of all connected cells 1.195~~

~~(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum 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) Specific gravity measurement may be substituted with the stabilized battery charging or float current for determining the state of charge of the designated pilot cell. This is acceptable only during a maximum of 7 days following a battery charge.~~

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters—Operating

LCO 3.8.7 The required Channel A, B, C, and D AC ~~Train A, Train B, Train C, and Train D~~ inverters shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9 with one AC vital bus de-energized. ----------	
A. One required inverter inoperable.	A.1 Power AC vital bus from its Class 1E constant voltage source transformer. AND A.2 Restore inverter to OPERABLE status.	2 hours 24 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems—Operating

LCO 3.8.9 Train A and Train B AC~~,~~ Subsystems A, B, C, and D DC, and Channels A, B, C, and D AC vital bus ~~Trains A, B, C, and D DC; and Trains A, B, C, and D AC vital bus~~ electrical power distribution ~~sub~~systems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One AC electrical power distribution ~~sub~~system inoperable.	A.1 Restore AC electrical power distribution ~~sub~~system to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One or more AC vital bus inoperable.	B.1 Restore AC vital bus ~~subsystem~~ to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One or more DC electrical power distribution subsystem inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution ~~sub~~systems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems—Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution ~~sub~~systems shall be OPERABLE to support equipment required to be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution ~~sub~~systems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	
		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution ~~sub~~system(s) to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required shutdown cooling ~~sub~~system(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution ~~sub~~systems.	7 days

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.15 Containment Leakage Rate Testing Program (Continued)

The provisions of Surveillance Requirement 3.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program. However, test frequencies specified in this Program may be extended consistent with the guidance provided in NEI 94-01, "Industry Guideline For Implementing Performance-Based Option Of 10CFR 50, Appendix J," as endorsed by Regulatory Guide 1.163. Specifically, NEI 94-01 has these provisions for test frequencies extension:

1. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for recommended Type A testing may be extended by up to 15 months. This option should be used only in cases where refueling schedules have been changed to accommodate other factors.

2. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for the recommended surveillance frequency for Type B and Type C testing may be extended by up to 25 percent of the test interval, not to exceed 15 months.

The provisions of Surveillance Requirement 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

5.5.2.16 Reserved.

5.5.2.17 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, which includes the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and

b. Actions to verify that the remaining cells are above 2.07 V when a battery cell or cells have been found less than 2.13 V, and

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

ATTACHMENT D

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Proposed Technical Specifications pages, Underline and Strikeout, Unit 3

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	----------NOTES---------- 1. Bus~~es~~ 2A04 ~~and 2D1 are~~is required when unit crosstie breaker 2A0417 is used to provide a source of AC power. 2. Bus~~es~~ 2A06 ~~and 2D2 are~~is required when unit crosstie breaker 2A0619 is used to provide a source of AC power. ---------- Verify correct breaker alignment and power availability for each required offsite circuit.	7 days

(continued)

3.8 ELECTRICAL POWER SYSTEMS

3.8.4 DC Sources—Operating

LCO 3.8.4 The Train A and ~~, Train B, Train C, and Train D~~ DC electrical power subsystems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~A.c~~ -------NOTE-------- Only applicable to 1800 amp-hour rated batteries. ---------- One or two required battery charger(s) ~~or associated control equipment or cabling~~ on one train inoperable.	~~C.1 Verify battery cell parameters meet Table 3.8.6-1 category A limits.~~	~~1 hour~~ ~~AND~~ ~~Once per 8 hours thereafter~~
	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 ≤ 1.50 amps.	Once per 12 hours
	AND	
	A.3.1 Restore required battery charger(s) to OPERABLE status.	72 hours
	OR	
	A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.	72 hours
	AND	
	A.3.2.2 Restore required battery charger(s) to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. -------NOTE-------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage.	2 hours
	AND	
	B.2 Verify battery float current ≤ 0.75 amp.	Once per 12 hours
	AND	
	B.3.1 Restore required battery charger(s) to OPERABLE status.	72 hours
	OR	72 hours
	B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.	
	AND	7 days
	B.3.2.2 Restore required battery charger(s) to OPERABLE status.	
C.~~D~~ Required Action and associated Completion Time of Condition ~~C~~A or B not met.	C~~D~~.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D~~A~~. One DC electrical power subsystem ~~battery or associated control equipment or cabling~~ inoperable for reasons other than Condition A or B.	D~~A~~.1 Restore DC electrical power subsystem to OPERABLE status. OR D.2 Cross connect with same train DC subsystem (1800 amp-hour rated battery required).	2 hours 2 hours
E. DC Subsystem Buses cross connected (1800 amp-hour rated battery required).	E.1 Restore DC Subsystem Buses to non-cross-connected configuration.	-----NOTE----- Completion Time is 30 days when cross connected to upgrade to 1800 amp-hour rated batteries. --- 21 days
F~~B~~. Required Action and Associated Completion Time of Condition D or E not met.	F~~B~~.1 Be in MODE 3. AND F~~B~~.2 Be in MODE 5.	6 hours 36 hours

~~(continued)~~

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.4.1	Verify battery terminal voltage is greater than or equal to the minimum established float voltage ~~≥ 129 V on float charge.~~	7 days
~~SR 3.8.4.2~~	~~Verify no visible corrosion at terminals and connectors.~~ ~~OR~~ ~~Verify connection resistance is ≤ 150×10^{-6} ohm for inter-cell connections, ≤ 150×10^{-6} ohm for inter-rack connections, ≤ 150×10^{-6} ohm for inter-tier connections, and ≤ 150×10^{-6} ohm for terminal connections.~~	~~92 days~~
~~SR 3.8.4.3~~	~~Verify cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration.~~	~~24 months~~

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
~~SR 3.8.4.4~~	~~Remove visible terminal corrosion, verify cell to cell and terminal connections are clean and tight, and are coated with anti-corrosion material.~~	~~24 months~~
~~SR 3.8.4.5~~	~~Verify connection resistance is $\leq 150x10^{-6}$ ohm for inter-cell connections, $\leq 150x10^{-6}$ ohm for inter-rack connections, $\leq 150x10^{-6}$ ohm for inter-tier connections, and $\leq 150x10^{-6}$ ohm for terminal connections.~~	~~24 months~~
SR 3.8.4.2~~6~~	~~----------NOTE----------~~ ~~Credit may be taken for unplanned events that satisfy this SR.~~ ~~----------~~ Verify each battery charger supplies ≥ rated ~~300~~ amps at ≥ the minimum established float voltage ~~129 V~~ for ≥ 8~~12~~ hours.	24 months
SR 3.8.4.3~~7~~	~~----------NOTES----------~~ ~~1.~~ The battery performance discharge test in SR 3.8~~.4.8~~.6.7 may be performed in lieu of SR 3.8.4~~.7~~.3 once per 48 months for batteries rated at 1260 amp-hours. ~~2. This Surveillance shall not be performed in MODE 1,2,3, or 4.~~ ~~3. Credit may be taken for unplanned events that satisfy this SR.~~ ~~----------~~ Verify ~~battery~~ capacity of the 1260 amp-hour rated battery 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.	24 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.4.4 ----------NOTE---------- The modified performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.4 for batteries rated at 1800 amp-hours. ---------- Verify capacity of the 1800 amp-hour rated battery 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.	30 months
~~SR 3.8.4.8 ----------NOTES----------~~ ~~1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~ ~~2. 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.~~	~~60 months~~ ~~AND~~ ~~-----NOTE-----~~ ~~Only applicable when battery shows degradation or has reached 85% of the expected life~~ ~~==========~~ ~~12 months~~

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 The 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

NOTE

LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ~~B~~ NOTE Only applicable to 1800 amp-hour rated batteries. One or two required battery charger(s) ~~or associated control equipment or cabling~~ on one train inoperable.	~~B.1 Verify battery cell parameters meet Table 3.8.6-1 Category A limits.~~ AND A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND A.2 Verify battery float current ≤ 1.50 amps. AND A.3.1 Restore required battery charger(s) to OPERABLE status. OR A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND A.3.2.2 Restore required battery charger(s) to OPERABLE status.	~~1 hour~~ ~~AND~~ ~~Once per 8 hours thereafter~~ 2 hours Once per 12 hours 72 hours 72 hours 7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND B.2 Verify battery float current ≤ 0.75 amp. AND B.3.1 Restore required battery charger(s) to OPERABLE status. OR B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND B.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D~~A~~. One or more required ~~battery or associated control equipment or cabling~~ DC electrical power subsystem(s) inoperable for reasons other than Condition A or B.	D~~A~~.1 Declare affected required feature(s) inoperable. OR D~~A~~.2.1 Suspend CORE ALTERATIONS. AND D~~A~~.2.2 Suspend movement of irradiated fuel assemblies. AND D~~A~~.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND D~~A~~.2.4 Initiate action to restore required DC electrical power subsystem(s) to OPERABLE status.	Immediately Immediately Immediately Immediately Immediately

~~(continued)~~

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.4.2~~6~~, ~~and~~ SR 3.8.4.3~~7~~, and SR 3.8.4.4 ~~and SR 3.8.4.8~~. ----------	
	For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, ~~SR 3.8.4.4~~ SR 3.8.4.3~~7~~ ~~SR 3.8.4.2~~ ~~SR 3.8.4.5~~ ~~SR 3.8.4.8.~~ ~~SR 3.8.4.3~~ SR 3.8.4.2~~6~~, and SR 3.8.4.4	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery ~~Cell~~ Parameters

LCO 3.8.6 Battery ~~cell~~ parameters for the Train A and~~,~~ Train B~~, Train C, and Train D~~ batteries shall be within limits.~~the Category A and B 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 limits.~~	~~A.1 Verify pilot cells electrolyte level and float voltage meet Table 3.8.6-1 Category C values.~~	~~1 hour~~
	~~AND~~	
	~~A.2 Verify battery cell parameters meet Table 3.8.6-1 Category C values.~~	~~24 hours~~
	~~AND~~	
	~~A.3 Restore battery cell parameters to Category A and B limits of Table 3.8.6-1.~~	~~31 days~~

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two batteries on one train with one or more battery cells with float voltage <2.07 V.	A.1 Perform SR 3.8.4.1. AND A.2.1 Perform SR 3.8.6.1. OR A.2.2 Perform SR 3.8.6.2. AND A.3 Restore affected cell voltage ≥ 2.07 V.	2 hours 2 hours 2 hours 24 hours
B. ---------NOTE--------- Only applicable to 1800 amp-hour rated batteries. ---------- One or two batteries on one train with float current > 1.50 amps.	B.1 Perform SR 3.8.4.1. AND B.2 Restore battery float current to ≤ 1.50 amps.	2 hours 12 hours
C. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries ---------- One or two batteries on one train with float current > 0.75 amp.	C.1 Perform SR 3.8.4.1. AND C.2 Restore battery float current to ≤ 0.75 amp.	2 hours 12 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or two batteries on one train with one or more cells with electrolyte level less than minimum established design limits.	----------NOTES---------- 1. Required Actions D.1 and D.2 are only applicable if electrolyte level is below the top of the plates. 2. Required Action D.2 shall be completed if electrolyte level was below the top of the plates. ---------- D.1 Restore electrolyte level to above the top of the plates. AND D.2 Verify no evidence of leakage. AND D.3 Restore electrolyte level to greater than or equal to minimum established design limits.	8 hours 12 hours 31 days
E. One or two batteries on one train with pilot cell electrolyte temperature less than minimum established design limits.	E.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
F. One or more batteries in redundant trains with battery parameters not within limits.	F.1 Restore battery parameters for batteries in one train to within limits.	2 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~G~~. ---------NOTE--------- Only applicable to 1800 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, B, D, E, or F not met. OR One or ~~two more~~ batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 1.50 amps. ~~with average electrolyte temperature of the representative cells < 60°F.~~ ~~OR~~ ~~One or more batteries with one or more battery cell parameters not within Category C values.~~	~~G~~.1 Declare associated battery inoperable.	Immediately
H. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, C, D, E, or F not met. OR One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 0.75 amp.	H.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 ≤ 1.50 amps for batteries rated at 1800 amp-hours.	7 days
SR 3.8.6.2	----------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 ≤ 0.75 amp for batteries rated at 1260 amp-hours.	7 days
SR 3.8.6.3	Verify each battery pilot cell voltage is ≥2.07 V.	31 days
SR 3.8.6.4	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.5~~3~~	Verify each battery pilot cell~~average electrolyte~~ temperature is greater than or equal to minimum established design limits.~~of representative cells is > 60°F~~.	31~~92~~ days
SR 3.8.6.6	Verify each battery connected cell voltage is ≥2.07 V.	92 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.~~4.8~~6.7	~~----------NOTES----------~~ ~~1. This Surveillance shall not be performed in MODE 1, 2, 3, or 4.~~ ~~2. 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 ~~-----NOTE-----~~ ~~Only applicable~~ when the battery shows degradation or has reached 85% of the expected life with capacity <100% of the manufacturer's rating AND 24 months when the battery has reached 85% of the expected life with capacity ≥100% of the manufacturer's rating
~~SR 3.8.6.1~~	~~Verify battery cell parameters meet Table 3.8.6-1 Category A limits.~~	~~7 days~~
~~SR 3.8.6.2~~	~~Verify battery cell parameters meet Table 3.8.6-1 Category B limits.~~	~~92 days~~ ~~AND~~ ~~Once within 7 days after battery discharge < 110 V~~ ~~AND~~ ~~Once within 7 days after battery overcharge > 150 V~~

Table 3.8.6-1 (page 1 of 1)
Battery Surveillance Requirements

PARAMETER	CATEGORY A: LIMITS FOR EACH DESIGNATED PILOT CELL	CATEGORY B: LIMITS FOR EACH CONNECTED CELL	CATEGORY C: ALLOWABLE VALUE FOR EACH CONNECTED CELL
Electrolyte Level	> Minimum level indication mark, and ≤ ¼ inch above maximum level indication mark(a)	> Minimum level indication mark, and ≤ ¼ 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)	≥ 1.200	≥ 1.195 AND Average of all connected cells ≥ 1.205	Not more than 0.020 below the average of all connected cells AND Average of all connected cells ≥ 1.195

(a) It is acceptable for the electrolyte level to temporarily increase above the specified maximum 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) Specific gravity measurement may be substituted with the stabilized battery charging or float current for determining the state of charge of the designated pilot cell. This is acceptable only during a maximum of 7 days following a battery charge.

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters—Operating

LCO 3.8.7 The required Channel A, B, C, and D AC ~~Train A, Train B, Train C, and Train D~~ inverters shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required inverter inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9 with one AC vital bus de-energized. ---------- A.1 Power AC vital bus from its Class 1E constant voltage source transformer. AND A.2 Restore inverter to OPERABLE status.	2 hours 24 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems—Operating

LCO 3.8.9 Train A and Train B AC, ~~,~~ Subsystems A, B, C, and D DC, and Channels A, B, C, and D AC vital bus ~~Trains A, B, C, and D DC; and Trains A, B, C, and D AC vital bus~~ electrical power distribution ~~sub~~systems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One AC electrical power distribution ~~sub~~system inoperable.	A.1 Restore AC electrical power distribution ~~sub~~system to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One or more AC vital bus inoperable.	B.1 Restore AC vital bus ~~subsystem~~ to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One or more DC electrical power distribution subsystem inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution ~~sub~~systems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems—Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution ~~sub~~systems shall be OPERABLE to support equipment required to be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution ~~sub~~systems inoperable.	A.1 Declare associated supported required feature(s) inoperable.	Immediately
	OR	
	A.2.1 Suspend CORE ALTERATIONS.	Immediately
	AND	
	A.2.2 Suspend movement of irradiated fuel assemblies.	Immediately
	AND	
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration.	Immediately
	AND	
		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution ~~sub~~system(s) to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required shutdown cooling ~~sub~~system(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution ~~sub~~systems.	7 days

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.15 Containment Leakage Rate Testing Program (Continued)

The provisions of Surveillance Requirement 3.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program. However, test frequencies specified in this Program may be extended consistent with the guidance provided in NEI 94-01, "Industry Guideline For Implementing Performance-Based Option Of 10CFR 50, Appendix J," as endorsed by Regulatory Guide 1.163. Specifically, NEI 94-01 has these provisions for test frequencies extension:

1. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for recommended Type A testing may be extended by up to 15 months. This option should be used only in cases where refueling schedules have been changed to accommodate other factors.

2. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for the recommended surveillance frequency for Type B and Type C testing may be extended by up to 25 percent of the test interval, not to exceed 15 months.

The provisions of Surveillance Requirement 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

5.5.2.16 Reserved.

5.5.2.17 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, which includes the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and

b. Actions to verify that the remaining cells are above 2.07 V when a battery cell or cells have been found less than 2.13 V, and

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

ATTACHMENT E

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Proposed Technical Specifications pages, Unit 2

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	----------NOTES---------- 1. Bus 3A04 is required when unit crosstie breaker 3A0416 is used to provide a source of AC power. 2. Bus 3A06 is required when unit crosstie breaker 3A0603 is used to provide a source of AC power. ---------- Verify correct breaker alignment and power availability for each required offsite circuit.	7 days

(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
A. --------NOTE------- Only applicable to 1800 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND A.2 Verify battery float current $\leq$ 1.50 amps. AND A.3.1 Restore required battery charger(s) to OPERABLE status. OR A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND A.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. --------NOTE------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND B.2 Verify battery float current ≤ 0.75 amp. AND B.3.1 Restore required battery charger(s) to OPERABLE status. OR B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND B.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One DC electrical power subsystem inoperable for reasons other than Condition A or B.	D.1 Restore DC electrical power subsystem to OPERABLE status. OR D.2 Cross connect with same train DC subsystem (1800 amp-hour rated battery required).	2 hours 2 hours
E. DC Subsystem Buses cross connected (1800 amp-hour battery required).	E.1 Restore DC Subsystem Buses to non-cross-connected configuration.	-----NOTE----- Completion Time is 30 days when cross connected to upgrade to 1800 amp-hour rated batteries. ---------- 21 days
F. Required Action and Associated Completion Time of Condition D or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 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	Verify each battery charger supplies ≥ rated amps at ≥ the minimum established float voltage for ≥ 8 hours.	24 months
SR 3.8.4.3	----------NOTE---------- The battery performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.3 once per 48 months for batteries rated at 1260 amp-hours. ---------- Verify capacity of the 1260 amp-hour rated battery 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.	24 months
SR 3.8.4.4	----------NOTE---------- The modified performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.4 for batteries rated at 1800 amp-hours. ---------- Verify capacity of the 1800 amp-hour rated battery 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.	30 months

This page intentionally deleted.

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 The 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

---NOTE---

LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ---NOTE--- Only applicable to 1800 amp-hour rated batteries. --- One or two required battery charger(s) on one train inoperable.	A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND A.2 Verify battery float current ≤ 1.50 amps. AND A.3.1 Restore required battery charger(s) to OPERABLE status. OR A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND A.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND B.2 Verify battery float current $\leq$ 0.75 amp. AND B.3.1 Restore required battery charger(s) to OPERABLE status. OR B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND B.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or more required DC electrical power subsystem(s) inoperable for reasons other than Condition A or B.	D.1 Declare affected required feature(s) inoperable. OR	Immediately
	D.2.1 Suspend CORE ALTERATIONS. AND	Immediately
	D.2.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	D.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately
	D.2.4 Initiate action to restore required DC electrical power subsystem(s) to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.4.2, SR 3.8.4.3, and SR 3.8.4.4. ---------- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, SR 3.8.4.2, SR 3.8.4.3, and SR 3.8.4.4.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

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.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two batteries on one train with one or more battery cells with float voltage <2.07 V.	A.1 Perform SR 3.8.4.1. AND A.2.1 Perform SR 3.8.6.1. OR A.2.2 Perform SR 3.8.6.2. AND A.3 Restore affected cell voltage ≥ 2.07 V.	2 hours 2 hours 2 hours 24 hours
B. ---NOTE--- Only applicable to 1800 amp-hour rated batteries. --- One or two batteries on one train with float current > 1.50 amps.	B.1 Perform SR 3.8.4.1. AND B.2 Restore battery float current to ≤ 1.50 amps.	2 hours 12 hours
C. ---NOTE--- Only applicable to 1260 amp-hour rated batteries. --- One or two batteries on one train with float current > 0.75 amp.	C.1 Perform SR 3.8.4.1. AND C.2 Restore battery float current to ≤ 0.75 amp.	2 hours 12 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or two batteries on one train with one or more cells with electrolyte level less than minimum established design limits.	----------NOTES---------- 1. Required Actions D.1 and D.2 are only applicable if electrolyte level is below the top of the plates. 2. Required Action D.2 shall be completed if electrolyte level was below the top of the plates. ---------- D.1 Restore electrolyte level to above the top of the plates. AND D.2 Verify no evidence of leakage. AND D.3 Restore electrolyte level to greater than or equal to minimum established design limits.	 8 hours 12 hours 31 days
E. One or two batteries on one train with pilot cell electrolyte temperature less than minimum established design limits.	E.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
F. One or more batteries in redundant trains with battery parameters not within limits.	F.1 Restore battery parameters for batteries in one train to within limits.	2 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. --------NOTE-------- Only applicable to 1800 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, B, D, E, or F not met. OR One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 1.50 amps.	G.1 Declare associated battery inoperable.	Immediately
H. --------NOTE-------- Only applicable to 1260 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, C, D, E, or F not met. OR One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 0.75 amp.	H.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 ≤ 1.50 amps for batteries rated at 1800 amp-hours.	7 days
SR 3.8.6.2	----------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 ≤ 0.75 amp for batteries rated at 1260 amp-hours.	7 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.3	Verify each battery pilot cell voltage is ≥ 2.07 V.	31 days
SR 3.8.6.4	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.5	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.6	Verify each battery connected cell voltage is ≥ 2.07 V.	92 days
SR 3.8.6.7	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 the battery shows degradation or has reached 85% of the expected life with capacity < 100% of the manufacturer's rating AND 24 months when the battery has reached 85% of the expected life with capacity ≥ 100% of the manufacturer's rating

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters—Operating

LCO 3.8.7 The required Channel A, B, C, and D AC inverters shall be OPERABLE. |

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9 with one AC vital bus de-energized. ----------	
A. One required inverter inoperable.	A.1 Power AC vital bus from its Class 1E constant voltage source transformer. AND A.2 Restore inverter to OPERABLE status.	2 hours 24 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems—Operating

LCO 3.8.9 Train A and Train B AC, Subsystems A, B, C, and D DC, and Channels A, B, C, and D AC vital bus electrical power distribution systems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One AC electrical power distribution system inoperable.	A.1 Restore AC electrical power distribution system to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One or more AC vital bus inoperable.	B.1 Restore AC vital bus to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One or more DC electrical power distribution subsystem inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution systems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems—Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution systems shall be OPERABLE to support equipment required to be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution systems inoperable.	A.1 Declare associated supported required feature(s) inoperable. OR	Immediately
	A.2.1 Suspend CORE ALTERATIONS. AND	Immediately
	A.2.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately
		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution system(s) to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required shutdown cooling system(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution systems.	7 days

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.15 Containment Leakage Rate Testing Program (Continued)

The provisions of Surveillance Requirement 3.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program. However, test frequencies specified in this Program may be extended consistent with the guidance provided in NEI 94-01, "Industry Guideline For Implementing Performance-Based Option Of 10CFR 50, Appendix J," as endorsed by Regulatory Guide 1.163. Specifically, NEI 94-01 has these provisions for test frequencies extension:

1. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for recommended Type A testing may be extended by up to 15 months. This option should be used only in cases where refueling schedules have been changed to accommodate other factors.

2. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for the recommended surveillance frequency for Type B and Type C testing may be extended by up to 25 percent of the test interval, not to exceed 15 months.

The provisions of Surveillance Requirement 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

5.5.2.16 Reserved.

5.5.2.17 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, which includes the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and

b. Actions to verify that the remaining cells are above 2.07 V when a battery cell or cells have been found less than 2.13 V, and

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

ATTACHMENT F

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Proposed Technical Specifications pages, Unit 3

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Required Action and Associated Completion Time of Condition A, B, C, D, or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 36 hours
G. Three or more required AC sources inoperable.	G.1 Enter LCO 3.0.3.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	----------NOTES---------- 1. Bus 2A04 is required when unit crosstie breaker 2A0417 is used to provide a source of AC power. 2. Bus 2A06 is required when unit crosstie breaker 2A0619 is used to provide a source of AC power. ---------- Verify correct breaker alignment and power availability for each required offsite circuit.	7 days

(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
A. --------NOTE-------- Only applicable to 1800 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	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 ≤ 1.50 amps.	Once per 12 hours
	AND	
	A.3.1 Restore required battery charger(s) to OPERABLE status.	72 hours
	OR	
	A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source.	72 hours
	AND	
	A.3.2.2 Restore required battery charger(s) to OPERABLE status.	7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. --------NOTE-------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND B.2 Verify battery float current $\leq$ 0.75 amp. AND B.3.1 Restore required battery charger(s) to OPERABLE status. OR B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND B.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One DC electrical power subsystem inoperable for reasons other than Condition A or B.	D.1 Restore DC electrical power subsystem to OPERABLE status. OR D.2 Cross connect with same train DC subsystem (1800 amp-hour rated battery required).	2 hours 2 hours
E. DC Subsystem Buses cross connected (1800 amp-hour rated battery required).	E.1 Restore DC Subsystem Buses to non-cross-connected configuration.	------NOTE----- Completion Time is 30 days when cross connected to upgrade to 1800 amp-hour rated batteries. ---------- 21 days
F. Required Action and Associated Completion Time of Condition D or E not met.	F.1 Be in MODE 3. AND F.2 Be in MODE 5.	6 hours 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	Verify each battery charger supplies ≥ rated amps at ≥ the minimum established float voltage for ≥ 8 hours.	24 months
SR 3.8.4.3	----------NOTE---------- The battery performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.3 once per 48 months for batteries rated at 1260 amp-hours. ---------- Verify capacity of the 1260 amp-hour rated battery 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.	24 months
SR 3.8.4.4	----------NOTE---------- The modified performance discharge test in SR 3.8.6.7 may be performed in lieu of SR 3.8.4.4 for batteries rated at 1800 amp-hours. ---------- Verify capacity of the 1800 amp-hour rated battery 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.	30 months

This page intentionally deleted.

3.8 ELECTRICAL POWER SYSTEMS

3.8.5 DC Sources—Shutdown

LCO 3.8.5 The 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

---NOTE---

LCO 3.0.3 is not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ---NOTE--- Only applicable to 1800 amp-hour rated batteries. --- One or two required battery charger(s) on one train inoperable.	A.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND A.2 Verify battery float current ≤ 1.50 amps. AND A.3.1 Restore required battery charger(s) to OPERABLE status. OR A.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND A.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two required battery charger(s) on one train inoperable.	B.1 Restore battery terminal voltage to greater than or equal to the minimum established float voltage. AND B.2 Verify battery float current $\leq$ 0.75 amp. AND B.3.1 Restore required battery charger(s) to OPERABLE status. OR B.3.2.1 Provide ability to power the spare battery charger from a diesel-backed source. AND B.3.2.2 Restore required battery charger(s) to OPERABLE status.	2 hours Once per 12 hours 72 hours 72 hours 7 days
C. Required Action and associated Completion Time of Condition A or B not met.	C.1 Declare associated battery inoperable.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or more required DC electrical power subsystem(s) inoperable for reasons other than Condition A or B.	D.1 Declare affected required feature(s) inoperable. OR	Immediately
	D.2.1 Suspend CORE ALTERATIONS. AND	Immediately
	D.2.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	D.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately
	D.2.4 Initiate action to restore required DC electrical power subsystem(s) to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.5.1	----------NOTE---------- The following SRs are not required to be performed: SR 3.8.4.2, SR 3.8.4.3, and SR 3.8.4.4. ---------- For DC sources required to be OPERABLE, the following SRs are applicable: SR 3.8.4.1, SR 3.8.4.2, SR 3.8.4.3, and SR 3.8.4.4.	In accordance with applicable SRs

3.8 ELECTRICAL POWER SYSTEMS

3.8.6 Battery Parameters

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.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or two batteries on one train with one or more battery cells with float voltage < 2.07 V.	A.1 Perform SR 3.8.4.1. AND A.2.1 Perform SR 3.8.6.1. OR A.2.2 Perform SR 3.8.6.2. AND A.3 Restore affected cell voltage ≥ 2.07 V.	2 hours 2 hours 2 hours 24 hours
B. ---------NOTE--------- Only applicable to 1800 amp-hour rated batteries. ---------- One or two batteries on one train with float current > 1.50 amps.	B.1 Perform SR 3.8.4.1. AND B.2 Restore battery float current to ≤ 1.50 amps.	2 hours 12 hours
C. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- One or two batteries on one train with float current > 0.75 amp.	C.1 Perform SR 3.8.4.1. AND C.2 Restore battery float current to ≤ 0.75 amp.	2 hours 12 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or two batteries on one train with one or more cells with electrolyte level less than minimum established design limits.	----------NOTES---------- 1. Required Actions D.1 and D.2 are only applicable if electrolyte level is below the top of the plates. 2. Required Action D.2 shall be completed if electrolyte level was below the top of the plates. ---------- D.1 Restore electrolyte level to above the top of the plates. AND D.2 Verify no evidence of leakage. AND D.3 Restore electrolyte level to greater than or equal to minimum established design limits.	8 hours 12 hours 31 days
E. One or two batteries on one train with pilot cell electrolyte temperature less than minimum established design limits.	E.1 Restore battery pilot cell temperature to greater than or equal to minimum established design limits.	12 hours
F. One or more batteries in redundant trains with battery parameters not within limits.	F.1 Restore battery parameters for batteries in one train to within limits.	2 hours

(continued)

ACTIONS (Continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. ---------NOTE--------- Only applicable to 1800 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, B, D, E, or F not met. OR One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 1.50 amps.	G.1 Declare associated battery inoperable.	Immediately
H. ---------NOTE--------- Only applicable to 1260 amp-hour rated batteries. ---------- Required Action and associated Completion Time of Condition A, C, D, E, or F not met. OR One or two batteries on one train with one or more battery cells with float voltage < 2.07 V and float current > 0.75 amp.	H.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 ≤ 1.50 amps for batteries rated at 1800 amp-hours.	7 days
SR 3.8.6.2	----------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 ≤ 0.75 amp for batteries rated at 1260 amp-hours.	7 days

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.8.6.3	Verify each battery pilot cell voltage is ≥ 2.07 V.	31 days
SR 3.8.6.4	Verify each battery connected cell electrolyte level is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.5	Verify each battery pilot cell temperature is greater than or equal to minimum established design limits.	31 days
SR 3.8.6.6	Verify each battery connected cell voltage is ≥ 2.07 V.	92 days
SR 3.8.6.7	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 the battery shows degradation or has reached 85% of the expected life with capacity < 100% of the manufacturer's rating AND 24 months when the battery has reached 85% of the expected life with capacity ≥ 100% of the manufacturer's rating

3.8 ELECTRICAL POWER SYSTEMS

3.8.7 Inverters—Operating

LCO 3.8.7 The required Channel A, B, C, and D AC inverters shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required inverter inoperable.	----------NOTE---------- Enter applicable Conditions and Required Actions of LCO 3.8.9 with one AC vital bus de-energized. ---------- A.1 Power AC vital bus from its Class 1E constant voltage source transformer. AND A.2 Restore inverter to OPERABLE status.	2 hours 24 hours
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.9 Distribution Systems—Operating

LCO 3.8.9 Train A and Train B AC, Subsystems A, B, C, and D DC, and Channels A, B, C, and D AC vital bus electrical power distribution systems shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One AC electrical power distribution system inoperable.	A.1 Restore AC electrical power distribution system to OPERABLE status.	8 hours AND 16 hours from discovery of failure to meet LCO
B. One or more AC vital bus inoperable.	B.1 Restore AC vital bus to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO
C. One or more DC electrical power distribution subsystem inoperable.	C.1 Restore DC electrical power distribution subsystem to OPERABLE status.	2 hours AND 16 hours from discovery of failure to meet LCO

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A, B, or C not met.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.9.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution systems.	7 days

3.8 ELECTRICAL POWER SYSTEMS

3.8.10 Distribution Systems—Shutdown

LCO 3.8.10 The necessary portion of AC, DC, and AC vital bus electrical power distribution systems shall be OPERABLE to support equipment required to be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required AC, DC, or AC vital bus electrical power distribution systems inoperable.	A.1 Declare associated supported required feature(s) inoperable. OR	Immediately
	A.2.1 Suspend CORE ALTERATIONS. AND	Immediately
	A.2.2 Suspend movement of irradiated fuel assemblies. AND	Immediately
	A.2.3 Suspend operations involving positive reactivity additions that could result in loss of required SDM or boron concentration. AND	Immediately
		(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.2.4 Initiate actions to restore required AC, DC, and AC vital bus electrical power distribution system(s) to OPERABLE status.	Immediately
	AND	
	A.2.5 Declare associated required shutdown cooling system(s) inoperable and not in operation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.10.1	Verify correct breaker alignments and voltage to required AC, DC, and AC vital bus electrical power distribution systems.	7 days

5.5 Procedures, Programs, and Manuals (continued)

5.5.2.15 Containment Leakage Rate Testing Program (Continued)

The provisions of Surveillance Requirement 3.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program. However, test frequencies specified in this Program may be extended consistent with the guidance provided in NEI 94-01, "Industry Guideline For Implementing Performance-Based Option Of 10CFR 50, Appendix J," as endorsed by Regulatory Guide 1.163. Specifically, NEI 94-01 has these provisions for test frequencies extension:

1. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for recommended Type A testing may be extended by up to 15 months. This option should be used only in cases where refueling schedules have been changed to accommodate other factors.

2. Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for the recommended surveillance frequency for Type B and Type C testing may be extended by up to 25 percent of the test interval, not to exceed 15 months.

The provisions of Surveillance Requirement 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

5.5.2.16 Reserved.

5.5.2.17 Battery Monitoring and Maintenance Program

This Program provides for battery restoration and maintenance, which includes the following:

a. Actions to restore battery cells with float voltage < 2.13 V, and

b. Actions to verify that the remaining cells are above 2.07 V when a battery cell or cells have been found less than 2.13 V, and

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

ATTACHMENT G.1

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Proposed Bases pages (for information only), Unit 2

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 4297 V is above the maximum reset voltage of the 4.16 kV bus undervoltage relays (Ref. SR 3.3.7). Achieving a voltage at or above 4297 V ensures that the LOVS/SDVS/DGVSS relay logic will reset allowing sequencing of the ESF loads on to the ESF bus if one or more ESF actuation signals is present. This minimum voltage limit, which is consistent with ANSI C84.1-1982 (Ref. 11), is above the allowed voltage drop to the terminals of 4160 V motors whose minimum steady state operating voltage is 3744 V (90% of 4160 V). This minimum voltage requirement also ensures that adequate voltage is provided to motors and other equipment down through the 120 V level. The specified maximum steady state output voltage of 4576 V ensures that, for a lightly loaded distribution system, the voltage at the terminals of 4160 V motors is no more than the maximum allowable steady state operating voltage (110% of 4160V). The specified minimum and maximum frequencies of the DG are 59.7 Hz and 61.2 Hz, respectively. The upper frequency limit is equal to + 2% of the 60 Hz nominal frequency and is derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3). The lower frequency limit is equal to - 0.5% of the 60 Hz nominal frequency and is based on maintaining acceptable high pressure safety injection system performance as assumed in the accident analyses.

During a DG surveillance test, steady state DG voltage of 4297 to 4576 volts and steady state frequency of 59.7 to 61.2 Hz shall be verified. For the lower voltage and frequency limits, the Total Loop Uncertainty (TLU) of the measurement device (Reference Calculation E4C-098) shall be considered.

SR 3.8.1.1

This SR assures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that availability of independent offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

The SR is modified by two NOTES to indicate that Bus 3A04 or Bus 3A06 is required when unit crosstie breaker 3A0416 or 3A0603, respectively, is used to provide a source of AC power.

(continued)

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.4 DC Sources—Operating

BASES

BACKGROUND

The station DC electrical power system provides the AC emergency power system with control power. It also provides both motive and control power to selected safety related equipment and preferred AC vital bus power (via inverters). As required by 10 CFR 50, Appendix A, GDC 17 (Ref.1), the DC electrical power system is designed to have sufficient independence, redundancy, and testability to perform its safety functions, assuming a single failure. The DC electrical power system also conforms to the recommendations of Regulatory Guide 1.6 (Ref. 2) and IEEE-308 (Ref. 3).

The 125 VDC electrical power system consists of two independent and redundant safety related Class 1E DC electrical power systems (Train A and Train B). Each train consists of two subsystems each containing a DC bus, one 125 VDC battery, the required battery charger for each battery, and all the associated control equipment and interconnecting cabling.

During normal operation, the 125 VDC load is powered from the required battery charger with the batteries floating on the system. In case of loss of normal power to the required battery charger, the DC load is automatically powered from the station batteries.

The Train A and Train B DC electrical power systems provide control power for their associated Class 1E AC power load group, 4.16 kV switchgear, and 480 V load centers. The DC electrical power subsystems also provide DC electrical power to other loads including inverters which in turn power the AC vital buses.

Train A DC systems (Subsystems A and C) provide power to the Channel A and C inverters feeding the 120 VAC vital bus 1 and 3 electrical power distribution subsystems (Channel A and C). Train B DC system (Subsystems B and D) provide power to the Channel B and D inverters feeding the 120 VAC vital bus 2 and 4 electrical power distribution subsystems (Channel B and D). DC subsystem C also provides DC power to the Auxiliary Feedwater Pump (AFWP) P 140 steam inlet valve HV-4716 and the AFWP electric governor.

BASES (continued)

BACKGROUND (continued)

Train A DC systems are capable of providing DC power to both Channel A and Channel C loads when DC subsystems A and C are manually cross-connected. This allows both DC buses to remain operable during battery replacement, testing, or maintenance of any one DC battery. A dedicated battery charger(s) can be replaced, tested or maintained when the swing charger is OPERABLE.

Train B DC systems are capable of providing DC power to both Channel B and Channel D loads when DC subsystem B and D are manually cross-connected. This allows both DC buses to remain operable during battery replacement, testing, or maintenance of any one DC battery. A dedicated battery charger(s) can be replaced, tested or maintained when the swing charger is OPERABLE.

Train	Subsystem	DC Bus	Battery	Charger	Swing Charger
A	A	D1	B007	B001	B021
	C	D3	B009	B003	
B	B	D2	B008	B002	B022
	D	D4	B010	B004	

During cross-connecting of subsystem buses A and C or B and D, two batteries will be paralleled for a short duration. An electrical fault during that duration could exceed the interrupting duties of the protective devices. This is an accepted practice during transfer of power sources and is considered to be an acceptable minimal risk. Once the cross-tie alignment is complete, only one battery is aligned to cross-connected buses D1 and D3 or D2 and D4.

An OPERABLE Class 1E battery bank B00X may replace B007, B008, B009 or B010 battery to allow battery maintenance (including replacement) activities.

The DC power distribution system is described in more detail in the Bases for LCO 3.8.9, "Distribution Systems – Operating," and for LCO 3.8.10, "Distribution Systems – Shutdown."

Each 125 VDC battery is separately housed in a ventilated room apart from its charger and distribution buses. Each subsystem is located in an area separated physically and electrically from the other subsystems to ensure that a single failure in one subsystem does not cause a failure in a redundant subsystem. There is no sharing of equipment

BASES (continued)

BACKGROUND (continued)

between redundant Class 1E subsystems, such as batteries, battery chargers, or distribution panels. Subsystems A and C or B and D share an 1800 amp-hour rated battery and battery charger(s) when cross-tied.

Each battery has adequate storage capacity to meet the duty cycle(s) discussed in the UFSAR, Chapter 8 (Ref. 6). The battery is designed with additional capacity above that required by the design duty cycle to allow for temperature variations and other factors.

The batteries for Train A and Train B DC electrical power subsystems are sized to produce the required capacity at 80% of nameplate rating, corresponding to the warranted capacity at end of life cycles and the 100% design demand. The minimum design voltage limit at the supplied loads is 105 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 by a fully charged cell when there is no charging or discharging. Once fully charged with its open circuit voltage $\geq$ 2.065 Vpc, the battery cell will maintain its capacity for 30 days without further charging per manufacturer's instructions. All cells begin to self-discharge when left on open circuit, but cells can be left open circuit for some period of time (> 30 days, refer to the manufacturer's instruction for the maximum storage periods) without any long-term performance degradation. Optimal long-term performance however, is obtained by maintaining a float voltage of 2.20 to 2.28 Vpc. This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge. The nominal float voltage of 2.267 Vpc corresponds to a total float voltage of 131.5 V for a 58-cell battery.

Each Train A and Train B DC electrical power subsystem battery charger has ample power output capacity for the steady state operation of connected loads required during normal operation, while at the same time maintaining its battery bank fully charged. Each battery charger also has sufficient excess capacity to restore the battery from the design minimum charge to its fully charged state within 24 hours while supplying normal steady state loads discussed in the UFSAR, Chapter 8 (Ref. 6).

BASES (continued)

BACKGROUND (continued)

Each subsystem has a dedicated battery charger that is rated at 300 Amps. Each Train has a 400 Amp rated swing battery charger that meets all the performance requirements of the dedicated charger and can be manually aligned to either subsystem. The swing charger breakers and interconnecting cables allow alignment to either subsystem within a train. Key interlocks limit swing charger alignment to one subsystem at a time. The Train B swing charger can also be aligned to non-1E 125 VDC Battery Bus D5. Electrical isolation and independence between subsystems required by R.G. 1.75 is maintained by the isolation capability of the battery charger itself and the key interlocked output circuit breakers. If the swing battery charger is substituted for one of the dedicated battery chargers, the requirements of independence and redundancy between subsystems are maintained.

The swing battery charger and the dedicated battery charger are equally qualified. When required, the swing battery charger can replace the dedicated battery charger using the provided circuit breakers. The swing battery charger can stay in service indefinitely, and there are no restrictions on swing battery charger use. The swing and dedicated battery chargers are designed to operate in parallel in any combination. The swing battery charger is powered from its respective Train's common MCC which is diesel generator backed as required by TS 3.8.1, "AC Sources – Operating," or TS 3.8.2, "AC Sources – Shutdown."

With same train DC buses cross-connected, an OPERABLE charger or chargers with a combined rated capacity greater than or equal to 400 Amps is required.

A "required battery charger" is one of the following:

- the "dedicated charger" aligned to its respective DC bus
- the "swing battery charger" aligned to the respective DC bus
- **two** ""dedicated chargers" aligned to cross-tied DC buses, or
- the "swing battery charger" aligned to cross-tied DC buses.

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.

BASES (continued)

BACKGROUND (continued)

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.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 7) and Chapter 15 (Ref. 8), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining the DC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite AC power or all onsite AC power; and

b. A worst-case single failure.

The DC sources satisfy Criterion 3 of the NRC Policy Statement.

BASES (continued)

LCO

The DC electrical power trains, each train consisting of two DC buses, two batteries, the required battery charger for each battery, and the corresponding control equipment and interconnecting cabling supplying power to the associated bus within the train are required to be OPERABLE by LCO 3.8.9 "Distribution Systems - Operating." This ensures the availability of the required power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. Loss of any train DC electrical power subsystem does not prevent the minimum safety function from being performed consistent with UFSAR Chapter 8 (Ref. 6).

An OPERABLE DC electrical power train requires two batteries and required chargers to be operating and connected to the associated DC buses.

During the cross-connection period of 21 days (30 days for upgrade to 1800 amp-hour rated batteries), an OPERABLE DC electrical power train (A or B) requires one battery and the required battery charger(s) to be operating and connected to subsystem DC buses A and C or B and D.

APPLICABILITY

The DC electrical power sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure safe unit operation and to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

b. Adequate core cooling is provided, and containment integrity and other vital functions are maintained in the event of a postulated DBA.

The DC electrical power requirements for MODES 5 and 6 are addressed in the Bases for LCO 3.8.5, "DC Sources - Shutdown."

ACTIONS

Conditions A and B represent one train with one or two required battery chargers or associated control equipment or cabling inoperable (e.g., the battery 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 the required charger(s) to OPERABLE status in a reasonable time period.

BASES (continued)

ACTIONS

A.1, A.2, and A.3 (A.3.1 or A.3.2.1 and A.3.2.2)

Condition A is modified by a NOTE identifying that it is only applicable to 1800 amp-hour rated batteries.

Required Action A.1 requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage (≥ 129.0 V) 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. A discharged battery having a 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.

The charger operating in the current limit mode in excess of 2 hours 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 fully recharged within 12 hours (Required Action A.2).

BASES (continued)

ACTIONS

A.1, A.2, and A.3 (A.3.1 or A.3.2.1 and A.3.2.2) (continued)

Required Action A.2 requires that the battery float current be verified to be less than or equal to 1.50 amps. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it is now fully capable to supply the maximum expected load requirement. The battery manufacturer certified that at 1.50 amps the battery is at least 98% charged. A 2% capacity margin (correction factor) has been used in the battery sizing calculation (Ref. 12) which ensures that the battery has sufficient capacity to meet the maximum expected load demand. If at the expiration of the initial 12 hour period the battery float current is not less than or equal to 1.50 amps this indicates there may be additional battery problems and the battery must be declared inoperable.

A digital multimeter of high accuracy in an average function mode is required to measure the steady state float charging current. The multimeter must be capable of measuring the low magnitude of DC current (less than 1.50 amps) and filtering the induced AC noise from the connected inverter. A millivolt shunt located close to the battery terminal provides the battery float charging current signal.

Required Action A.3 (A.3.1 or A.3.2.1 and A.3.2.2) 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 spare battery charger).

Required Action A.3.1 limits the restoration time for the required battery charger to 72 hours if a non-1E charger with a non-1E power source is used. The restoration time for the required battery charger can be extended to 7 days (Required Action A.3.2.2) if the ability to power the spare battery charger from a diesel-backed source has been established within 72 hours (Required Action A.3.2.1). All preparations to accomplish the ability to power the spare battery charger must be complete within 72 hours. The purpose of this provision is to facilitate connection of the spare battery charger to a diesel-backed source in $\leq$ 4 hours if non-1E power is lost. The 7 day completion time reflects a reasonable time to effect restoration of the required battery charger to operable status.

B.1, B.2, and B.3 (B.3.1 or B.3.2.1 and B.3.2.2)

Condition B is modified by a NOTE identifying that it is only applicable to 1260 amp-hour rated batteries.

Required Action B.1 basis is the same as A.1.

BASES (continued)

ACTIONS

B.1, B.2, and B.3 (B.3.1 or B.3.2.1 and B.3.2.2) (continued)

Required Action B.2 requires that the battery float current be verified to be less than or equal to 0.75 amp. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it is now fully capable to supply the maximum expected load requirement. The battery manufacturer certified that at 0.75 amp the battery is at least 98% charged. A 2% capacity margin (correction factor) has been used in the battery sizing calculation (Ref. 12) which ensures that the battery has sufficient capacity to meet the maximum expected load demand. If at the expiration of the initial 12 hour period the battery float current is not less than or equal to 0.75 amp this indicates there may be additional battery problems and the battery must be declared inoperable.

A digital multimeter of high accuracy in an average function mode is required to measure the steady state float charging current. The multimeter must be capable of measuring the low magnitude of DC current (less than 0.75 amp) and filtering the induced AC noise from the connected inverter. A millivolt shunt located close to the battery terminal provides the battery float charging current signal.

Required Action B.3 (B.3.1 or B.3.2.1 and B.3.2.2) basis is the same as A.3 (A.3.1 or A.3.2.1 and A.3.2.2).

C.1

With the required DC electrical power subsystem battery charger or associated control equipment or cabling outside the allowances of the Required Actions for Condition A or B, sufficient capacity to supply the maximum expected load requirement is not assured and the associated DC battery must be declared inoperable immediately.

BASES (continued)

ACTIONS

D.1 and D.2

Condition D represents one train with one or two DC electrical power subsystems inoperable for reasons other than Condition A or B including when a battery is inoperable. With a battery inoperable, the associated DC bus is being supplied by the required battery charger. Any event that results in a loss of the AC bus supporting the battery charger will eventually result in loss of DC to that subsystem. Recovery of the AC bus, especially if it is due to a loss of offsite power, will be hampered by the fact that many of the components necessary for the recovery (e.g., diesel generator control and field flash, AC load shed and diesel generator output circuit breaker, etc.) rely upon the operability of the battery(ies). In addition, DC loads with energization transients that are beyond the capability of the battery charger and normally require the assistance of the battery will not be able to be brought online. The 2-hour limit allows sufficient time to effect restoration of a DC electrical power subsystem or an inoperable battery given that the majority of the conditions that lead to battery inoperability (e.g., loss of battery charger, battery cell voltage less than 2.07 V, etc.) are identified in LCOs 3.8.4, 3.8.5, and 3.8.6 together with additional specific completion times.

Condition D also represents one train 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 subsystem. The 2-hour limit is consistent with the allowed time for an inoperable DC distribution system.

If one of the required DC electrical power subsystems is inoperable for reasons other than Condition A or B (e.g., inoperable battery charger and associated inoperable battery), the remaining DC electrical power subsystem has 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 to mitigate a worst-case accident, continued power operation should not exceed 2 hours. The 2-hour Completion Time is based on Regulatory Guide 1.93 (Ref. 9) and reflects a reasonable time to cross connect with same train DC subsystem (1800 amp-hour rated battery required) or 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

BASES (continued)

ACTIONS

D.1 and D.2 (continued)

status, to prepare to effect an orderly and safe unit shutdown. Either of Required Actions D.1 or D.2 will restore the DC subsystem train to OPERABLE status. Required Action D.2 includes a requirement to ensure the battery aligned to the cross-tied subsystem buses has adequate capacity.

Cross connection of two subsystems on two trains has not been analyzed and is therefore not permitted.

E.1

Condition E represents one train with one subsystem battery out of service and two subsystems cross-connected with one 1800 amp-hour rated battery. This alignment will allow both subsystems to remain OPERABLE for 21 days (30 days for upgrade to 1800 amp-hour rated batteries). The 21-day duration is adequate for in-kind replacement of a battery bank or other maintenance activities such as performance of battery discharge testing (online) in MODES 1 through 4. The 30-day duration is adequate for upgrade/replacement of a battery bank to 1800 amp-hours including replacement of battery racks and battery room modifications to accommodate the larger battery cells. The Completion Time includes a NOTE to allow an extension to 30 days for upgrade to 1800 amp-hour rated batteries.

The SONGS 2/3 Living PRA determined acceptable risk impact for a period of 30 days while two same train DC subsystems are cross-connected with one 1800 amp-hour rated battery supporting both buses. The analysis was performed consistent with the guidelines of Regulatory Guides 1.174 and 1.177.

Cross connection of two subsystems on two trains has not been analyzed and is therefore not permitted.

F.1 and F.2

If the inoperable DC electrical power subsystem cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems. The Completion Time to bring the unit to MODE 5 is consistent with the time required in Regulatory Guide 1.93 (Ref. 9).

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.4.1

Verifying battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the battery chargers, which support the ability of the batteries to perform their intended function. 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 fully charged state, 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 (2.20 Vpc). This voltage maintains the battery plates in a condition that supports maintaining the grid life (expected to be approximately 20 years). The 7-day frequency is consistent with manufacturer recommendations.

SR 3.8.4.2

This SR verifies the design capacity of the swing and dedicated battery chargers. Regulatory Guide 1.32 (Ref. 10) recommends that the battery charger supply is 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 ensure that these requirements can be satisfied. Each required battery charger must be capable of supplying rated amps at the minimum established float voltage for 8 hours. The ampere requirements are based on the output rating of the chargers. The time period is sufficient for the charger temperature to have stabilized and to have been maintained for at least 2 hours.

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 24-month intervals.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.4.3

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 IEEE 450 (Ref. 4). Prior to a battery service test or performance discharge test, perform SR 3.8.106.8.

For batteries with a rated capacity of 1260 amp-hours, the service test will be performed at 24-month intervals. The performance discharge test may be used in lieu of the service test at 48-month intervals as stated in the NOTE.

This SR is modified by a NOTE that allows the battery performance discharge test in SR 3.8.6.7 to be performed in lieu of the service test in SR 3.8.4.3 once per 48 months for batteries rated at 1260 amp-hours. The substitution is acceptable because the battery performance discharge test in SR 3.8.6.7 represents a more severe test of battery capacity than the service test in SR 3.8.4.3. The NOTE is in accordance with the post TSIP licensing bases.

If for any reason a battery has to undergo a service and performance test (e.g., one following the other during scheduled maintenance testing), the service test shall be completed first. Recharging of the battery is required before the performance test is conducted. The "as found" condition prior to the performance test is state of the battery immediately prior to the performance test.

SR 3.8.4.4

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 IEEE 450 (Ref. 4). Prior to a battery service test, performance discharge test or modified performance discharge test, perform SR 3.8.106.8.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.4.4 (continued)

This SR is modified by a NOTE that allows the modified performance discharge test in SR 3.8.6.7 to be performed in lieu of the service test in SR 3.8.4.4 for batteries rated at 1800 amp-hours. The substitution is acceptable because modified performance discharge test in SR 3.8.6.7 represents a more severe test of battery capacity than the service test in SR 3.8.4.4. The modified performance discharge test is described in the Bases for SR 3.8.6.7.

For 1800 amp-hour rated batteries, the modified performance discharge test will use the combined duty cycle of the cross-connected subsystems. Battery life expectancy is optimized by using a 30-month test interval.

A battery service test or modified performance discharge test shall be performed after installation of a new battery bank for Operability. Within 2 years after initial installation, a modified battery performance discharge test shall be performed for collecting baseline data for future battery capacity trending purposes.

REFERENCES

1. 10 CFR.50, Appendix A, GDC 17.
2. Regulatory Guide 1.6, March 10, 1971.
3. IEEE-308-1978.
4. IEEE-450-2002.
5. IEEE-485-1997.
6. UFSAR, Chapter 8.
7. UFSAR, Chapter 6.
8. UFSAR, Chapter 15.
9. Regulatory Guide 1.93, December 1974.
10. Regulatory Guide 1.32, February 1977.
11. Regulatory Guide 1.129, April 1977.
12. SCE Calculation E4C-017.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.5 DC Sources—Shutdown

BASES

BACKGROUND

A description of the DC sources is provided in the Bases for LCO 3.8.4, "DC Sources – Operating." When TS 3.8.5 applies, there are two exceptions to what is described in the Bases for LCO 3.8.4:

1. Same train DC subsystem Buses may be cross-tied to an 1800 amp-hour rated battery. This alignment allows both subsystems to remain OPERABLE. There is no time limit to the duration DC subsystem buses may be cross-tied with the unit shutdown.

2. With same train DC buses cross-connected, an OPERABLE charger or chargers with a combined rated capacity greater than or equal to 300 Amps is required. A "required battery charger" is one of the following:

   - the "dedicated charger" aligned to its respective DC bus
   - the "swing battery charger" aligned to the respective DC bus
   - **one** "dedicated charger" aligned to cross-tied DC buses, or
   - the "swing battery charger" aligned to cross-tied DC buses.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume that Engineered Safety Feature (ESF) systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum DC electrical power sources during MODES 5 and 6 and during movement of irradiated fuel assemblies ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

BASES (continued)

APPLICABLE SAFETY ANALYSES

c. Adequate DC electrical power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

The DC sources satisfy Criterion 3 of the NRC Policy Statement.

LCO

Each DC electrical power train, consisting of two batteries (unless cross connected), the required charger for each battery, and the corresponding control equipment and interconnecting cabling within the train, are required to be OPERABLE to support required trains of distribution systems required OPERABLE by LCO 3.8.10, "Distribution Systems – Shutdown." This ensures the availability of sufficient DC electrical power sources to maintain the unit in a safe shutdown condition and to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The DC electrical power sources required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies provide assurance that:

a. Required features to mitigate a fuel handling accident are available;

b. Required features necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

c. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition or refueling condition.

The DC electrical power requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.4.

ACTIONS

LCO 3.0.3 is not applicable while in MODE 5 or 6. However, since irradiated fuel assembly movement can occur in MODE 1, 2, 3, or 4, the ACTIONS have been modified by a NOTE stating that LCO 3.0.3 is not applicable. If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operations. Entering LCO 3.0.3, while in MODE 1, 2, 3 or 4 would require the unit to be shutdown unnecessarily.

BASES (continued)

ACTIONS (continued)

Conditions A and B represent one train with one or two required battery chargers or associated control equipment or cabling inoperable (e.g., the battery 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 the required charger(s) to OPERABLE status in a reasonable time period.

A.1, A.2, and A.3 (A.3.1 or A.3.2.1 and A.3.2.2)

Condition A is modified by a NOTE identifying that it is only applicable to 1800 amp-hour rated batteries.

Required Action A.1 requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage ($\geq$ 129.0 V) 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 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. 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 shutdown of refueling activities.

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.

The charger operating in the current limit mode in excess of 2 hours is an indication that the battery is partially

BASES (continued)

ACTIONS

A.1, A.2, and A.3 (A.3.1 or A.3.2.1 and A.3.2.2) (continued)

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 fully 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 1.50 amps. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it is now fully capable to supply the maximum expected load requirement. The battery manufacturer certified that at 1.50 amps the battery is at least 98% charged. A 2% capacity margin (correction factor) has been used in the battery sizing calculation (Ref. 3), which ensures that the battery has sufficient capacity to meet the maximum expected load demand. If at the expiration of the initial 12 hour period the battery float current is not less than or equal to 1.50 amps this indicates there may be additional battery problems and the battery must be declared inoperable.

A digital multimeter of high accuracy in an average function mode is required to measure the steady state float charging current. The multimeter must be capable of measuring the low magnitude of DC current (less than 1.50 amps) and filtering the induced AC noise from the connected inverter. A millivolt shunt located close to the battery terminal provides the battery float charging current signal.

Required Action A.3 (A.3.1 or A.3.2.1 and A.3.2.2) 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 spare battery charger).

Required Action A.3.1 limits the restoration time for the required battery charger to 72 hours if a non-1E charger with a non-1E power source is used. The restoration time for the battery charger can be extended to 7 days (required Action A.3.2.2) if the ability to power the spare battery charger from a diesel-backed source has been established within 72 hours (Required Action A.3.2.1). All preparations to accomplish the ability to power the spare battery charger must be complete within 72 hours. The purpose of this provision is to facilitate connection of the spare battery charger to a diesel-backed source in $\leq$ 4 hours if non-1E

BASES (continued)

ACTIONS

A.1, A.2, and A.3 (A.3.1 or A.3.2.1 and A.3.2.2) (continued)

power is lost. The 7-day completion time reflects a reasonable time to effect restoration of the required battery charger to operable status.

B.1, B.2, and B.3 (B.3.1 or B.3.2.1 and B.3.2.2)

Condition B is modified by a NOTE identifying that it is only applicable to 1260 amp-hour rated batteries.

Required Action B.1 basis is the same as A.1.

Required Action B.2 requires that the battery float current be verified to be less than or equal to 0.75 amp. This indicates that, if the battery had been discharged as the result of the inoperable battery charger, it is now fully capable to supply the maximum expected load requirement. The battery manufacturer certified that at 0.75 amp the battery is at least 98% charged. A 2% capacity margin (correction factor) has been used in the battery sizing calculation (Ref. 3) which ensures that the battery has sufficient capacity to meet the maximum expected load demand. If at the expiration of the initial 12 hour period the battery float current is not less than or equal to 0.75 amp this indicates there may be additional battery problems and the battery must be declared inoperable.

A digital multimeter of high accuracy in an average function mode is required to measure the steady state float charging current. The multimeter must be capable of measuring the low magnitude of DC current (less than 0.75 amp) and filtering the indicated AC noise from the connected inverter. A millivolt shunt located close to the battery terminal provides the battery float charging current signal.

Required Action B.3 (B.3.1 or B.3.2.1 and B.3.2.2) basis is the same as A.3 (A.3.1 or A.3.2.1 and A.3.2.2).

C.1

With the required DC electrical power subsystem battery charger or associated control equipment or cabling outside the allowances of the Required Actions for Condition A, sufficient capacity to supply the maximum expected load requirement is not assured and the associated DC battery must be declared inoperable immediately.

BASES (continued)

ACTIONS

D.1 or D.2.1, D.2.2, D.2.3 and D.2.4

Condition D represents one DC electrical power subsystem inoperable for reasons other than Condition A or B. The ACTIONS provide a tiered response allowing the option to declare required features inoperable immediately with the associated DC power source(s) inoperable.

If two trains are required per LCO 3.8.10, the remaining train with DC power available may be capable of supporting sufficient systems to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features inoperable with the associated DC power source(s) inoperable, appropriate restrictions will be implemented in accordance with the affected required features LCO ACTIONS. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions). The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory, provided the required SDM is maintained.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required DC electrical power subsystems and to continue this action until restoration is accomplished in order to provide the necessary DC electrical power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. 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 unit safety systems may be without sufficient power.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.5.1

SR 3.8.5.1 states that Surveillances required by SR 3.8.4.1 through SR 3.8.4.4 are applicable in these MODES. See the corresponding Bases for LCO 3.8.4 for a discussion of each SR.

This SR is modified by a NOTE. The reason for the NOTE is to preclude requiring the OPERABLE DC sources from being discharged below their capability to provide the required power supply or otherwise rendered inoperable during the performance of SRs. It is the intent that these SRs must still be capable of being met, but actual performance is not required.

Verification of the battery terminal voltage and battery charger output amps is addressed by LCS 3.8.105.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.
3. SCE Calculation E4C-017.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.6 Battery Parameters

BASES

BACKGROUND

This LCO delineates the limits on battery float current as well as electrolyte temperature, level, and float voltage for the DC power subsystem batteries. A discussion of these batteries and their OPERABILITY requirements is provided in the Bases for LCO 3.8.4, "DC Sources – Operating," and LCO 3.8.5, "DC Sources – Shutdown." In addition to the limitations of this Specification, the licensee controlled program also implements a program specified in Administrative Controls Section 5.5.2.17 for monitoring various battery parameters that is based on recommendations of IEEE Standard 450-2002, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications" (Ref. 3).

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 of 2.20 to 2.28 Vpc. This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge. The nominal float voltage of 2.267 Vpc corresponds to a total float voltage output of 131.5 V for a 58-cell battery.

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature systems are OPERABLE. The DC electrical power system provides normal and emergency DC electrical power for the DGs, emergency auxiliaries, and control and switching during all MODES of operation.

BASES (continued)

APPLICABLE SAFETY ANALYSES (continued)

The OPERABILITY of the DC subsystems is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining at least one train of DC sources OPERABLE during accident conditions, in the event of:

a. An assumed loss of all offsite AC power or all onsite AC power; and

b. A worst-case single failure.

Battery parameters satisfy Criterion 3 of the NRC Policy Statement.

LCO

Battery parameters must remain within acceptable limits to ensure availability of the required DC power to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. Battery parameter limits are conservatively established, allowing continued DC electrical system function even with limits not met.

Additional preventative maintenance, testing, and monitoring performed in accordance with the Licensee Controlled Specifications 3.8.104, 3.8.105, and 3.8.106 is conducted as specified in Administrative Controls Section 5.5.2.17.

APPLICABILITY

The battery parameters are required solely for the support of the associated DC electrical power subsystems. Therefore, battery parameter limits are only required when the DC power source is required to be OPERABLE. Refer to the Applicability discussion in the Bases for LCO 3.8.4 and LCO 3.8.5.

ACTIONS

A.1, A.2.1 or A.2.2 and A.3

A battery cell is degraded when the cell float voltage is <2.07 V. A battery bank may not be degraded with one or more degraded battery cells. Within 2 hours, verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage (perform SR 3.8.4.1) and of the overall battery state of charge by monitoring the battery float charge current (perform SR 3.8.6.1 or SR 3.8.6.2 as applicable). This assures that there is still sufficient battery capacity to perform the intended

BASES (continued)

ACTIONS

A.1, A.2.1 or A.2.2 and A.3 (continued)

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 per Required Action A.3.

Since the Required Actions of A.1 and A.2.1 or A.2.2 only specify "perform", a failure of SR 3.8.4.1 or SR 3.8.6.1 or SR 3.8.6.2 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. If SR 3.8.6.1 or SR 3.8.6.2 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.

B.1 and B.2

Condition B is modified by a NOTE identifying that it is only applicable to 1800 amp-hour rated batteries.

One or two batteries in one train with float current of ≥1.50 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.

Verification of the required battery charger OPERABILITY is made by monitoring the battery terminal voltage within 2 hours (perform SR 3.8.4.1). 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. The charger operating in the current limit mode after 2 hours 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 fully recharged within 12 hours (Required Action B.2). The battery must therefore be declared inoperable.

BASES (continued)

ACTIONS

B.1 and B.2 (continued)

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 G is applicable and the battery must be declared inoperable immediately. If float voltage is satisfactory there is a 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. 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.

C.1 and C.2

Condition C is modified by a NOTE identifying that it is only applicable to 1260 amp-hour rated batteries.

One or two batteries in one train with float current of > 0.75 amp 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.

The basis for C.1 and C.2 is the same as B.1 and B.2 except for 1260 amp-hour rated batteries, Condition H applies instead of Condition G.

BASES (continued)

ACTIONS (continued)

D.1, D.2 and D.3

With one or two batteries on one train with one or more cells with electrolyte level above the top of the plates, but below the minimum established design limits, the battery still retains sufficient capacity to perform the intended function. Therefore, the affected battery is not required to be considered inoperable solely as a result of electrolyte level not met. Electrolyte level limits are visually indicated on each cell via minimum and maximum electrolyte level lines. Within 31 days the minimum established design limits for electrolyte level must be re-established. With electrolyte level below the top of the plates there is a potential for dryout and plate degradation. Required Actions D.1 and D.2 address this potential (as well as provisions in Administrative Controls Section 5.5.2.17, Battery Monitoring and Maintenance Program). Actions for battery cell(s) with electrolyte level below the top of the plates, per Administrative Controls Section 5.5.2.17.c, are specified in LCS 3.8.106.

The Required Actions are modified by two NOTES:

NOTE 1 indicates that Required Actions D.1 and D.2 are only applicable if electrolyte level is below the top of the plates. Within 8 hours, the electrolyte level is required to be restored to above the top of the plates.

NOTE 2 indicates that Required Action D.2 must be completed if electrolyte level was below the top of the plates.

The Required Action D.2 requirement to verify that there is no leakage by visual inspection and the Administrative Controls Section 5.5.2.17.c initiate action to equalize and test in accordance with manufacturer's recommendation and to implement corrective actions in accordance with Annex D of IEEE Standard 450-2002 (Ref. 3). They are performed following the restoration of the electrolyte level to above the top of the plates. Based on the results of the manufacturer's recommended testing, the battery(ies) may have to be declared inoperable and the affected cells replaced.

BASES (continued)

ACTIONS (continued)

E.1

With one or two batteries on one train with pilot cell electrolyte temperature less than the minimum established design limit (specified in LCS SR 3.8.106), 12 hours is allowed to restore the temperature to greater than or equal to minimum established design 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 electrolyte temperature not met.

F.1

With one or more batteries in redundant trains with battery parameters not within limits there is not sufficient assurance that battery capacity has not been affected to the degree that the batteries can still perform their required function, given that redundant batteries are involved. With redundant batteries involved this potential could result in a total loss of function on multiple systems that rely upon the batteries. The longer completion times specified for battery parameters on non-redundant batteries not within limits are therefore not appropriate, and the parameters must be restored to within limits on at least one train within 2 hours.

G.1

Condition G is modified by a NOTE identifying that it is only applicable to 1800 amp-hour rated batteries.

With one or more batteries with any battery parameter outside the allowances of the Required Actions for Condition A, B, D, E or F, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC battery must be declared inoperable. Additionally, discovering one or two batteries in one train with one or more battery cells with float voltage less than 2.07 V and float current greater than 1.50 amps indicates that the battery capacity may not be sufficient to perform the intended functions. The battery must therefore be declared inoperable immediately.

BASES (continued)

ACTIONS (continued)

H.1

Condition H is modified by a NOTE identifying that it is only applicable to 1260 amp-hour rated batteries.

With one or more batteries with any battery parameter outside the allowances of the Required Actions for Condition A, C, D, E, or F, sufficient capacity to supply the maximum expected load requirement is not assured and the corresponding DC battery must be declared inoperable. Additionally, discovering one or two batteries in one train with one or more battery cells with float voltage less than 2.07 V and float current greater than 0.75 amp indicates that the battery capacity may not be sufficient to perform the intended functions. The battery must therefore be declared inoperable immediately.

SURVEILLANCE REQUIREMENTS

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 and the 7-day frequency is consistent with the battery manufacturer's recommendation.

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 provide the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of $\leq$ 1.50 amps for batteries rated at 1800 amp-hours is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained.

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.6.2

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 and the 7-day Frequency is consistent with the battery manufacturer's recommendation.

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 B are being taken, which provide the necessary and appropriate verifications of the battery condition. Furthermore, the float current limit of $\leq$ 0.75 amp for batteries rated at 1260 amp-hours is established based on the nominal float voltage value and is not directly applicable when this voltage is not maintained.

SR 3.8.6.3 and SR 3.8.6.6

SRs 3.8.6.3 and 3.8.6.6 require verification that the pilot or connected cell float voltages are equal to or greater than the short term absolute minimum voltage of 2.07 V. 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. This provides adequate over-potential, which limits the formation of lead sulfate and self-discharge, which could eventually render the battery inoperable. Float voltage less than the administrative limit in LCS 3.8.106, but greater than 2.07 Vpc, is addressed in LCS 3.8.106 as required by Administrative Controls Section 5.5.2.17 a and b. The frequency for cell voltage verification every 31 days for pilot cell and 92 days for each connected cell is consistent with IEEE-450-2002 (Ref. 3).

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.6.4

The limit specified for electrolyte level ensures that the plates suffer no physical damage and maintain adequate electron transfer capability. The minimum established design limit is the minimum mark on the cell jar, which is above the top of the plates. The 31-day frequency is consistent with IEEE-450-2002 (Ref. 3). Battery cells with electrolyte level below the top of the plates are addressed in LCS 3.8.106.

SR 3.8.6.5

This Surveillance verifies that the pilot cell temperature is greater than or equal to the minimum established design limit, which is specified in LCS 3.8.106. The LCS requires electrolyte temperature to be maintained at $\geq 50^{\circ}F$ for batteries rated 1800 amp-hours that are not cross-connected or $\geq 60^{\circ}F$ for batteries rated 1260 amp-hours or batteries that are cross-connected. 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 31-day frequency is consistent with IEEE-450-2002 (Ref. 3).

BASES (continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.6.7

A battery performance discharge test is a test of constant current capacity of a battery, normally done in the "as found" condition, after having been in service, to detect any change in the capacity determined by the acceptance test. The test is intended to determine overall battery degradation due to age and usage. For 1800 amp-hour rated batteries, the modified performance discharge test will use the combined duty cycle of the cross-connected subsystems.

Either the battery performance discharge test or the modified performance discharge test is acceptable for satisfying SR 3.8.6.7. Prior to a performance discharge test or modified performance discharge test, perform SR 3.8.106.8.

A modified performance discharge test is a test of the battery capacity and its ability to provide a high rate, short duration load (usually the highest rate of the duty cycle). This will confirm the battery's ability to meet the critical period of the load duty cycle, in addition to determining its percentage of rated capacity. Initial conditions for the modified performance discharge test should be identical to those specified for a service test. The modified performance discharge test is conducted in accordance with IEEE-450-2002 Annex I.3. The battery terminal voltage for the modified performance discharge test must remain above the minimum battery terminal voltage specified in the battery service test for the duration of time equal to that of the service test.

The acceptance criteria for this Surveillance are consistent with IEEE-450-2002 (Ref. 3) and IEEE-485-1997 (Ref. 4). These references recommend that the battery be replaced if its capacity is below 80% of the manufacturer rating. A capacity of 80% shows that the battery rate of deterioration is increasing, even if there is ample capacity to meet the load requirements. Furthermore, the battery is sized to meet the assumed duty cycle loads when the battery design capacity reaches this 80% limit.

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.8.6.7 (continued)

The Surveillance Frequency for this test is normally 60 months. If the battery shows degradation, or if the battery has reached 85% of its expected life and capacity is <100% of the manufacturer's rating, the Surveillance Frequency is reduced to 12 months. However, if the battery shows no degradation but has reached 85% of its expected life, the Surveillance Frequency is only reduced to 24 months for batteries that have capacity ≥ 100% of the manufacturer's rating. Degradation is indicated, according to IEEE-450-2002 (Ref. 3), when the battery capacity drops by more than 10% relative to its capacity on the previous performance test or when it is ≥ 10% below the manufacturer's rating. These frequencies are consistent with the recommendations in IEEE-450-2002 (Ref. 3).

Spare cell(s) are normally maintained qualified by installing them in a seismic battery rack where the OPERABLE cells reside, kept on float charge and surveilled as if they were OPERABLE. The spare cells are included during battery discharge testing to demonstrate their adequacy under the discharge conditions that would be present if they were OPERABLE.

If for any reason a battery has to undergo a service and performance test (e.g., one following the other during scheduled maintenance testing), the service test shall be completed first. Recharging of the battery is required before the performance test is conducted. The "as found" condition prior to the performance test is state of the battery immediately prior to the performance test.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.
3. IEEE-450-2002.
4. IEEE-485-1997.
5. SCE Calculation E4C-017.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems — Operating

BASES

BACKGROUND

The onsite Class 1E AC, DC, and AC vital bus electrical power distribution systems are divided as follows: Train A and Train B for AC Subsystems A, B, C and D for DC, Channels A, B, C and D for AC vital bus electrical power distribution systems.

The AC primary electrical power distribution system is divided into two trains consisting of two 4.16 kV Engineered Safety Feature (ESF) buses, each having at least one separate and independent offsite source of power as well as a dedicated onsite diesel generator (DG) source. Each 4.16 kV ESF bus is normally connected to a preferred offsite source. After a loss of the preferred offsite power source to a 4.16 kV ESF bus, a transfer to the alternate offsite source is accomplished by utilizing a time delayed bus undervoltage relay. If all offsite sources are unavailable, the onsite emergency DG supplies power to the 4.16 kV ESF bus. Control power for the 4.16 kV breakers is supplied from the Class 1E batteries. Additional description of this system is in the Bases for LCO 3.8.1, "AC Sources–Operating," and the Bases for LCO 3.8.4, "DC Sources–Operating."

The 120 VAC vital buses are arranged into four channels and each channel is normally powered from its own channel inverter. The alternate power supply for the vital buses are Class 1E constant voltage source transformers powered from one of the trains in the same load group (one transformer per load group) which is governed by LCO 3.8.7, "Inverters – Operating." Each constant voltage source transformer is powered from a Class 1E AC bus.

There are four independent 125 VDC electrical power distribution subsystems (two for each Train). Background detail for the DC System is found in the Bases for LCO 3.8.4, "DC Sources – Operating" and the Bases for LCO 3.8.6, "Battery Parameters."

The AC systems, DC subsystems, and the AC vital buses are further defined in Table B 3.8.9-1.

BASES (continued)

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident (DBA) and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume ESF systems are OPERABLE. The AC, DC, and AC vital bus electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC and DC electrical power distribution systems and AC vital buses are consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This includes maintaining power distribution systems OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC electrical power; and

b. A worst case single failure.

The distribution systems satisfy Criterion 3 of the NRC Policy Statement.

LCO

The required power distribution subsystems listed in Table B 3.8.9-1 ensure the availability of AC, DC, and AC vital bus electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence (AOO) or a postulated DBA. The AC, DC, and AC vital bus electrical power distribution subsystems are required to be OPERABLE.

Maintaining the Train A and Train B AC; Trains A, B, C, and D DC, and Trains A, B, C, and D AC vital bus electrical power distribution subsystems OPERABLE ensures that the redundancy incorporated into the design of ESF is not defeated. Therefore, a single failure within any system or within the electrical power distribution subsystems will not prevent safe shutdown of the reactor.

(continued)

BASES

ACTIONS (continued)

C.1

With one or more DC electrical power distribution subsystems in one train inoperable, the remaining DC electrical power distribution subsystems are capable of supporting the minimum safety functions necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming no single failure. The overall reliability is reduced, however, because a single failure in the remaining DC electrical power distribution subsystem could result in the minimum required DC bus must be restored to OPERABLE status within 2 hours.

Condition C represents one or more trains without adequate DC power; potentially both with the battery significantly degraded and the associated charger nonfunctioning. In this situation, the unit is significantly more vulnerable to a complete loss of all DC power. It is, therefore, imperative that the operator's attention focus on stabilizing the unit, minimizing the potential for loss of power to the remaining trains and restoring power to the affected train.

This 2 hour limit is more conservative than Completion Times allowed for the vast majority of components which would be without power.

The 2 hour Completion Time for DC buses is consistent with Regulatory Guide 1.93 (Ref. 3).

The second Completion Time for Required Action C.1 establishes a limit on the maximum time allowed for any combination of required distribution subsystems to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition C is entered while, for instance, and AC bus is inoperable and subsequently restored OPERABLE, the LCO may already have been not met for up to 8 hours. This could lead to a total of 10 hours, since initial failure of the LCO, to restore the DC distribution system. At this time, an AC train could again become inoperable, and DC distribution restored OPERABLE. This could continue indefinitely.

(continued)

BASES (continued)

BACKGROUND (continued)

Table B 3.8.9-1 (Page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	TRAIN A		TRAIN B	
AC	4160 V	ESF Bus A04		ESF Bus A06	
	480 V	Load Center B04		Load Center B06	
DC	125 V	SUBSYSTEM A	SUBSYSTEM C	SUBSYSTEM B	SUBSYSTEM D
		Bus D1 Panel D1P1	Bus D3 Panel D3P1	Bus D2 Panel D2P1	Bus D4 Panel D4P1
AC vital bus	120 V	CHANNEL A	CHANNEL C	CHANNEL B	CHANNEL D
		Bus Y01	Bus Y03	Bus Y02	Bus Y04

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.10 Distribution Systems — Shutdown

BASES

BACKGROUND

A description of the AC, DC, and AC vital bus electrical power distribution systems is provided in the Bases for LCO 3.8.9, "Distribution Systems—Operating" and the Bases for LCO 3.8.5, "DC Sources – Shutdown."

APPLICABLE SAFETY ANALYSES

The initial conditions of Design Basis Accident and transient analyses in the UFSAR, Chapter 6 (Ref. 1) and Chapter 15 (Ref. 2), assume Engineered Safety Feature (ESF) systems are OPERABLE. The AC, DC, and AC vital bus electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded.

The OPERABILITY of the AC and DC electrical power distribution systems and AC vital buses is consistent with the initial assumptions of the accident analyses and the requirements for the supported systems' OPERABILITY.

The OPERABILITY of the minimum AC and DC electrical power distribution systems, and AC vital buses during MODES 5 and 6 ensures that:

a. The unit can be maintained in the shutdown or refueling condition for extended periods;

b. Sufficient instrumentation and control capability is available for monitoring and maintaining the unit status; and

c. Adequate power is provided to mitigate events postulated during shutdown, such as a fuel handling accident.

The AC and DC electrical power distribution systems satisfy Criterion 3 of the NRC Policy Statement.

BASES (continued)

LCO

Various combinations of subsystems, equipment, and components are required OPERABLE by other LCOs, depending on the specific unit condition. Implicit in those requirements is the required OPERABILITY of necessary support required features. This LCO explicitly requires energization of the portions of the electrical distribution system necessary to support OPERABILITY of required systems, equipment and components—all specifically addressed in each LCO and implicitly required via the definition of OPERABILITY.

Maintaining these portions of the distribution system energized ensures the availability of sufficient power to operate the unit in a safe manner to mitigate the consequences of postulated events during shutdown (e.g., fuel handling accidents).

APPLICABILITY

The AC and DC electrical power distribution systems required to be OPERABLE in MODES 5 and 6, and during movement of irradiated fuel assemblies, provide assurance that:

a. Systems to provide adequate coolant inventory makeup are available for the irradiated fuel in the core;

b. Systems needed to mitigate a fuel handling accident are available;

c. Systems necessary to mitigate the effects of events that can lead to core damage during shutdown are available; and

d. Instrumentation and control capability is available for monitoring and maintaining the unit in a cold shutdown condition and refueling condition.

The AC and DC electrical power distribution systems, and AC vital buses requirements for MODES 1, 2, 3, and 4 are covered in LCO 3.8.9.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5

Although redundant required features may require redundant trains of electrical power distribution systems to be OPERABLE, one OPERABLE distribution system may be capable of supporting sufficient required features to allow continuation of CORE ALTERATIONS and fuel movement. By allowing the option to declare required features associated with an inoperable distribution system inoperable, appropriate restrictions are implemented in accordance with the affected distribution system LCO's Required Actions. In many instances, this option may involve undesired administrative efforts. Therefore, the allowance for sufficiently conservative actions is made (i.e., to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions that could result in loss of required SDM (Mode 5) or boron concentration (Mode 6)). Suspending positive reactivity additions that could result in failure to meet the minimum SDM or boron concentration limit is required to assure continued safe operation. Introduction of coolant inventory must be from sources that have a boron concentration greater than what would be required in the RCS for minimum SDM or refueling boron concentration. This may result in an overall reduction in RCS boron concentration, but provides acceptable margin to maintaining subcritical operation. Introduction of temperature changes including temperature increases when operating with a positive MTC must also be evaluated to ensure they do not result in a loss of required SDM.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC and DC electrical power distribution systems and to continue this action until restoration is accomplished in order to provide the necessary power to the unit safety systems.

Notwithstanding performance of the above conservative Required Actions, a required shutdown cooling (SDC) system may be inoperable. In this case, these Required Actions of Condition A do not adequately address the concerns relating to coolant circulation and heat removal. Pursuant to LCO 3.0.6, the SDC ACTIONS would not be entered.

BASES (continued)

ACTIONS

A.1, A.2.1, A.2.2, A.2.3, A.2.4, and A.2.5 (continued)

Therefore, the Required Actions of Condition A direct declaring SDC inoperable, which results in taking the appropriate SDC actions.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required distribution systems should be completed as quickly as possible in order to minimize the time the unit safety systems may be without power.

SURVEILLANCE REQUIREMENTS

SR 3.8.10.1

This Surveillance verifies that the AC, DC, and AC vital bus electrical power distribution system is functioning properly, with all the required buses energized. The verification of proper voltage availability on the buses ensures that the required power is readily available for motive as well as control functions for critical system loads connected to these buses. The 7-day frequency takes into account the redundant capability of the electrical power distribution systems and other indications available in the control room that alert the operator to system malfunctions.

REFERENCES

1. UFSAR, Chapter 6.
2. UFSAR, Chapter 15.

ATTACHMENT G.2

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Proposed Licensee Controlled Specifications pages (for information only), Unit 2

3.8 ELECTRICAL POWER SYSTEMS

LCS 3.8.104 DC Sources—Operating

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

VALIDITY STATEMENT: Rev. 0 effective 00/00/07, to be implemented within 120 days

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

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SR 3.8.104.1 not met	A.1 Enter LCO 3.8.4 Condition A or B.	Immediately
B. SR 3.8.104.2 not met	B.1 Initiate action to perform an engineering evaluation and operability assessment of the associated DC system.	8 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.104.1	Verify battery terminal voltage is ≥ 129.0 V (minimum established float voltage).	SR 3.8.4.1 (7 days)
SR 3.8.104.2	---NOTE--- Credit may be taken for the performance of SR 3.8.105.2. --- Verify each required battery charger output is < rated amps with float voltage ≥ 131.0 V.	31 days

3.8 ELECTRICAL POWER SYSTEMS

LCS 3.8.105 DC Sources—Shutdown

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."

VALIDITY STATEMENT: Rev. 0 effective 00/00/07, to be implemented within 120 days

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

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SR 3.8.105.1 not met	A.1 Enter LCO 3.8.5 Condition A or B.	Immediately
B. SR 3.8.105.2 not met	B.1 Initiate action to perform an engineering evaluation and operability assessment of the associated DC system.	8 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.105.1	Verify required battery terminal voltage is ≥ 129.0 V (minimum established float voltage).	SR 3.8.4.1 (7 days)
SR 3.8.105.2	----------NOTE---------- Credit may be taken for the performance of SR 3.8.104.2. --- Verify each required battery charger output is < rated amps with float voltage ≥ 131.0 V.	31 days

3.8 ELECTRICAL POWER SYSTEMS

LCS 3.8.106 Battery Parameters

Battery parameters for the Train A and Train B batteries shall be within limits.

VALIDITY STATEMENT: Rev. 0 effective 00/00/07, to be implemented within 120 days

APPLICABILITY: When the batteries are required to be OPERABLE.

ACTIONS

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SR 3.8.106.1 or SR 3.8.106.2 not met	A.1 Initiate action to perform an engineering evaluation and operability assessment of the battery bank.	8 hours
B. SR 3.8.106.3 not met	B.1 Remove cell(s) with electrolyte level below the top of the plates. OR B.2 Equalize and test the affected cell(s) per the manufacturer's recommendation.	24 hours 48 hours
C. SR 3.8.106.4 or SR 3.8.106.6 not met.	C.1 Perform SR 3.8.6.6. AND C.2 Initiate action for engineering to trend cell performance and restore the affected cell(s) to $\geq$ 2.13 V.	8 hours 12 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. SR 3.8.106.5 or SR 3.8.106.7 not met	D.1 Perform SR 3.8.6.5 on remaining OPERABLE batteries. AND D.2 Restore battery cell temperature to greater than or equal to minimum established design limits.	2 hours 12 hours
E. Required Action and associated Completion Time of Condition D not met.	E.1 Declare associated battery inoperable.	Immediately
F. SR 3.8.106.8 not met.	F.1 Initiate action for engineering to trend the performance of the affected cell(s).	12 hours
G. SR 3.8.106.9 or SR 3.8.106.10 not met	G.1 Initiate action to perform an engineering evaluation and operability assessment of the battery bank.	8 hours

SURVEILLANCE REQUIREMENTS

	SURVEILLANCE	FREQUENCY
SR 3.8.106.1	Verify cells, cell plates, and battery racks show no visual indication of physical damage or abnormal deterioration or cracks in cells or evidence of electrolyte leakage.	31 days
SR 3.8.106.2	Verify no visible corrosion at terminals and connectors. OR Perform SR 3.8.106.10.	31 days
SR 3.8.106.3	Verify electrolyte level is above the top of the plates.	SR 3.8.6.4 (31 days)
SR 3.8.106.4	Verify battery pilot cell voltage is ≥ 2.13 V.	SR 3.8.6.3 (31 days)
SR 3.8.106.5	----------NOTE---------- Maintain electrolyte temperature ≥ 50°F for batteries rated 1800 amp-hours that are not cross-connected or ≥ 60°F for batteries rated 1260 amp-hours or batteries that are cross-connected. ---------- Verify the electrolyte temperature for each battery pilot cell (cell averaging not allowed) is above the limit specified in the NOTE above.	SR 3.8.6.5 (31 days)
SR 3.8.106.6	Verify battery connected cell voltage is ≥ 2.13 V.	SR 3.8.6.6 (92 days)

SURVEILLANCE REQUIREMENTS (continued)

	SURVEILLANCE	FREQUENCY
SR 3.8.106.7	----------NOTE---------- Maintain electrolyte temperature ≥ 50°F for batteries rated 1800 amp-hours that are not cross-connected or ≥ 60°F for batteries rated 1260 amp-hours or batteries that are cross-connected. ---------- Verify the average electrolyte temperature for the specified connected battery cells is above the limit specified in the NOTE above. 10% of connected cells AND All connected cells	 92 days AND 12 months
SR 3.8.106.8	----------NOTE---------- Specific gravity needs to be corrected for electrolyte temperature and level. Level correction is not required, when battery is on float charge (≤ 1.50 amps for batteries rated at 1800 amp-hours and ≤ 0.75 amp for batteries rated at 1260 amp-hours). ---------- Verify the specific gravity for each connected battery cell is ≥ 1.200.	 12 months AND Prior to a battery service test, performance discharge test or modified performance discharge test.
SR 3.8.106.9	Perform, to the extent possible, a detailed visual inspection of the battery installation in accordance with IEEE 450-2002, Annex E.	12 months

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.106.10	----------NOTE---------- Total connection resistance for each battery should not exceed the maximum limit specified in Calculation E4C-017. ---------- Verify connection resistance is $\leq 150 \times 10^{-6}$ ohm for each inter-cell, inter-rack, inter-tier, and terminal connection.	12 months

ATTACHMENT H

Proposed Change Notice (PCN) 548, Rev. 3

Batteries Upgrade and DC Cross-tie Capability

San Onofre Nuclear Generating Station, Units 2 and 3

Summary of Regulatory Commitments

Summary of Regulatory Commitments

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		One-Time Action (Yes/No)	Programmatic (Yes/No)
1. Include minimum established float voltage of ≥129.0 V in proposed Technical Specification (TS) Bases and Licensee Controlled Specifications (LCS).	Implemented by TS Amendment implementation date.	Yes	Yes
2. Relocate the requirements of existing Surveillance Requirements (SRs) 3.8.4.2 (connection resistance, visible corrosion), 3.8.4.3 (physical damage or deterioration), 3.8.4.4 (terminal connections), and 3.8.4.5 (connection resistance) from the TSs to the LCS. Change frequency of existing SR 3.8.4.2 from 92 days to 31 days in LCS.	Implemented by TS Amendment implementation date.	Yes	Yes
3. Relocate specific gravity monitoring to the proposed Battery Monitoring and Maintenance Program. This specific gravity monitoring will be performed prior to each battery discharge test.	Implemented by TS Amendment implementation date.	Yes	Yes
4. Relocate battery parameters of cell voltage, electrolyte level, electrolyte temperature, and float voltage from TS 3.8.6 to the proposed Battery Monitoring and Maintenance Program.	Implemented by TS Amendment implementation date.	Yes	Yes

5. Maintain a capacity margin (presently 2%) to account for the uncertainty in the battery capacity assigned by the manufacturer for allowed float current limit of 1.50 amps for 1800 amp-hour batteries and 0.75 amp for 1260 amp-hour batteries.	Calculation approved 9/5/2007 and issued by Corporate Document Management.	Yes	Yes
6. Appropriate design features will be added to measure float charging current when a swing battery charger is aligned to a Class 1E subsystem battery.	Implemented per Engineering Change Package (ECP) by TS Amendment implementation date.	Yes	Yes
7. Include appropriate battery maintenance practices from industry standard IEEE 450-2002 in new LCS.	Implemented by TS Amendment implementation date.	Yes	Yes
8. Relocate rated amps and minimum established float voltage values for the battery charger from TS 3.8.4 to the new LCS Bases.	Implemented by TS Amendment implementation date.	Yes	Yes
9. Revise Operations procedure to provide ability to power a spare battery charger from a diesel-backed source. This includes having all preparations in place prior to the 72-hour CT.	Implemented by TS Amendment implementation date.	Yes	Yes

ATTACHMENT I

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

PRA Evaluation

OBJECTIVE

The objective of this risk-informed analysis is to support an extension of the Completion Time (CT) of Technical Specification (TS) 3.8.4 for San Onofre Nuclear Generating Station (SONGS) 2/3 1E DC Power System.

BACKGROUND

The SONGS 125V DC Class 1E (1E) batteries have a design life of 20 years. IEEE Standard and NRC regulations require batteries to be tested annually when a battery reaches 85% of service life or falls below 90% of its rated capacity. These batteries will approach their 85% service life within the next two fuel cycles and some batteries are approaching their 90% capacity. In order to avoid the need for annual tests that cannot be completed online within the current CT, SONGS is replacing these batteries.

In addition to replacing 1E DC batteries, the 1E DC power system is to be upgraded to include the capability to 1) cross-tie subsystems A and C (as well as sub-systems B and D) when a battery is removed from service, and 2) align a permanently installed swing charger (one for each train) to either of two DC buses on a single train. The first added feature permits an operator to align two DC buses from the same train together and remove a battery from service for testing or maintenance. This configuration would allow all four DC buses to remain energized with sufficient battery support. The second added feature permits online battery charger testing or maintenance by first aligning the swing battery charger to the supported bus.

The proposed technical specification change would permit a battery to be removed for up to 30 days provided that the supported DC bus is realigned within 2 hours via the new cross-tie capability to its companion same train bus that is supported by a battery. For example, prior to removing battery B007 from bus D1, D1 is to be cross-tied to bus D3 that is supported by battery B009.

This analysis evaluates the increase in risk between the normal alignment and the maintenance alignment with a battery removed from service and the upgraded realignments implemented.

This allowed outage time extension request is unique because the out-of-service component is to be replaced by a designed and installed 'compensatory' measure. The compensatory measure is an alternate power source that can meet the functional requirements of the unavailable component. Without the alternate power source, the TS extension is not allowed and the TS reverts to a format that is effectively the same as the current allowed outage time of 2 hours.

METHODOLOGY

This analysis is performed consistent with the requirements of Regulatory Guides (RG) 1.174 and 1.177 [1,2]. The SONGS 2/3 Living Probabilistic Risk Assessment (PRA) is modified to reflect the proposed design change to the 1E DC system. The modified model is used for all calculations.

Regulatory Guide 1.177:

Regulatory Guide 1.177 requires the licensee to demonstrate that the proposed TS CT change has only a small quantitative impact on plant risk. An incremental conditional core damage probability (ICCDP) of less than 5.0E-7 is considered small for a single TS CT change. An incremental conditional large early release probability (ICLERP) of less than 5.0E-8 is also considered small. As defined in RG 1.177,

ICCDP* = [(conditional CDF[1] with the subject equipment out of service) – (baseline CDF with subject equipment in service)] X (duration of the single CT under consideration)

ICLERP* = [(conditional LERF[2] with the subject equipment out of service) – (baseline LERF with subject equipment in service)] X (duration of the single CT under consideration)

*nominal maintenance unavailabilities are assumed for all other equipment

To demonstrate that the change in risk is small for TS 3.8.4, ICCDP and ICLERP are calculated for a battery out-of-service as follows:

$ICCDP_{battery}$ = [(conditional CDF with a battery out of service) – (baseline CDF with battery available)] X (1 year/365 days) X (30 days) [1]

$ICLERP_{battery}$ = [(conditional LERF with a battery out of service) – (baseline LERF with battery available)] X (1 year/365 days) X (30 days) [2]

These calculations are performed for preventive and corrective maintenance and compared to the RG 1.177 guidelines. Since the allowed outage time extensions are to be applicable to all four electrical sub-systems, calculations should be performed for all four sub-systems. However, to simplify the analysis, the most bounding sub-system is determined and all subsequent calculations are based on the bounding case.

Regulatory Guide 1.174:

The anticipated changes in overall annual core damage frequency (CDF) and large early release frequency (LERF) are calculated and compared to the risk acceptance guidelines in Figures 3 and 4 of RG 1.174. This is calculated using an expected annual frequency and duration of corrective and preventive maintenance multiplied by the CDF/LERF with the subject component out-of-service.

PRA Model:

The SONGS 2/3 Living PRA (as of November 3, 2003) is modified to reflect the proposed design change to the 1E DC system. All calculations are performed with this modified model.

[1] Core Damage Frequency (CDF)
[2] Large Early Release Frequency (LERF)

ANALYSIS

The proposed design change only impacts the electrical power system fault tree of the SONGS 2/3 Living PRA. The expected usage of the extended allowed outage time is provided by the electrical engineering group within the SONGS Maintenance Engineering Division and listed in Table 1.

The relevant calculations are performed with the following notes and assumptions.

Notes and Assumptions:

1. As part of the proposed design change, each battery is to be replaced with one of a larger capacity. By design, each new 1800 amp-hour (AH) rated 1E DC battery, while cross-connected, will supply sufficient power to support two 1E DC buses. For example, when bus D1 is cross-connected to D3 with Battery B007 removed from service, Battery B009 can meet the concurrent design load requirements for both DC buses D1 and D3.

2. When performing preventive maintenance of a battery, the cross-connect between buses is completed prior to removing the battery from service (i.e., 'make before break'). The probability of operator failure to properly align the cross-tie is zero. If the action is unsuccessful, the TS action to align the cross-tie within two hours will not have been met and therefore the extension to 30 days is not permitted. The order of restoration of the battery to the bus is done in reverse (i.e., the battery breaker is closed to the bus prior to opening the cross-tie breakers).

3. Emergent unavailability (i.e., corrective maintenance) of a battery requires operators to perform local actions to close breakers to cross-connect buses. If the alignment is not performed within 2 hours or performed incorrectly, then the TS action to align has not been met and the extension to 30 days is not permitted. Only when the alignment is properly performed is the extension to 30 days granted. Once aligned, the 1E DC system is identical to the preventive maintenance alignment. Therefore, except for common-cause failure probability considerations, the corrective maintenance calculation is similar to the preventive maintenance calculation.

4. The PRA model reflects the proposed design as described in Document 90090, "Scope: Replacement of Class 1E Batteries And Associated Equipment," SONGS Design Engineering, June 2003.

5. Test and preventive maintenance activities on a battery are assumed not to increase the likelihood of any additional events.

6. All common-cause failures (CCF) of 1E 125VDC batteries have been modeled along with CCF of all battery chargers (including dedicated and swing chargers).

7. Credit for cross connecting DC buses is limited to maintenance activities. Without post-initiator specific procedures, credit for successful post-initiator alignment of the DC bus cross-tie is difficult to assess. Although such credit would improve the baseline risk (i.e., reduce risk), this improvement is minimal since the likelihood of post-initiator failure of a battery is extremely small.

8. Components other than the affected battery are set to their nominal maintenance unavailabilities.

Data Analysis:

Modifications to the model include the addition of 125V circuit breakers, swing battery chargers and upgraded batteries. Since these added components are generically similar to components already existing in the model, it is reasonable to use the same failure data of similar components already in the Living PRA. Therefore, data found in the Living PRA for failures of circuit breakers, battery chargers, and batteries are applicable to the new breakers, batteries, and battery chargers. Probabilities for common-cause failures are adjusted to account for the added components.

The initiating event frequencies for fire are increased for rooms containing DC bus D1 and D2 to account for the addition of the swing battery chargers B021 and B022, respectively, which provide an additional fire source in those rooms. Therefore, the fire frequencies in these rooms increase from 2.1E-5/yr to 4.2E-5/yr.

Maintenance Data:

Table 1 shows the expected maintenance activities for batteries. The activities are shown with the expected frequency and duration. The shaded activities are those activities that require the cross-tie and therefore require entry into TS 3.8.4 action statement. This data is used to assess the expected annual risk impact for comparison to risk acceptance guidelines in RG 1.174.

Table 1
List of Battery Maintenance Activities

Batteries – Preventive Maintenance	Requires Cross-tie? (yes/no)	Frequency	Duration
Pilot cell re-designation	No	Annual	1 hr/battery
Spare cell inspections	No	0.5/year	2 hrs/battery
Monthly battery inspection	No	Monthly	1 hr/battery
Quarterly battery inspection	No	Quarterly	8 hr/battery
Physical inspection of battery	No	Annual	8 hrs (or 1 shift)/battery
Equalize charge	No	Annual	7 days/battery
Single cell equalize charge	No	4-8 years	7 days/battery
Acid adjustment on low specific gravity cells	No	4-8 years	1 day/battery
Performance or Modified Performance Test	Yes	5 years	7 days/battery
Service Test	Yes	2.5 years	7 days/battery
Proactive replacement of battery and battery rack	Yes	15-20 years	30 days/battery
Proactive replacement of multiple jars	Yes	10 years	21-20 days/ battery

Human Reliability Analysis (HRA):

The additional operator actions required for this design change are:

Basic Event	Operator Action Description
U-HCD1TOD3-V	Operator Fails To Cross-tie Bus D1 and D3 (Train A)
U-HCD2TOD4-V	Operator Fails To Cross-tie Bus D2 and D4 (Train B)

This design change also required the addition of operator actions to align the swing battery charger. The likelihood of operator failure to align the swing battery charger in the base and maintenance cases was set to 1.0 (i.e., no credit for swing battery chargers).

When performing preventive maintenance on a battery, operators will align the crosstie to the other bus prior to removing the battery to be serviced (also known as "make before break"). Pre-alignment of the crosstie will be proceduralized and successfully implemented prior to removing equipment from service and entering the TS 3.8.4 action statement. Since a revised TS 3.8.4 would allow a CT extension to 30 days only if the bus cross-tie is closed within 2 hours, alignment failure precludes a CT extension. That

is, the extension to operate in the cross-tied alignment for 30 days is permitted only upon successful alignment of the alternate power source. Therefore, during preventive maintenance, the probability of failure for operator actions to align the alternate power source is set to zero.

Common-Cause Failure (CCF) Analysis:

Common-cause failures of swing and dedicated battery chargers are directly modeled in the electrical power system fault tree and quantified using the alpha factor method [5]. Common-cause failure of cross-tie and swing battery charger breakers is not required since the breakers are operated in series where a single breaker failure is sufficient to fail power from the alternate source. Common-cause failure modeling for batteries is included in the base model. The CCF probabilities for batteries are not modified for the preventive maintenance case. CCF probabilities for batteries are modified upward, however, for corrective maintenance of a battery. Modifications are necessary since an emergent battery failure may impact other batteries due to common failure mechanisms.

Uncertainty Analysis:

Parameter uncertainty calculations were not performed since the base case CDF and LERF are essentially the same as those calculated when either buses A and C or B and D are cross-tied. This expectation is similarly stated in Section 2.3.5 of Regulatory Guide 1.177. Modeling uncertainties were assessed via sensitivity analysis of key assumptions. This is described in more detail in the following sensitivity analysis section.

Sensitivity Analysis:

Sensitivity analysis was addressed in several areas: cull level, operator action, bounding sub-system and operation in Modes 2 - 4. These areas are discussed specifically below.

Cull Level: Analyses to assess sensitivity to cull level for both CDF and LERF were performed. The base analysis was performed at a cull level of 5E-10/yr and 5E-11/yr for CDF and LERF, respectively. Sensitivity runs for CDF with cull levels of 1E-10/yr and 1E-11/yr were performed. Similar runs for LERF were performed at 1E-11/yr and 1E-12/yr. The calculated CDF/LERF and increase in baseline CDF/LERF are very small and less than 1E-7/yr and 1E-8/yr, respectively. Reducing the cull levels did not change the single AOT risk from that calculated using a cull level of 5E-10/yr (CDF) and 5E-11/yr (LERF).

Operator Action: Sensitivity analysis on operator action values was not performed for alignments. Operator actions to align the cross-tie to another DC bus to perform preventive maintenance were assumed to be successful since alignment must be successful prior to removing equipment for preventive maintenance (i.e., also known as "make before break"). Successful alignment will be based on an approved step-by-step procedure with independent verification (second checker). Also, the completion time extension to 30 days is dependent on successful alignment to the other bus within 2 hours. If successful alignment is not or cannot be performed in 2 hours, then the extension is not permitted and the allowed outage time remains at 2 hours (as it is in the current TS). Therefore, since operator success is a condition of the extension, no sensitivity analysis is required.

Bounding Sub-system: To determine the most limiting of the four sub-systems to be assessed for this application, sensitivity calculations were performed to assess which sub-system, when aligned to its alternate power source, would result in the highest risk increase. The differences in the core damage and large early release frequencies between each of the sub-systems were calculated to be very small and insignificant. Therefore, sub-system A was arbitrarily chosen for all calculations.

Impact of Peer Review Comments: Sensitivity calculations were performed in response to several facts and observations (F & O's) from the pilot peer review of the SONGS 2/3 Living PRA against the ASME PRA Standard [4]. These sensitivity analyses are discussed in the PRA Quality Section.

Operations in Modes 2 – 4: The requested TS is applicable in Modes 1 – 4. Although it is unlikely that SONGS would operate in Mode 2 – 4 for 30 days, sensitivity calculations were also performed for Modes 2 – 4. The results are provided in the following Table:

		CDF base	CDF maint	delta CDF	ICCDP	LERF base	LERF maint	delta LERF	ICLERP
Mode 2	startup	3.457E-05	3.458E-05	1E-8	8E-10	1.226E-06	1.226E-06	<1E-9	<1E-10
Mode 3	Hot Standby	2.786E-05	2.786E-05	<1E-9	<1E-10	7.702E-07	7.702E-7	<1E-10	<1E-11
Mode 4	AFW cooling (no TDAFWP)	5.014E-05	5.030E-05	1.6E-7	1E-08	3.037E-06	3.037E-06	<1E-9	<1E-10

In Modes 2 – 4, the ICCDP and ICLERP are consistent with RG 1.177 risk acceptance guidelines of 5E-7 and 5E-8 for ICCDP and ICLERP, respectively. Calculation of impact on an annual frequency (for comparison with RG 1.174 acceptance guidelines), based on intended annual usage, was not performed since the AOT extension is not expected to be used in Modes 2 - 4.

PRA QUALITY:

PRA Adequacy Determination Process:

PRA adequacy refers to 1) baseline PRA model quality and 2) adequacy of the PRA calculation for the application.

Determination of baseline PRA technical quality/adequacy is based on assessing the current quality status of the SONGS 2/3 PRA as reviewed in a number of cumulative quality PRA reviews over recent years. Most recently, the SONGS 2/3 PRA was reviewed against the ASME PRA standard [3]. This review identified a number of ASME PRA Standard supporting requirements that are less than capability category II. This peer review provides insight into the current quality status of the SONGS 2/3 PRA.

The technical adequacy of the PRA for the application is based on an assumption that a capability category II for all supporting requirements is inherently sufficient to meet adequacy requirements for risk-informed applications, including risk-informed CT applications. In cases where a peer review has identified supporting requirements as less than capability category II, then technical adequacy for the application is deemed sufficient when the peer review 'facts & observations,' that are the basis of the reduced capability category determination, can be shown to have little or no impact on the calculated results and no impact on the decisions and conclusions of the application. The assessment of impact is addressed by either 1) sensitivity calculations or 2) bounding risk-informed arguments.

Baseline PRA Adequacy:

Several measures have been implemented in the development of the SONGS 2 and 3 Living PRA to ensure quality. Changes in the model that impact assumptions, success criteria, basic event probabilities, and system and plant models formally undergo several levels of review, and depending on the complexity of the change, may also include peer and/or technical expert panel review.

A comprehensive independent peer review of the SONGS 2 and 3 Level 1 and Level 2 internal events living PRA for full power and shutdown operations was conducted between August 1996 and April 1997 by an outside consultant (Scientech, Inc.). During this review, documents, procedures, and supporting calculations and analyses were examined. The review was based primarily on the guidance provided in the PRA procedure guides such as NUREG/CR-2300, "PRA Procedures Guide: A Guide to the Performance of PRAs for Nuclear Power Plants," and NUREG/CR-4550, Revision 1, "Analysis of Core Damage Frequency," as well as PRA applications documents such as EPRI TR-105396, "PSA Applications Guide," and NUREG-1489, "Review of NRC Staff Uses of PRA." The results of all independent review activities performed by internal and external reviewers were documented in the SONGS PRA Change Package process and tracked in the PRA Punch List Database. In June 2003, a pilot application of the ASME PRA Standard peer review process for the SONGS 2/3 Living PRA was performed [4]. The results of this pilot application are documented in WCAP-16165 Rev. 0 [3].

Adequacy Of The PRA Calculation For The Application:

The ASME peer review team provided a list of comments (known as 'facts and observations' or F & O's). These F & O's were identified based on a review of the SONGS 2/3 Living PRA versus the high level and supporting requirements of the ASME PRA Standard. Each F & O was graded based on the type of finding (i.e., technical adequacy or correctness, editorial, suggestion, or complementary). Seventy-five (75) comments are of type A/B. By definition, A/B F & O's are:

"Important and necessary to address to assure the technical adequacy of the PRA, the capability of the PRA or the robustness of the PRA update process."

All type A/B F & O's (75) were reviewed for possible impact on the results and conclusions of this report. These F & O's cover supporting requirements with all capability categories. Almost all SRs with capability category of less than II have an associated F & O. Ten F & O's were determined to potentially have an impact on the results and are included at the end of this attachment. Sensitivity calculations were performed on each of these ten F & O's. The results of these calculations show that none of the F & O's impact the results or conclusions.

There are three (3) supporting requirements with capability category I that did not have an associated F & O from the peer review. These three supporting requirements were assessed to determine the impact, if any, on the application.

Supporting Requirement AS-A9:

Capability Category I	Capability Category II
USE generic thermal hydraulic analyses (e.g., as performed by a plant vendor for a class of similar plants) to determine the accident progression parameters (e.g., timing, temperature, pressure, steam) that could potentially affect the operability of the mitigating systems.	**USE realistic, applicable (i.e., from similar plants) thermal hydraulic analyses** to determine the accident progression parameters (e.g., timing, temperature, pressure, steam) that could potentially affect the operability of the mitigating systems.

SONGS uses plant-specific thermal/hydraulic (T/H) analyses (MAAP and RETRAN) in lieu of generic design basis T/H analyses when such analyses is deemed overly conservative. SCE believes that the SONGS living PRA meets capability category II for the supporting requirements. Additionally, more extensive use of realistic, applicable T/H analyses would equally impact the base and maintenance (cross-tied) calculations for the application. Therefore, capability category I for this supporting requirement is considered sufficient for this application.

Supporting Requirement DA-C10:

Capability Category I	Capability Categories II & III
When using surveillance test data, REVIEW the test procedure to determine whether a test should be credited for each possible failure mode. COUNT only completed tests or unplanned operational demands as success for component operation.	When using surveillance test data, REVIEW the test procedure to determine whether a test should be credited for each possible failure mode. COUNT only completed tests or unplanned operational demands as success for component operation. **If the component failure mode is decomposed into sub-elements (or causes) that are fully tested, then USE tests that exercise specific sub-elements in their evaluation. Thus, one sub-element sometimes has many more successes than another**

The requirements for capability category II, as written, state that if the component failure mode is decomposed, then the PRA should include those tests that exercise the specific elements. Since decomposing failure modes into sub-elements is not required, it could be argued that SONGS does in fact meet capability category II. Interpretation notwithstanding, rigorous decomposition of failure modes would be applicable to both the base and maintenance cases and therefore are equally affected by it. Consequently, capability category I for this supporting requirement is considered acceptable for this application.

Supporting Requirement QU-D3:

Capability Category I	Capability Categories II & III
No requirement to compare results to those from similar plants	COMPARE results to those from similar plants and IDENTIFY causes for differences in significant contributors.

SCE believes that the SONGS 2/3 Living PRA meets capability category II/III. A comparison of PRA cutsets and dominant contributors for all Combustion Engineering (CE) pressurized water reactors (PWRs) was performed and documented in CE NPSD-1029, Supplement 1, "Summary Report for Comparison of PSA Cutsets for Dominant Contributors for CE PWRs, Phase 5, CEOG Task 1046." San Onofre's results compare favorably with similar CE plants.

RESULTS:

Table 2 provides results for removing a 1E DC battery for preventive maintenance. Lines 4 and 5 show CDF/LERF results when a battery is out of service (OOS) and in-service, respectively. The results show that the cross-tie alignment yields minimal change in risk. This result is expected because of the availability and high reliability of an alternate aligned qualified source of power.

TABLE 2

SONGS Conditional CDF & LERF Contributions for Preventive Maintenance (PM)

		TS 3.8.4	
		CDF[d]	LERF[d]
1	Present Allowed Outage Time (AOT)	2 hours	
2	Proposed AOT - aligned to alternate power source	30 days	
3	Baseline (CDF/LERF) - nominal maintenance	*3.235E-5/yr*	*1.425E-6/yr*
4	Conditional CDF/LERF for PM (Component UNAVAILABLE, others nominal maintenance)	*3.237E-5/yr*	*1.425E-6/yr*
5	Conditional CDF/LERF for PM (Component AVAILABLE, others nominal maintenance)	*3.235E-5/yr*	*1.425E-6/yr*
6	Increase in CDF/LERF for PM *(Line 4 – Line 5)*	2E-8/yr	<1E-9/yr
7	**Single AOT Risk (ICCDP/ICLERP) for PM - proposed AOT (RG 1.177): 30 days** *(Line 6)*30/365*	**2E-9**	**<9E-11**
8	Downtime Frequency for PM[a] *(from Table 1)*	3.07 /year[b]	
9	Mean Duration of PM	10.69 days[c]	
10	Single AOT Risk for PM - based on mean duration *(Line 6) * (line 9)/365*	<6E-10	<3E-11
11	**Yearly AOT Risk for PM - based on mean duration (RG 1.174)** *(Line 10) * (Line 8)*	**<2E-9/yr**	**<1E-10/yr**

[a] Frequency represents the combined downtime frequency of all four sub-systems.

[b] Preventive maintenance consists of tests and proactive battery replacements: 2 performance tests in 10 years and 4 service tests in 10 years. This is a total of 6 tests in 10 years times 4 batteries. 6 tests * 4 batteries/10 years = 2.4 tests/year; 4 battery replacements every 15 years or 0.267/year; *proactive multiple jar replacements for four batteries every 10 years or 0.4/year;* total downtime frequency = 2.4 + 0.267 + *0.4 = 3.07/year*

[c] Mean duration = [2.4 (7 days) + 0.267 (30 days) + *0.4 (20 days)]/3.07 = 10.69* days

[d] Cull level = 5E-10/yr CDF, 5E-11/yr LERF
Bolded values are measured against RG 1.174/1.177 acceptance guidelines

The change in LERF (line 6) is smaller than the last significant digit in the calculation (1E-9/yr). To test whether the calculation is performed correctly and the model changes completed accurately, the cross-tie breakers were set to 0.1 failure probability instead of 0.0. In this test case, valid cutsets with an increase in CDF/LERF were expected and observed. This confirms that the same identical case was not performed for

base and maintenance cases. However, since the change in LERF is less than the last significant digit of the Safety Monitor output (1E-9), calculations for lines 7, 10, and 11 are based on ΔLERF < 1E-9/yr.

Regulatory Guide 1.177:

From line 7, the single CT risk for the removal of a battery is much less than the RG 1.177 guideline of 5E-7 for ICCDP and 5E-8 for ICLERP. Line 7 is calculated by taking the increase in risk in line 6 and integrating over the proposed AOT duration of 30 days.

Regulatory Guide 1.174:

From Line 11, the annual increase in risk takes into account the expected frequency and duration of outages of the batteries. This value is less than the RG 1.174 guideline of 1E-6/yr for CDF and 1E-7/yr for LERF.

Corrective Maintenance:

Since initial commercial operation, battery maintenance has been predominantly preventive maintenance. Except in one case, corrective battery maintenance has been limited to activities that did not require entry into a TS action statement and/or did not involve a battery that would be unable to perform its design functions. One case involving a single cell's voltage below TS limits was corrected within the current TS CT of 2 hours. The corrective action was to jumper in an available spare cell. Battery maintenance activities are otherwise proactive in anticipation of degrading cell capacity or to correct potential personnel safety concerns. In all instances of past battery or jar replacement, the batteries would have been able to meet their design requirement at the time of replacement. Batteries, by their nature, do not exhibit rapid, immediate failure but rather degrade over time. With the SONGS trending and surveillance program, degradation to the degree in which a battery is unable to perform (i.e., fail) is predictable and can be maintained through proactive replacement. Although immediate failure requiring corrective maintenance is unlikely, such a calculation with conservative assumptions for frequency and duration is included in this analysis.

For the purposes of assessing the sensitivity of risk to corrective maintenance, a bounding standby failure frequency of a battery must be developed. It's conservatively assumed that one battery failure has occurred since commercial operation of Units 2 and 3 (approximately 42 years of operation). The results of this sensitivity evaluation are included in Table 3.

TABLE 3

SONGS Conditional CDF & LERF Contributions for Corrective Maintenance (CM)

		TS 3.8.4	
		CDF[d]	LERF[d]
1	Present Completion Time (CT)	2 hours	
2	Proposed CT - aligned to alternate power source	30 days	
3	Baseline (CDF/LERF) - nominal maintenance	*3.235E-5/yr*	*1.425-06*
4	Conditional CDF/LERF for CM (Component UNAVAILABLE, others nominal maintenance)	*7.811E-5/yr*	*6.345E-6/yr*
5	Conditional CDF/LERF for CM (Component AVAILABLE, others nominal maintenance)	*3.235E-5/yr*	*1.425E-6/yr*
6	Increase in CDF/LERF for CM *(Line 4 – line 5)*	4.576E-5/yr	4.920E-6/yr
7	Single AOT Risk (ICCDP/ICLERP) for CM *(Line 6)*30/365*	~~1.87~~3.76E-06	4.04E-7
8	Downtime Frequency for CM[a] *(From Table 1)*	0.024/yr[b]	
9	Mean Duration of CM	30 days[c]	
10	Single AOT Risk for CM - based on mean duration *(Line 6) * (line 9)/365*	3.76E-06	4.04E-7
11	Yearly AOT Risk for CM - based on mean duration *(Line 10) * (Line 8)*	9.03E-8/yr	9.71E-9/yr

[a] Frequency represents the combined downtime frequency of all four sub-systems.

[b] Downtime frequency: In one instance, corrective maintenance was required to jumper in a spare cell to replace a cell that fell below the TS required minimum voltage. The action to jumper a cell was completed within the current 2 hour TS CT. Since no other battery failures have occurred at SONGS Units 2 and 3, for purposes of determining downtime frequency, one battery failure requiring full battery replacement is assumed to have occurred since initial power operation. That is, one failure in 42 years or 0.024/year.

[c] Mean duration: Battery replacement and testing requires 30 days

[d] Cull level = 5E-10/yr CDF, 5E-11/yr LERF

Corrective maintenance requiring 30 days to complete represents replacement of a failed battery. Although the ICCDP/ICLERP (line 7) are greater than the RG 1.177 guidelines, the conservative assumption on frequency of usage/duration provides results that are consistent with the RG 1.174 guidelines.

CONCLUSIONS:

The objective of this risk-informed analysis is to support an extension of the completion time (CT) of Technical Specification 3.8.4 for SONGS 2/3 1E DC Power System (battery). Calculations were performed to assess the incremental core damage and large early release probabilities and the expected annual CDF and LERF for the proposed TS change. The results are compared against NRC RG 1.174 and RG 1.177 acceptance guidelines.

Regulatory Guide 1.177:

As shown in line 6 of Table 2, the increases in core damage and large early release frequencies with two same train DC buses cross-connected are less than 1E-7/year and 1E-8/yr, respectively. The changes in risk are small because a fully qualified alternate power source is aligned when a battery is removed for maintenance. The calculated incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP) (line 7 of Table 2) are less than the acceptance guidelines from NRC Regulatory Guide 1.177 of 5E-7 and 5E-8, respectively.

Regulatory Guide 1.174:

In line 11 of Table 2, the expected frequency of TS 3.8.4 usage and duration are combined with the core damage frequency while in the TS to assess the expected annual risk impact of the TS change. The expected annual risk impact is measured against NRC Regulatory Guide 1.174. The expected annual increase in risk is < 1E-7/year for CDF and <1E-8/year for LERF, which are less than the RG 1.174 acceptance guidelines.

Therefore, the flexibility of the enhanced DC system to allow cross-connection to the other sub-system on the same train supports a Technical Specification 3.8.4 allowed outage time extension to 30 days as measured against the risk acceptance guidelines of RG 1.174 [1] and RG 1.177 [2].

SUMMARY:

The PRA results compare favorably against Regulatory Guides 1.174 and 1.177 in large part because a qualified alternate source of power is aligned prior to removing a battery. When aligned to the alternate power source, each DC bus remains energized with a highly reliable source.

REFERENCES:

[1] U.S. NRC Regulatory Guide 1.174, "An Approach For Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes To The Licensing Basis," July 1998.

[2] U.S. NRC Regulatory Guide 1.177, "An Approach For Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," August 1998.

[3] "Pilot Application of ASME PRA Standard Peer Review Process For the San Onofre Nuclear Generating Station Units 2 and 3 PRA," WCAP-16165, CEOG Task 1037, November 2003.

[4] "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," ASME RA-S-2002, ASME, April 2002.

[5] "Common-Cause Failure Parameter Estimations," NUREG/CR-5497, October 1998.

FACTS & OBSERVATIONS (F & O's) FROM THE PILOT APPLICATION OF THE ASME PRA STANDARD PEER REVIEW PROCESS

When assessing the impact of a Fact & Observation, the impact on the delta or difference in the non-aligned case versus the aligned case was assessed. With the 1E Direct Current (DC) sub-system crosstie, there is one battery supporting two buses. With respect to each bus, the bus is still supported by one battery. The failure rate of each sub-system remains the same. However, the failure probability of two sub-systems simultaneously increases because of the common battery. A failure of one of the cross-tied buses or its power source may also fail both sub-systems simultaneously. Peer review comments have an impact on results if the comment results in an increase in risk for the cross-connected (one battery/two bus cross-tied) case without a commensurate increase in risk for the base ('two battery/two bus) case. The following 10 F & O's were determined to potentially have an impact on the results.

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
DA-C3-02	NM	Some significant components (e.g., LPSI pumps, AFW pumps, and Service Water pumps) were assumed some demand rate as 12 years ago and adopted the demand data collected from 1985 to 1991 as current demand data. Especially, the demand data of Tank 121 was adopted from the P140 demand data from control room log from 1997 to 2001, but, P140 did not apply its own data, instead of, P140 applied the demand data from 1985 to 1991. Furthermore, most of the components applied a time period 54 months, but P140 applied 10 months only without reasonable reason documented.	None provided	Turbine driven AFW pump P140 sensitivity was tested by doubling the failure to start probability and testing with Sub-system A battery B007 in-service and out-of-service. The calculation shows a delta risk with the doubled failure rate of P140 to be 1E-7/year CDF. A very minimal increase that does not impact the conclusions or the request for a TS 3.8.4 CT extension. Pumps from other systems are expected to have an even smaller impact on a delta risk calculation.

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
DA-C3-03	NM	SCE assumed that 70% T/D AFW pump failed to run is due to overspeed and it is recoverable. There is no bases can be found to support this assumption. Plant data showed 0 failure to run in 295 hours and 0 failure to start on 38 demands. Furthermore, there is no justification to apply this recoverable credit to failure to start not the failure to run. (Note that Failure to start has higher failure rate than failure to run.)	None provided	The non-recovery probability for P140 (L-TP140NR--S) was doubled. The calculation shows a delta risk of less than 1E-7/year CDF. *Therefore, this F&O has no impact on* the conclusions.
DA-C14-01	NM	Recovery of common cause failure of AFW and Diesel Generators does no use plant-specific data and the applicable Common Cause has not been reviewed. Common cause failure to run events for the EDGs and AFW pumps are recovered using data from an EPRI report. It is not clear that the data from that reference report (NSAC-161) applies to common cause failure events.	Review plant specific data to identify actual or potential common cause failure of the AFW and diesel generators and document that these failures can be recovered. Update recovery rates and common cause failure factors using plant-specific data.	Sensitivity calculations were performed by adjusting the recovery of CCF of AFW pumps and EDGs. When setting these recoveries to 1.0 together, the base case CDF (LERF) increased from 3.24E-5/yr (1.12E-6/yr) to 3.25E-5 (1.13E-6/yr). The cross-tied case went from 3.24E-5/yr (1.12E-6/yr) to 3.26E-5 (1.13E-6/yr). The ICCDP and ICLERP for 30 days are 8E-9 and 8E-10, respectively.
DA-D3-01	III	*Consider modifying the SONGS 2/3 Generic Data for TP and* BC. A mean of 3.0E-2 for turbine driven pump failure to start on demand appears to be significantly conservative before factoring the SONGS failure experience with condensate trips. PLG-500 has a value of 1.3E-7 EF 4. The SONGS experience that is included in the generic data should be removed for determining the generic component, as long as it is included in the Bayesian update. A mean of 6.0E-7 for battery charger failure to operate appears to be non-conservative since a value of 1E-5 EF 5 is available from EGGSSRE-8875.	Review current PRA data studies and update generic data for these components.	The failure rate of the battery chargers was increased by a factor of 16.7 to 1E-5/hr with a 24 hour failure probability = 2.4E-4. The CCF values of battery chargers were also increased by a factor of 16.7. X-tied CDF= 3.227E-5/y Base CDF = 3.226E-5/y ΔCDF = 1E-8/y ICCDP = 8E-10 X-tied LERF= 1.125E-6/y Base LERF= 1.125E-6/y ΔLERF < 1E-9/y ICLERP < 1E-10 Note: cull level for CDF and LERF set to 5E-10.

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
				TP: Reducing the failure rate of the turbine driven pump by several orders of magnitude as suggested by the F & O would reduce the frequencies of all cutsets involving the pump and DC power. This essentially eliminates any contribution of the TD AFW pump to this application. Therefore, this F&O has no impact on the conclusions.
HR-G4-05	II	Human action should only be used as interviewed. This means scenarios where indication is lost (e.g., Loss of 125 VDC pre-trip and post trip) the human actions that credited this indication should not be used.	Use human actions as interviewed	All Initiating events (IE's) except for Loss of DC (LDC1 & LDC2) were set to 0.0. The initiating frequency for LDC1 & LDC2 were set to 1.0. All resulting cutsets were reviewed for any operator actions (HC events, that is: post-initiator operator actions). The only operator actions that are relevant are operator manually closing breakers for AFW pumps P141 and P504. The probability of these actions is 0.1, but they are multiplied by 10 to account for loss of indication (from loss of DC). Therefore, the loss of indication was already accounted for in the calculation for the main report. Also, with the above settings, the following results were calculated: X-tied CDF= 1.79E-5/y Base CDF = 1.79E-5/y ΔCDF < 1E-7/y ICCDP < 8E-9 X-tied LERF= 9.61E-6/y Base LERF= 9.61E-6/y ΔLERF < 1E-8/y ICLERP < 8E-10 Note: cull level for CDF and LERF set to 5E-

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
				10. No impact from this F&O.
QU-A2-01	II	The uncertainty analysis attempting to address the correlation of parameter inputs does appear to yield results that would be expected. The results of the case accounting for the impact of parameter correlation yielded a reduction in the mean CDF as compared to the uncorrelated results. This should not be the case. It appears that either the inputs are incorrect (for example, the translation from the histogram to code inputs) or there is a computational problem.	Make sure that inputs for both cases are appropriate and/or benchmark code to assure appropriate treatment to resolve problem.	No impact. Resolution of this F & O will equally affect the base and maintenance case. Therefore, a delta risk calculation is unaffected by this F&O.

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
QU-A4-01	I/II/III	Recoveries - Post Processing (Appendix A-7 Post Processing Explanation Report) - a number of post processing action (9 of 23) increase the basic event probability in the minimum cutset, some by significant factors (i.e., multiplication factors of 34.2 and 90.9). Applying increasing factors after solution will allow cutsets which should have been above the truncation limit and part of the solution to be missing from the final analysis, since they were dropped by the truncation and were not present to have the multiplier applied. This also impacts the importance of components for applications such as the Maintenance Rule.	Incorporate these corrections into the fault trees. Missing cutsets will impact both the overall solution of CDF/LERF as well as individual importances.	No impact. Truncation limit dropped to 1E-12 for CDF and LERF. X-tied CDF= 3.753E-5/y Base CDF = 3.746E-5/y ΔCDF = 7E-8/y ICCDP = 6E-9 X-tied LERF= 1.723E-6/y Base LERF= 1.719E-6/y ΔLERF = 4E-9/y ICLERP = 3E-10
QU-B3-01	NM	The truncation limits selected for CDF and LERF were not selected sufficiently low enough to capture an adequate number of cutsets, especially for applications involving component importance such as the Maintenance Rule. One industry rule of thumb is to use a truncation that captures 90% of the CDF obtained when 1% change in CDF occurs when dropping the truncation one decade. From the figures provided in IPE-MR-000, there was a 4.2% drop at 5E-12 truncation for CDF and 9.0% drop at 1E-12 truncation for LERF for the lowest solved analyses. Therefore the value assumed to be "close" to the final value was not valid. Even though the selected truncation captures 94% of the lowest analyzed value for CDF and 92% for LERF, it is capturing a much lower ratio of the actual CDF and LERF. The statement in the reports that 95% of the CDF is being captured is not accurate. This is also why the number of minimum cutsets is less than usually observed at other utilities. From experience, the truncation would be expected to be about a decade lower for CDF and between 1-2 decades for LERF. (Note: SR QU-B3 requires that truncation be such that no significant accident sequences are inadvertently eliminated. The NRC quantitative interpretation of significant is that you need to have enough cutsets such have 95% of final CDF/LERF for solution with convergence sufficient to	My experience is that truncation usually falls between 5 to 6 decades below the CDF or LERF value. The industry thumb-rule can be used. Since a fast analysis engine is being used the time needed for the solutions should not be excessive. Enough calculations need to be performed that it is clear that the "curve" has truly flattened and the selected value adequately captures CDF and LERF.	Sensitivity analysis was performed to assess the impact of lower truncation levels (1E-11, 1E-12). Lower truncation levels did not impact the results and conclusions. Therefore, this F & O will equally affect the base and maintenance case. Therefore, a delta risk calculation is unaffected by this F&O.

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
		demonstrate the 95% of CDF/LERF.		

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
QU-F3-01	NM	There was some discussion in Section 12.5 of the Main Report of the assessment of impact of assumptions that could impact PRA results. This focused on results of a series of sensitivity cases that were run. Within this set of cases, the impacts of selected modeling assumptions were quantified and evaluated individually. However, SR QU-F3 (and also SR QU-E2 and QU-E4) of the ASME Standard should be interpreted as requiring a more structured approach to: (a) identifying what the key assumptions and key sources of uncertainty are, and (b) for evaluating and documenting both individual and, to the extent practical, cumulative or overlapping impacts. Some items of particular interest would be assumptions that may introduce significantly conservative bias into the results (e.g., the simplifying assumptions made for loss of control room HVAC), and assumptions that result in the screening of potential contributors from the model (e.g., the process used in the internal flooding analysis), or assumptions and uncertainties associated with success criteria. Some additional guidance is provided in the SRs noted above..	The presence of impacts of such assumptions and sources of uncertainties can affect risk-informed decisions made using the PRA. Consider developing a process for identifying key assumptions and key sources of uncertainty in the PRA, and developing meaningful sets of sensitivity cases to identify their impacts.	Sensitivity analyses were performed on specific assumptions that may affect the base case differently than the maintenance case. These are discussed in the sensitivity analysis section of this report.
QU-F6-01	NM	The main report describes the overall results and provides some sensitivity analyses. No description of the limitations of the PRA model was identified. In the self-assessment, the focus of SCE's response was on limitations in scope (i.e., shutdown, Level 3, etc.). However, the internal events CDF/LERF model has limitations in and of its self.	Add a section to the main report that discusses limitations of the PRA model.	Sensitivity analyses were performed on specific assumptions that may affect the base case differently than the maintenance case. These are discussed in the sensitivity analysis section of this report.

F&O	Capability Category of SR	Observation	Proposed Resolution from Peer Review Team	DC CT Extension Impact
SY-A11-01	I/II/III	The DG mission time is limited to 8 hrs. This is based on the data that no LOOP in excess of 8 hrs have occurred in this region. There is some likelihood that a LOOP in excess of 8 hrs. Assigning a zero likelihood to this possibility seems overly optimistic. In Recoveries, Post Processing Basis Code #1, Changes the Mission Time of the Diesel Generators from 24 hours to 8 hours for internal initiators. The basis for this change is recovery of offsite power having a high probability of recovery within 8 hours. However, recovery of offsite power requires manual operator action and such action is not being added to the recovered cutset to account for failure to restore power.	Model the full spectrum of possible LOOP durations up to 24 hrs. If the 8 hour mission time is retained, add an operator action with this recovery to account for restoration of offsite power.	No impact. The run times were extended to 24 hrs with the following results: X-tied CDF= 3.221E-5/y Base CDF = 3.220E-5/y ΔCDF = 1E-8/y ICCDP = 8E-10 X-tied LERF= 1.121E-6/y Base LERF= 1.121E-6/y ΔLERF < 1E-9/y ICLERP < 1E-10 Note: cull level for CDF and LERF set to 5E-10.

ATTACHMENT J

Proposed Change Notice (PCN) 548, Rev. 3

Battery and DC Sources Upgrades and Cross-Tie

San Onofre Nuclear Generating Station, Units 2 and 3

Responses to Request for Additional Information dated August 10, 2007, annotated with location of responses in Enclosure 3

SOUTHERN CALIFORNIA
EDISON
An EDISON INTERNATIONAL® Company

A. Edward Scherer
Manager of
Nuclear Regulatory Affairs

August 10, 2007

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: **Docket Nos. 50-361 and 50-362**
Response to Request for Additional Information on the Proposed Amendment Regarding Revision to DC Sources - TSTF-360
San Onofre Nuclear Generating Station, Units 2 and 3

References:
1. July 18, 2007, letter from N. Kalyanam (NRC) to Southern California Edison (SCE), Subject: Meeting with Representatives of SCE for SONGS 2 and 3

2. May 3, 2007 letter from N. Kalyanam (NRC) to R. M Rosenblum (SCE), Subject: San Onofre Nuclear Generating Station, Units 2 and 3 Request for Additional Information on the Proposed Amendment Regarding Revision to DC Sources - TSTF-360 (TAC NOS. MD5140 and MD5141)

3. March 30, 2007 letter from B. Katz (SCE) to Document Control Desk (NRC), Subject: Docket Nos. 50-361 and 50-362, Proposed Change Number (PCN) 548, Revision 2, Battery and DC Sources Upgrades and Cross-Tie, San Onofre Nuclear Generating Station, Units 2 and 3

Dear Sir or Madam:

By letter dated May 3, 2007, the Nuclear Regulatory Commission issued a request for additional information (Reference 2) regarding Proposed Change Number (PCN) 548, Revision 2, Battery and DC Sources Upgrades and Cross-Tie (Reference 3). The enclosure provides Southern California Edison's (SCE's) response. SCE's response reflects discussions between SCE and the NRC by phone and at NRC headquarters (Reference 1).

SCE plans to submit a new revision to PCN-548 in September 2007 which incorporates the enclosed responses and identifies all of the regulatory commitments. New regulatory commitments are made in the responses to NRC Questions 2 and 8.

P.O. Box 128
San Clemente, CA 92672
949-368-7501
Fax 949-368-7575

If you have any questions or require additional information, please contact Ms. Linda T. Conklin at (949) 368-9443.

Sincerely,

C E Ellis for

Enclosure

cc: B. S. Mallett, Regional Administrator, NRC Region IV
N. Kalyanam, NRC Project Manager, San Onofre Units 2 and 3
C. C. Osterholtz, NRC Senior Resident Inspector, San Onofre Units 2 and 3

ENCLOSURE

Response to Request for Additional Information (RAI)
on the Proposed Amendment Regarding Revision to DC Sources

NRC Question 1:

Provide an endorsement letter from your Battery Manufacturer(s) to show that float current monitoring can be used to identify a battery's state-of-charge and that the proposed float current value will remain adequate throughout the expected service life of the battery. This is consistent with the industry resolution that was reached following the July 12, 2006, Technical Specifications Task Force (TSTF)-360 public meeting.

SCE Response:

REF 7.13 PAGE 57

A letter from the battery manufacturer, EnerSys, is provided as Attachment 1 to this Enclosure.

NRC Question 2:

Does the proposed 2 ampere float current limit indicate a fully charged battery? If not, provide a regulatory commitment to maintain a design margin to ensure that 2 amperes is indicative of a fully charged battery. This is consistent with the industry resolution that was reached following the July 12, 2006, TSTF-360 public meeting.

SCE Response:

TS 3.8.6 ITEM B.3 PAGE 32

A 2 ampere float current limit does not indicate a fully charged battery. Southern California Edison (SCE) is revising the float current limit to 1.5 amperes which indicates the battery is greater than 98 percent charged based on the manufacturer's letter provided in Attachment 1. SCE is making a regulatory commitment to maintain a capacity margin (presently 2%) to account for the uncertainty in the battery capacity assigned by the manufacturer associated with the allowed float current limit (presently 1.5 amps) for 1800 amp-hour (AH) batteries. This new commitment will be added to the list of regulatory commitments in the revised submittal. The Licensee Controlled Specification (LCS) will require 0.75 amps or less charging current for the 1260 AH batteries until they are upgraded to 1800 AH batteries.

COMMITMENT 5

NRC Question 3:

Identify the values for the minimum established design limits for float voltage and temperature in the Technical Specification (TS) Bases. This is consistent with the industry resolution that was reached following the July 12, 2006, TSTF-360 public meeting.

BASES FOR SR 3.8.4.1
SR 3.8.6.5
ATTACHMENT
G.1

SCE Response:

The values for the minimum established design limits for float voltage and temperature will be added to the proposed TS Bases in the revised submittal.

NRC Question 4:

Provide the basis for the proposed 7-day battery charger Completion Time. Consistent with the industry resolution that was reached following the July 12, 2006, TSTF-360 public meeting, the staff requires that a risk-informed evaluation be performed in accordance with Regulatory Guides (RGs) 1.174 and 1.177 to support extending the battery charger Completion Time beyond 72 hours when using a non-1E battery charger that is not capable of being supplied power from a source independent of the offsite power system (e.g., diesel generator). Furthermore, describe the 'alternate means' that is being credited for the proposed extended Completion Time.

TS 3.8.4
ITEM A.2
PAGES
19-20

SCE Response:

SCE is proposing to add TS 3.8.4 Required Action A.3, "Restore required battery charger(s) to OPERABLE status" to establish a finite time limit of 72 hours or 7 days for the battery charger Completion Time (CT) depending on the 480 VAC power source that is powering the spare battery charger. The basis for the proposed CTs is provided below.

The battery discharge is terminated when the charger is operating with an output voltage greater than what it would be if the battery were supplying the load. With charger output voltage greater than battery voltage, the charger will supply all of the load current as well as supply current back into the battery which, given sufficient time, will restore the battery to a fully charged state.

The "required" battery charger(s) (i.e., the existing dedicated battery chargers and the new swing battery chargers associated with the Train A and B 125 VDC system) are fully qualified chargers that are powered from a diesel-backed Class 1E distribution system and are fully capable of supporting system design requirements. These 100 percent capacity battery chargers are the preferred means for supporting the Train A and B 125 VDC subsystems.

If the "required" battery charger is inoperable, a spare battery charger will be used to restore the associated 125 VDC battery terminal voltage within 2 hours. The 100 percent capacity spare battery charger, which is identical to the dedicated Class 1E charger, is normally powered from a non-1E source and requires a 72-hour CT for restoration of the "required" battery charger.

The alternate means, consisting of when the spare battery charger can be powered from a Class 1E diesel-backed source within 4 hours, allows the 72-hour CT to be extended to 7 days.

The proposed TS adds a restriction to the CT. There is currently no TS restriction on how long a spare non-1E-powered battery charger can support a Class 1E 125 VDC bus at the San Onofre Nuclear Generating Station (SONGS). The current TS 3.8.4, DC Sources - Operating, Condition C, states "One required battery charger or associated control equipment or cabling inoperable." The corresponding Required Action C.1 states "Verify battery cell parameters meet Table 3.8.6-1 Category A limits" with a Completion Time of 1 hour AND Once per 8 hours thereafter."

Adding a proposed completion time for an aligned spare battery charger that requires plant shutdown where one does not currently exist is a positive risk improvement. Currently, an alignment where the spare battery charger maintains the battery's cell parameters within acceptable limits is permitted indefinitely. Qualitatively, with the proposed CT, the risk improves because the spare battery charger must be capable of being powered from an independent source (e.g., diesel generator) beyond 72 hours up to 7 days. Plant management awareness also increases since the normal plant battery charger alignment must be restored in the proposed CT to avoid shutting down the unit. These are positive risk improvement contributors. Other than the risk of shutting down the unit, there are no other identified negative risk contributors. As such, this qualitative assessment is considered sufficient, and a quantitative risk evaluation has not been performed.

NRC Question 5:

Per RGs 1.174 and 1.177, provide the deterministic basis for the proposed battery Completion Time extension.

SCE Response:

TS 3.8.4
ITEM A.6
PAGE 22

The Probabilistic Risk Assessment (PRA) evaluation submitted previously concluded that a 30-day battery CT is acceptable. Battery replacement CT is 21 days as described in item 1 below. Upgrade to 1800 AH batteries also requires construction activities as described in item 2 below for a total CT of 30 days. The 21-day CT and the one-time 30-day CT will be provided in the revised submittal.

1. Battery Replacement (bounding time for any maintenance activity) requires:
    a. Remove all cells and refurbish (repaint) the racks.
    b. Install new cells.
    c. Equalize charge.
    d. Perform discharge test.
    e. Equalize charge.
    f. Perform Return-To-Service surveillances.

2. Battery Upgrade requires item 1 above and:
    a. Remove battery racks and shower.
    b. Relocate battery room temperature instruments.
    c. Paint room.
    d. Install new battery racks.

NRC Question 6:

Provide the load profiles for all safety-related batteries that would be affected by the proposed TS changes.

SCE Response:

TABLE 1 PAGE 24

Load profiles for affected safety-related batteries, with battery capacity allocation, are provided in Attachment 2 to this Enclosure. Some values are preliminary and are subject to final review and approval. These will be provided with the revised submittal.

NRC Question 7:

Revise TS 5.5.2.16 wording to be consistent with the wording that was agreed upon at the July 12, 2006, TSTF-360 public meeting.

SCE Response:

NOW TS 5.5.2.17 PAGE 43

The wording for TS 5.5.2.16, Battery Monitoring and Maintenance Program, will be revised to be consistent with the wording that was agreed upon at the July 12, 2006, TSTF-360 public meeting, to read:

> "This Program provides for battery restoration and maintenance, which includes the following:
>
> a. Actions to restore battery cells with float voltage < 2.13 V, and
> b. Actions to verify that the remaining cells are above 2.07 V when a battery cell or cells have been found less than 2.13 V, and
> c. Actions to equalize and test battery cells that had been discovered with electrolyte level below the top of the plates."

NRC Question 8:

Provide a regulatory commitment to relocate specific gravity monitoring to the proposed Battery Monitoring and Maintenance Program. This is consistent with the industry resolution that was reached following the July 12, 2006, TSTF-360 public meeting.

SCE Response:

TS 3.8.6 ITEM B.3 PAGES 31-32

SCE will relocate specific gravity monitoring to the proposed Battery Monitoring and Maintenance Program. This commitment will be added to the list of regulatory commitments in the revised submittal. This specific gravity monitoring will be performed prior to each battery discharge test.

COMMITMENT 3

NRC Question 9:

On page 18 of the license amendment request dated March 30, 2007 (Agency-wide Documents Access and Management System Accession No. ML070950192), the licensee stated the following:

The proposed change provides specific Actions and increased Completion Times for out-of-limits conditions for cell voltage, electrolyte level, and electrolyte temperature. These allowed times recognize the margins available, the minimal impact on the battery capacity and capability to perform its intended function, and the likelihood of effecting restoration in a timely fashion and avoiding an unnecessary plant shutdown.

Describe 'the margins available' portion of this statement.

SCE Response:

The proposed increased Completion Times pertain to out-of-limit conditions for cell voltage, electrolyte level, and electrolyte temperature and recognize that there are available margins in the battery design.

Individual cell voltages are monitored, and actions are taken in accordance with the battery maintenance program to restore battery cells with float voltage of < 2.13 V. The battery terminal voltage is normally maintained at a float voltage of 131.5 V (2.267 Vpc) that keeps the battery cells at the maximum state-of-charge and capacity which provides a qualitative margin.

TS 3.8.6 ITEM C.3 PAGE 40

The electrolyte level is monitored to battery manufacturer's recommendations to maintain the electrolyte level between the high and low electrolyte level mark on the battery jar. Battery cells maintained at the recommended electrolyte level retain the maximum capacity which provides a qualitative margin.

TS 3.8.6 ITEM B.7 PAGE 36

The electrolyte temperature of the pilot cells is an accurate representation of the temperature of the battery bank because: 1) batteries have a very large thermal inertia, 2) SONGS Units 2 and 3 batteries are designed with sufficient margins (i.e., temperature, aging, and design), and 3) procedures are available to monitor and correct the cause of low battery room temperatures when an alarm is received at 66 degrees F (low limit is 60 degrees F).

TS 3.8.6 ITEM B.8 PAGES 36-37

The maximum electrolyte temperature variation between individual cells is in the range of ± 1 degree F due to evenly distributed air flow in the battery rooms. The electrolyte temperature is normally between 73 and 77 degrees F which provides up to 11% battery capacity margin. Due to the very large thermal inertia of the battery, it is highly probable that the room temperature excursion would be corrected prior to the battery electrolyte reaching its minimum design limit of 60 degrees F.

NRC Question 10:

Consistency with TSTF-360 and the Standard TSs is not an adequate basis for granting an amendment to the TSs. Provide a detailed justification for each proposed change that included this rationale as the basis for approval. Examples include the basis provided for proposed changes to limiting condition for operation (LCO) 3.8.4 (Change 2), LCO 3.8.5 (Change 2), and LCO 3.8.6 (Changes 3, 8, 12, 13,14, 16, and 17).

SCE Response:

Section 4.0, EVALUATION, and associated sections of the submittal will be revised in a new submittal to provide a detailed justification for each proposed change. Reference to "consistency with TSTF-360 or IEEE 450" will be minimized and used only when appropriate.

NRC Question 11:

On page 32 of the license amendment request, the licensee stated the following:

"The new 400 [ampere] (A) swing chargers and existing 300A chargers are adequate to support the design bases load requirements for various operating scenarios. In all cross-connect scenarios, the required charger(s) can supply the buses' steady-state loads and recharge the battery from a design minimum state within 24 hours."

However, the San Onofre Nuclear Generating Station Updated Final Safety Analysis states:

"The capacity of each Class 1E battery charger is based on the largest combined demand of all the steady-state loads and the charging current required to restore the battery from the design minimum charge state to a 95% charged state within 12 hours, irrespective of the status of the plant during which these demands occur. This is in compliance with the requirements of Regulatory Guide 1.32 (See Paragraph 8.3.2.2.1.4)."

Describe the discrepancy in the capability of the Class 1E battery chargers.

BATTERY AND CHARGER SIZING PAGE 48

SCE Response:

The Updated Final Safety Analysis Report (UFSAR) reflects the current design (non-cross-tied buses) and licensing basis and safety analysis. This proposed amendment revises the SONGS design basis to allow DC bus cross-tie operation and 24 hours to recharge a battery. Following NRC approval of this proposed amendment, the UFSAR will be revised.

Power is maintained to DC equipment during recharging of the batteries by the connected battery charger(s). Since there is continuous DC power available to the required equipment, the extended duration of the recharge does not impact availability or operability of electrical or mechanical equipment credited in the safety analyses.

NRC Question 12:

The TS Bases are provided for information only and have no regulatory standing; therefore, the staff cannot use them in evaluating the proposed changes. Provide a detailed justification for each proposed change in lieu of referencing the TS Bases for additional supporting information. Examples include item (1) on page 15 and item (6) on page 18 of the license amendment request.

SCE Response:

Section 4.0, EVALUATION, and associated sections of the submittal will be revised in a new submittal to provide a detailed justification for each proposed change in lieu of referencing the TS Bases for additional supporting information.

Attachment 1 to Enclosure

June 4, 2007 letter from Jan G. Reber (EnerSys) to Ashok Wadhwa (SCE),
Subject: Float Current's Relationship to Battery State of Charge

EnerSys
P.O. Box 14145
Reading, PA 19612-4145
800-538-3627 x 1680
Fax 610-208-1971
Email: jan.reber@enersys.com
www.enersys.com

Jan G. Reber
Director of Engineering
RP Flooded Products
Technology & Engineering

June 4, 2007

Mr. Ashok Wadhwa
Design Engineering Organization
San Onofre Nuclear Generating Station
14300 Mesa Road, G50B
San Clemente, CA 92672

Re: Float current's relationship to battery state of charge.

Dear Mr. Wadhwa,
EnerSys states the following with respect to float current monitoring:

1. A stabilized float current is a necessary condition of a fully charged battery. EnerSys believes that specific values of float current, which are relatively stable throughout the battery's useful life, are normally indicative of the battery's state of charge when the battery is near full charge and the pilot cell parameters of voltage, temperature, and level are within bounds.

2. Under these conditions, float current can be substituted for specific gravity verification to represent the approach of end of charge.

3. These float current values are specific to a unique installation, but can be sufficiently approximated for a type of battery construction so as to allow a specified value to indicate that the battery has achieved at least a noted percentage of its full capacity. For EnerSys systems, this limiting value of float current for the 2GN-15 batteries is 0.75 amps and for 2GN-23 batteries it is 1.50 amps when the batteries have reached a state of charge in excess of 98% of the batteries available capacity.

4. Aging does impact the float current, but it is expected to be within the noted ranges for the batteries serviceable life.

If you have any further question, please contact me.

Sincerely,

Jan G. Reber

cc: J. Gagge, S Weik, B. Ross, File 352

Attachment 2 to Enclosure

SONGS Class 1E Battery Load Profiles

SONGS Class 1E Battery Load Profiles, Correction Factors and Margins

1800 AH Batteries (Subsystem A & B batteries presently are 1260 AH):

90-minute LOVS/SIAS Profile

Subsystem	Amperes per Time (min)								Amp-Hours required	Capacity required	Amp-Hours rated	Correction Factors (CF)			Calculated Margin (60F)	Calculated Margin (50F)
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8				Float Current CF	Electrolyte Temp CF	Battery Aging CF		
	0-1	1-29	29-30	30-89	89-90	90-120	120-239	239-240								
A	461.15	165.40	165.40	165.54	241.37				254.43	14.1%	1800	2.0%	11% for 60F 19% for 50F	25.0%	43.45%*	39.40%*
B	468.90	170.07	170.07	170.21	249.08				261.54	14.5%					42.54%*	38.38%*
C	130.20*	107.38	107.38	62.38	76.56				116.69	6.5%					**81.54%***	**80.27%***
D	101.68	93.04	93.04	55.04	55.04				101.70	5.7%					**85.90%***	**84.82%***
A-C Cross-tie	591.35	272.78	272.78	227.92	317.93				371.12	20.6%	1800	2.0%	11% for 60F	25.0%	**10.49%***	**NA**
B-D Cross-tie	570.58	263.11	263.11	225.25	304.12				363.24	20.2%					**13.63%***	**NA**

4-hour SBO Profile

A	329.09	183.73	221.56	145.74	145.74	145.74	145.74	230.11	606.41	33.7%	1800	2.0%	11% for 60F 19% for 50F	25.0%	**22.36%***	**16.75%***
B	336.43	188.10	228.97	149.57	149.57	149.57	149.57	233.94	622.10	34.6%					**20.54%***	**14.89%***
C	130.20	107.38	107.38	62.38	62.38	62.38	62.38	76.56	272.64	15.1%					**69.68%***	**67.52%***
D	101.68	93.04	93.04	55.04	55.04	55.04	55.04	55.04	239.30	13.3%					**76.51%***	**74.75%***
A-C Cross-tie**	459.29	291.11	420.79	208.12	208.12	208.12	151.88	250.43	768.10	42.7%	1800	2.0%	11% for 60F	25.0%	**8.66%***	**NA**
B-D Cross-tie**	438.11	281.14	399.68	204.61	204.61	204.61	155.18	239.55	763.84	42.4%					**10.27%***	**NA**

1260 AH Batteries (Subsystem A & B):

90-minute LOVS/SIAS Profile

Subsystem	Amperes per Time (min)								Amp-Hours required	Capacity required	Amp-Hours rated	Correction Factors (CF)			Calculated Margin (60F)	Calculated Margin (50F)
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8				Float Current CF	Electrolyte Temp CF	Battery Aging CF		
	0-1	1-29	29-30	30-89	89-90	90-120	120-239	239-240								
A	461.15	165.40	165.40	165.54	241.37				254.43	20.2%	1260	2.0%	11% for 60F	25.0%	**9.48%***	**NA**
B	468.90	170.07	170.07	170.21	249.08				261.54	20.8%					**7.96%***	**NA**

4-hour SBO Profile

A	329.09	183.73	221.56	145.74	145.74	145.74	145.74	230.11	606.41	48.1%	1260	2.0%	11% for 60F	25.0%	**2.59%***	**NA**
B	336.43	188.10	228.97	149.57	149.57	149.57	149.57	233.94	622.10	49.4%					**0.46%***	**NA**

For "Load Profile" and "Margin" details refer to Calculation E4C-017.1 Rev 3 and E4C-017 Rev 19, CCN 92.
Increase in loads during period 5 for LOVS/SIAS and periods 3 and 8 for SBO reflect random loads.
Asterisks (**) indicate that CPC calculator and inverter are isolated at 30 and 120 minutes respectively.
Calculated margins with asterisk (*) are preliminary and subject to final review & approval.