

July 20, 2000

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

Gentlemen:

Subject: **Docket Nos. 50-361 and 50-362**  
**Supplement 1 To Proposed Technical Specification Change Number**  
**NPF-10/15-488, Degraded Voltage and Loss Of Voltage Setpoints**  
**San Onofre Nuclear Generating Station (SONGS) Units 2 and 3**

Reference: Letter dated August 11, 1999 from D. E. Nunn (SCE) to Document Control Desk (USNRC), Subject: Docket Nos. 50-361 and 50-362, Proposed Technical Specification Change Number NPF-10/15-488, Degraded Voltage and Loss Of Voltage Setpoints  
San Onofre Nuclear Generating Station (SONGS) Units 2 and 3

Enclosed is Supplement 1 to Amendment Application Number 189 to Facility Operating License NPF-10, and Amendment Application Number 174 to Facility Operating License NPF-15, for the San Onofre Nuclear Generating Station, Units 2 and 3, respectively. Supplement 1 to these amendment applications supersedes entirely the applications forwarded by the Reference letter, which are hereby withdrawn. These Amendment Applications consisted of Proposed Technical Specification Change Number (PCN)-488 Supplement 1.

PCN-488 Supplement 1 is a request to revise the acceptance criteria for Technical Specification (TS) 3.3.7, "Diesel Generator (DG) - Undervoltage Start," Surveillance Requirement (SR) 3.3.7.3, which verifies operability of the Loss Of Voltage and Degraded Voltage actuation circuits. The Proposed Change would replace the analytical limits currently specified as acceptance criteria with allowable values derived in Southern California Edison (SCE) engineering calculation E4C-098 Calculation Change Notice (CCN) 25, submitted with the referenced letter. PCN-488 Supplement 1 would also delete SR 3.3.7.4 on the basis that it is redundant with SR 3.3.7.3.

July 20, 2000

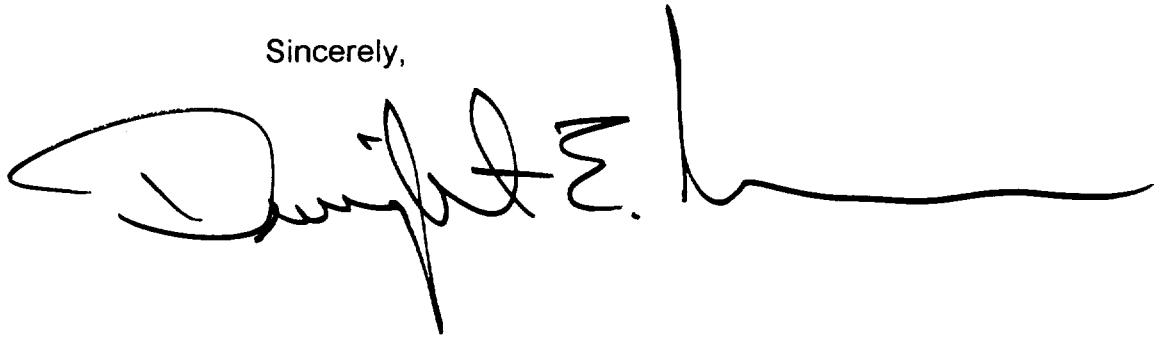
The original PCN-488 additionally requested deletion of certain currently specified restraints on relay operation that have no direct safety significance. Supplement 1 to PCN-488 rescinds this request for certain of these restraints and instead replaces the current restraints with allowable values derived in CCN 28 to calculation E4C-098, provided as Attachment G to the Enclosure.

As documented in the Enclosure, the proposed allowable values for SR 3.3.7.3 are within the bounds of the existing analytical limits, and they do not represent any significant hazards.

SCE requests these amendments be issued effective as of the date of issuance, to be implemented within 30 days.

If you would like additional information regarding this Proposed Technical Specification Change, please let me know.

Sincerely,

A handwritten signature in black ink, appearing to read "Douglas E. L.", with a long horizontal flourish extending to the right.

Enclosure:

cc: E. W. Merschoff, Regional Administrator, NRC Region IV  
J. A. Sloan, NRC Senior Resident Inspector, San Onofre Units 2 and 3  
R. R. Assa, NRC Acting Project Manager, San Onofre Units 2 and 3  
S. Y. Hsu, Department of Health Services, Radiologic Health Branch

ENCLOSURE  
AMENDMENT APPLICATIONS 189 AND 174  
(PCN-488)  
SUPPLEMENT 1

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN, CALIFORNIA	)	
EDISON COMPANY, ET AL. for a class 103	)	Docket No. 50-361
License to Acquire, Possess, and Use	)	
a Utilization Facility as Part of	)	Amendment Application
Unit No. 2 of the San Onofre Nuclear	)	No. 189 Supplement 1
Generating Station	)	

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10CFR50.90, hereby submit Supplement 1 to Amendment Application No. 189. This amendment application consists of Proposed Change No. PCN-488 Supplement 1 to Facility Operating License NPF-10. PCN-488 Supplement 1 is a request to revise the acceptance criteria of Surveillance Requirement 3.3.7.3 and to delete Surveillance Requirement 3.3.7.4.

Subscribed on this 20th day of July, 2000.

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By   
Dwight E. Nunn  
Vice President  
Engineering & Technical Services

State of California

County of San Diego

On July 20, 2000 before me Mariane Sanchez  
personally appeared Dwight E. Nunn, personally known  
to me to be the person whose name is subscribed to the within instrument and acknowledged  
to me that he executed the same in his authorized capacity, and that by his signature on the  
instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

Signature 



UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

Application of SOUTHERN, CALIFORNIA	)	
EDISON COMPANY, ET AL. for a class 103	)	Docket No. 50-362
License to Acquire, Possess, and Use	)	
a Utilization Facility as Part of	)	Amendment Application
Unit No. 3 of the San Onofre Nuclear	)	No. 174 Supplement 1
Generating Station	)	

SOUTHERN CALIFORNIA EDISON COMPANY, ET AL. pursuant to 10CFR50.90, hereby submit Supplement 1 to Amendment Application No. 174. This amendment application consists of Proposed Change No. PCN-488 Supplement 1 to Facility Operating License NPF-15. PCN-488 Supplement 1 is a request to revise the acceptance criteria of Surveillance Requirement 3.3.7.3 and to delete Surveillance Requirement 3.3.7.4.

Subscribed on this 20th day of July, 2000.

Respectfully submitted,

SOUTHERN CALIFORNIA EDISON COMPANY

By: 

Dwight E. Nunn  
Vice President  
Engineering & Technical Services

State of California

County of San Diego

On July 20, 2000 before me, Mariane Sanchez,  
personally appeared Dwight E. Nunn, personally known  
to me to be the person whose name is subscribed to the within instrument and acknowledged  
to me that he executed the same in his authorized capacity, and that by his signature on the  
instrument the person, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

Signature Mariane Sanchez



**DESCRIPTION OF  
SUPPLEMENT 1 TO  
TECHNICAL SPECIFICATION CHANGE PCN-488  
SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 AND 3  
(SONGS 2 & 3)**

Change Number PCN-488 Supplement 1 will revise Surveillance Requirement (SR) 3.3.7.3 of Technical Specification 3.3.7, "DG-Undervoltage Start," by providing allowable values in place of analytical limits for certain degraded voltage parameters, and by deleting or revising unnecessary parameter limits in cases where plant safety is not affected. The change will also delete redundant SR 3.3.7.4.

Supplement 1 to PCN-488 rescinds the previous request to delete certain parameter limits. Changes to the original PCN-488 description for Supplement 1 are identified by vertical change bars in the right margin.

**Existing Technical Specifications:**

Unit 2: See Attachment A

Unit 3: See Attachment B

**Proposed Technical Specifications:**

Unit 2: See Attachment C (redline and strikeout)

Unit 3: See Attachment D (redline and strikeout)

**Proposed Technical Specifications:**

Unit 2: See Attachment E

Unit 3: See Attachment F

**Supporting Calculation:**

Units 2 and 3: See Attachment G

**Description of Change:**

The proposed change to Technical Specification (TS) 3.3.7 consists of revising the acceptance criteria for Surveillance Requirements (SR) 3.3.7.3 and deleting redundant SR 3.3.7.4. Currently, SR 3.3.7.3 contains analytical limits--i.e., limits derived directly from engineering analyses without any margin. Southern California Edison (SCE) is proposing to replace the analytical limits with more restrictive allowable values--i.e., with values



which define a range of acceptable as-found values during Surveillance Testing. SCE defines allowable values as follows.

Allowable Value (minimum) = Design limit + |Positive tolerance| + Engineering margin

Allowable Value (maximum) = Design limit - |Negative tolerance| - Engineering margin

Also, the proposed change will revise SR 3.3.7.3 to delete the minimum allowable value for the Sustained Degraded Grid Voltage Signal (SDVS) function of the 27N relay time delay.

Finally, the proposed change will delete redundant SR 3.3.7.4 in its entirety.

### **Discussion:**

Undervoltage relay protection for the SONGS 2 & 3 Class 1E 4.16 kV buses is described in Updated Final Safety Analysis Report (UFSAR) Section 8.3.1.1.3.13.B. NRC staff reviewed and approved the protection scheme in a Safety Evaluation Report issued March 17, 1995 in support of Facility Operating License Amendment Nos. 118 (Unit 2) and 107 (Unit 3). SCE had requested these Amendments in a submittal dated September 30, 1993, supplemented in correspondence dated November 16, 1993, February 8, 1994, January 18, 1995 and February 2, 1995. SCE has subsequently refined the setpoint calculations that supported Amendment Nos. 118 and 107 and, with PCN-488 Supplement 1, is proposing the substitution of more restrictive allowable values in place of the present analytical limits.

As described in the UFSAR, each of the two 4.16 kV Class 1E buses per Unit is equipped with undervoltage relays to permit automatic transfer to the alternate preferred power source and for diesel generator (DG) starting. The undervoltage relaying scheme is designed to perform the following functions:

#### **1. Loss of Voltage Protection**

Four undervoltage relays (Westinghouse CV-2 induction disc relays with inverse time characteristics) 127F1, F2, F3 and F4 are provided on each 4.16 kV Class 1E bus. The output contacts of the relays are combined in a two-out-of-four logic to generate a Loss of Voltage Signal (LOVS) with a time delay of approximately 1 second for complete loss of voltage.

LOVS performs the following:

- a. LOVS with a Safety Injection Actuation Signal (SIAS) will transfer the 4.16 kV Class 1E bus to the standby power source (i.e., the DG);

- b. LOVS without SIAS will transfer the 4.16 kV Class 1E bus to the alternate preferred power source if available. If the alternate power source is not available it will transfer the bus to the standby power source.

## 2. Degraded Voltage Protection

- a. Four undervoltage relays (ASEA Brown Boveri ABB 27N, definite time delay solid state relay), 127D1, 2, 3, and 4, along with four timing relays, 162D1, 2, 3, and 4, are provided on each 4.16 kV Class 1E bus for the degraded voltage protection scheme.

The voltage and time delay settings are such that the permanently connected Class 1E loads will be maintained within equipment operating voltage ranges. The 127D relays are set to operate at 4228 V, with a response time of 2 seconds. The 162D relays are set at 110 seconds. As such, a sustained degraded voltage signal will be generated within approximately 112 seconds. This signal will be blocked when the 4.16 kV Class 1E bus is powered from the DG. These signals are combined in a two-out-of-four logic and the resulting signal is referred to as the Sustained Degraded Voltage Signal (SDVS).

The SDVS performs the following:

- (1) SDVS with SIAS will transfer the 4.16 kV Class 1E bus to the DG;
- (2) SDVS without SIAS will transfer the 4.16 kV Class 1E bus to the alternate preferred power source, if available. If the alternate preferred power source is not available, SDVS without SIAS will transfer the 4.16 kV Class 1E bus to the DG.

- b. Degraded Grid Voltage with SIAS Signal (DGVSS)

One output contact from each of the 127D1, 2, 3, and 4 undervoltage relays is used in a sustained degraded voltage protection scheme along with a set of timing relays for degraded grid voltage protection concurrent with a SIAS.

The voltage and time delay settings are such that signals will be generated with an intentional definite time delay upon initiation of a SIAS along with the degraded bus voltage as sensed by the 127D1, 2, 3, and 4 relays during the first load sequencing cycle only. This scheme is designed to actuate in the event of a SIAS with a degraded grid condition. These signals are combined in a two-out-of-four logic and the resulting signal is referred to as DGVSS. The 4.16 kV Class 1E buses are transferred directly to the DG rather than to the alternate preferred power source, which is likely to be experiencing a degraded voltage condition as well.

The time delay for this signal is chosen to ride through the voltage transients and to ensure that adequate voltage is available on the 4.16 kV Class 1E bus during post accident Engineered Safety Features (ESF) load sequencing. This time delay is initiated by SIAS, and is independent of the time delay chosen for SDVS. Following the acceleration of the first load group during post accident ESF load sequencing, the degraded voltage scheme will have a brief duration in which to sense the voltage on the 4.16 kV Class 1E bus. If the voltage is below the minimum analyzed value, the bus will separate from the preferred power source and transfer to the DG.

SCE Calculation E4C-098 was provided as Attachment G<sup>1</sup> of SCE's August 11, 1999 submittal. The calculation contains the SCE evaluation methodology, and has determined that for the 27N relays (127D) tested for the Degraded Voltage Function by SR 3.3.7.3.a, the allowable value for the measured relay dropout voltage should be greater than or equal to 4196 V and the pickup voltage less than or equal to 4281 V. (See Section 2.1.1 of Attachment G.)

During surveillance testing, it is important to measure both the dropout voltage, at which the relay actuates upon sensing degraded bus voltage, and the pickup voltage, at which the relay resets to enable sequencing loads onto the bus. This ensures operability of the relay to both protect the ESF loads against degraded voltage and to enable ESF load sequencing. The current SR does not distinguish between dropout and pickup voltages; rather, it specifies a voltage range between 4181 and 4275 V, inclusive.

It is not necessary to impose an upper bound on relay dropout voltage nor a lower bound on relay pickup voltage, as the safety function of the relay for dropout can be assured at any voltage  $\geq 4196$  V, and the safety function of the relay for pickup can be assured at any voltage  $\leq 4281$  V. Therefore, SCE is proposing a minimum allowable value (only) for relay dropout, and a maximum allowable value (only) for relay pickup.

Specifically, the proposal is:

Degraded Voltage Function:

- i. Dropout  $\geq 4196$  V
- ii. Pickup  $\leq 4281$  V

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<sup>1</sup>Calculation E4C-098 was previously submitted in our January 18, 1995 correspondence in support of our September 30, 1993 amendment request. This calculation was updated in Calculation Change Notice (CCN) 25 to support the present amendment request. The calculation was further updated in CCN 28 to support Supplement 1 to the amendment request.

As-found<sup>2</sup> dropout voltages have been between 4210.5 and 4239.9 V. These values are greater than the proposed minimum allowable value of 4196 V. Pickup voltages have been measured between 4233.25 and 4248.3 V. These values are less than the proposed maximum allowable value of 4281 V.

SCE Calculation E4C-098 has also determined (Section 2.1.1) that for the 27N relays tested by SR 3.3.7.3.a.i (127D relays for SDVS and DGVSS), the measured relay time delay should be less than or equal to 2.17 seconds. The current SR specifies between 1.8 and 2.2 seconds, inclusive, which is the analytic limit. The proposed maximum allowable value is within this range. The measured operating time of the 27N relays has been between 1.99 and 2.03 seconds, less than the proposed maximum allowable value of 2.17 seconds.

For the SDVS function, it is not necessary to impose a lower bound on the 27N relay time delay. Any value  $\leq 2.17$  seconds will ensure that the relay is capable of performing its intended safety function. Therefore, SCE is proposing to delete the minimum allowable value for the SDVS function of the 27N relay time delay from SR 3.3.7.3.a. Note, however, that a lower bound for this relay is imposed under the DGVSS.

The specific proposal to revise SR 3.3.7.3.a, Degraded Voltage Function, is:

SDVS (Sustained Degraded Grid Voltage Signal):

Time delay:

- i.  $127D \leq 2.17$  seconds.

For the DGVSS function of the 127D relays, the relay must operate above a specified minimum time delay value in order to assure proper relay operation. Therefore, the minimum allowable value of 1.83 seconds (2.00 - .17 seconds) of Section 2.1.1 of Calculation E4C-098 is proposed for inclusion in SR 3.3.7.3.a. The specific proposal to revise SR 3.3.7.3.a, Degraded Voltage Function, is:

DGVSS (Degraded Grid Voltage with SIAS Signal):

Time delay:

- i.  $127D \geq 1.83$  seconds and  $\leq 2.17$  seconds.

SCE Calculation E4C-098 has further determined (Section 2.1.2 of Calculation E4C-098) that for the CV-2 relays tested by SR 3.3.7.3.b (Loss of Voltage Function), the measured time delay should be  $\geq 0.75$  seconds and  $\leq 1.0$  seconds. The current SR specifies between 0.95 and 1.05 seconds, inclusive. Only the upper time limit performs a safety

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<sup>2</sup>As-found, measured values for this and subsequent parameters are documented in Section 4 of CCN 25 of calculation E4C-098.

function and the time dial of the CV-2 relays is selected such that the time delay of the entire LOVS channel including the associated auxiliary relays is  $\leq 1.0$  seconds. The lower limit has no safety function but it was selected to ensure proper relay operation and avoid unnecessary bus transfers.

Measured operating times for the CV-2 relays for the most recent Unit 2 refueling outage ranged between 0.91 and 1.01 seconds, inclusive (Section 4.3 of Attachment G). The one data point at 1.01 seconds would not meet the proposed allowable value. However, this datum resulted from the need to set the as-left value at or above 0.95 seconds, the minimum value under the existing TS. Under the proposed amendment, the minimum value will be lowered to 0.75 seconds with the result that the as-left value can be less than 0.95 seconds. Consequently, SCE does not expect setpoint drift to cause the proposed allowable value of  $\leq 1.0$  seconds to be exceeded once the as-left values are relaxed.

Specifically, the proposal for SR 3.3.7.3.b is:

Time delay:  $\geq 0.75$  seconds and  $\leq 1.0$  seconds at 0 V

SCE Calculation E4C-098 has also determined (Section 2.1.3) that for the Agastat relays tested by SR 3.3.7.3.a.ii (162D relays for SDVS), the measured relay time delay should be  $\geq 78$  seconds and  $\leq 128$  seconds. The current SR specifies between 88 and 132 seconds, inclusive. The proposed allowable value of 128 seconds is within this range. Measured operating time of the 162D relays has been between 108 and 116.6 seconds, less than the proposed maximum allowable value of 128 seconds and greater than the proposed minimum allowable value of 78 seconds. The lower limit does not perform a safety function, but is selected to be greater than the Design Basis Event complete loading sequence time.

Specifically, the proposal is:

SDVS (Sustained Degraded Grid Voltage Signal)

Time delay:

ii. 162D  $\geq 78$  seconds and  $\leq 128$  seconds

For the 162S relays in the DGVSS circuitry, the measured time delay should be  $4.3 \pm 0.14$  seconds, inclusive ( $4.3$  seconds  $\pm 3.33\%$ ) (Section 2.1.3 of Calculation E4C-098). The current SR specifies between 4.11 and 4.49 seconds, inclusive ( $4.3$  seconds  $\pm 4.4\%$ ). The proposed allowable values are within this range. Measured operating time of the 162S relays has been between 4.29 and 4.31 seconds, which is within the proposed range of allowable values (4.16 to 4.44 seconds, inclusive).

Specifically, the proposal is:

DGVSS (Degraded Grid Voltage with SIAS Signal):

Time delay:

ii.  $162S \geq 4.16$  seconds and  $\leq 4.44$  seconds.

SCE Calculation E4C-098 has further determined (Section 2.1.3) that for the Agastat relays tested by SR 3.3.7.3.a.iii (162T relays for DGVSS), the measured relay time delay should be  $1.25 \pm 0.37$  seconds, inclusive ( $1.25$  seconds  $\pm 29.87\%$ ). The current SR specifies between 0.85 and 1.65 seconds, inclusive ( $1.25$  seconds  $\pm 32\%$ ). The proposed allowable values are within this range. Measured operating time of the 162T relays has been between 1.23 and 1.38 seconds, which is within the proposed range of allowable values (0.88 to 1.62 seconds, inclusive).

Specifically, the proposal is:

DGVSS (Degraded Grid Voltage with SIAS Signal):

Time delay:

iii.  $162T \geq 0.88$  seconds and  $\leq 1.62$  seconds.

Finally, TS SR 3.3.7.4 currently requires verification that the response time of the DG-LOV channel is within 1.05 seconds. This SR is redundant with the Loss of Voltage Function time delay measurement of SR 3.3.7.3. SR 3.3.7.4 is not in NUREG-1432, Standard Technical Specifications, Combustion Engineering Plants. Accordingly, SCE is proposing to delete SR 3.3.7.4 in its entirety.

#### **No Significant Hazards Considerations:**

The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to a facility operating license 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. A discussion of these standards as they relate to this amendment request follows.

- 1) Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

No.

Proposed Change Number (PCN)-488 Supplement 1 revises the Technical Specification (TS) Surveillance Requirement (SR) acceptance criteria of the Loss of Voltage Signal (LOVS), Degraded Grid Voltage with Safety Injection Actuation Signal (DGVSS), and Sustained Degraded Voltage Signal (SDVS) relay circuits. These circuits are not accident initiators.

PCN-488 Supplement 1 revises the TS SR acceptance requirements to make them more limiting than the present requirements. Because the revised acceptance criteria are more limiting than the present requirements, the consequences of accidents analyzed in the Updated Final Safety Analysis Report (UFSAR) are not increased. PCN-488 Supplement 1 also revises the TS SR acceptance requirements to delete or revise upper and lower bounds in cases where the deleted bound provides no safety benefit. Deleting or revising bounds having no safety significance does not involve a significant increase in the probability or consequences of an accident previously evaluated.

PCN-488 Supplement 1 deletes redundant SR 3.3.7.4, which is not in NUREG-1432, Standard Technical Specifications, Combustion Engineering Plants. Deleting a redundant requirement does not involve a significant increase in the probability or consequences of an accident previously evaluated.

Consequently, the proposed amendment does not result in an increase in the probability or consequences of accidents evaluated in the UFSAR.

- 2) Does this amendment request create the possibility of a new or different kind of accident from any accident previously evaluated?

No.

PCN-488 Supplement 1 revises the TS SR acceptance criteria of the LOVS, DGVSS, and SDVS relay circuits, which are not accident initiators, and deletes a redundant SR. PCN-488 Supplement 1 does not introduce any revision in the hardware configuration of the protective circuitry for LOVS, DGVSS or SDVS. The measurement required by the deleted, redundant surveillance is required elsewhere in the TS. For these reasons, PCN-488 Supplement 1 does not create the possibility of any new or different kind of accident from any previously evaluated.

3) Does this amendment request involve a significant reduction in a margin of safety?

No.

PCN-488 Supplement 1 provides allowable values for the acceptance criteria for the TS SR for LOVS, DGVSS and SDVS. As such, the revised values are more limiting than the current values, which represent design limits. Therefore, PCN-488 Supplement 1 does not involve a significant reduction in a margin of safety.

PCN-488 Supplement 1 also revises the TS SR acceptance requirements to delete or revise upper and lower bounds in cases where the deleted bound provides no safety benefit. Deleting or revising bounds having no safety significance does not involve a significant reduction in a margin of safety.

PCN-488 Supplement 1 additionally deletes a redundant SR. Because the deleted surveillance is required elsewhere in the TS, this action does not involve a significant reduction in a margin of safety.

For these reasons, PCN-488 Supplement 1 does not involve a significant reduction in a margin of safety.

Based on the negative responses to these three Commission criteria, SCE concludes that the proposed amendment involves no significant hazards consideration.

**Environmental Consideration:**

Southern California Edison has determined that the proposed TS change 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 10CFR51.22(c)(9).



**ATTACHMENT A**

**EXISTING TECHNICAL SPECIFICATION  
SURVEILLANCE REQUIREMENTS 3.3.7.3 AND 3.3.7.4  
SAN ONOFRE UNIT 2**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.7.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2 Perform CHANNEL FUNCTIONAL TEST.	24 months
<p>SR 3.3.7.3 Perform CHANNEL CALIBRATION with setpoint Allowable Values as follows:</p> <p>a. Degraded Voltage Function <math>\geq 4181</math> V and <math>\leq 4275</math> V</p> <p>SDVSS (Sustained Degraded Grid Voltage):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.8</math> seconds and <math>\leq 2.2</math> seconds.</p> <p>ii. 162D <math>\geq 88</math> seconds and <math>\leq 132</math> seconds.</p> <p>DGVSS (Degraded Grid Voltage with SIAS Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.8</math> seconds and <math>\leq 2.2</math> seconds.</p> <p>ii. 162S <math>\geq 4.11</math> seconds and <math>\leq 4.49</math> seconds.</p> <p>iii. 162T <math>\geq 0.85</math> seconds and <math>\leq 1.65</math> seconds.</p> <p>b. Loss of Voltage Function <math>\geq 3554</math> V and <math>\leq 3796</math> V</p> <p>Time delay: <math>\geq 0.95</math> seconds and <math>\leq 1.05</math> seconds at 0 V.</p>	24 months
SR 3.3.7.4 Verify Response Time of required DG-LOV channel is within 1.05 seconds.	24 months on a STAGGERED TEST BASIS

**ATTACHMENT B**

**EXISTING TECHNICAL SPECIFICATION  
SURVEILLANCE REQUIREMENTS 3.3.7.3 AND 3.3.7.4  
SAN ONOFRE UNIT 3**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.7.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2 Perform CHANNEL FUNCTIONAL TEST.	24 months
<p>SR 3.3.7.3 Perform CHANNEL CALIBRATION with setpoint Allowable Values as follows:</p> <p>a. Degraded Voltage Function <math>\geq 4181</math> V and <math>\leq 4275</math> V</p> <p>SDVSS (Sustained Degraded Grid Voltage):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.8</math> seconds and <math>\leq 2.2</math> seconds.</p> <p>ii. 162D <math>\geq 88</math> seconds and <math>\leq 132</math> seconds.</p> <p>DGVSS (Degraded Grid Voltage with SIAS Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.8</math> seconds and <math>\leq 2.2</math> seconds.</p> <p>ii. 162S <math>\geq 4.11</math> seconds and <math>\leq 4.49</math> seconds.</p> <p>iii. 162T <math>\geq 0.85</math> seconds and <math>\leq 1.65</math> seconds.</p> <p>b. Loss of Voltage Function <math>\geq 3554</math> V and <math>\leq 3796</math> V</p> <p>Time delay: <math>\geq 0.95</math> seconds and <math>\leq 1.05</math> seconds at 0 V.</p>	24 months
SR 3.3.7.4 Verify Response Time of required DG-LOV channel is within 1.05 seconds.	24 months on a STAGGERED TEST BASIS

**ATTACHMENT C**

**PROPOSED TECHNICAL SPECIFICATION  
SURVEILLANCE REQUIREMENTS 3.3.7.3 AND 3.3.7.4  
SAN ONOFRE UNIT 2  
(REDLINE AND STRIKEOUT)**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.7.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2 Perform CHANNEL FUNCTIONAL TEST.	24 months
<p>SR 3.3.7.3 Perform CHANNEL CALIBRATION with setpoint Allowable Values as follows:</p> <p>a. Degraded Voltage Function: <math>\geq 4181</math> V and <math>\leq 4275</math> V</p> <p>i. Dropout <math>\geq 4196</math> V</p> <p>ii. Pickup <math>\leq 4281</math> V</p> <p>SDVSS (Sustained Degraded Grid Voltage Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.8</math> seconds and <math>\leq 2.2</math> 2.17 seconds.</p> <p>ii. 162D <math>\geq 878</math> seconds and <math>\leq 132</math> 128 seconds.</p> <p>DGVSS (Degraded Grid Voltage with SIAS Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.81.83</math> seconds and <math>\leq 2.2</math> 2.17 seconds.</p> <p>ii. 162S <math>\geq 4.114.16</math> seconds and <math>\leq 4.494.44</math> seconds.</p> <p>iii. 162T <math>\geq 0.850.88</math> seconds and <math>\leq 1.651.62</math> seconds.</p> <p>b. Loss of Voltage Function <math>\geq 3554</math> V and <math>\leq 3796</math> V</p> <p>Time delay: <math>\geq 0.975</math> seconds and <math>\leq 1.05</math> seconds at 0 V.</p>	24 months
<p><del>SR 3.3.7.4 Verify Response Time of required DG-LOV channel is within 1.05 seconds.</del></p>	<p><del>24 months on a STAGGERED TEST BASIS</del></p>

**ATTACHMENT D**

**PROPOSED TECHNICAL SPECIFICATION  
SURVEILLANCE REQUIREMENTS 3.3.7.3 AND 3.3.7.4  
SAN ONOFRE UNIT 3  
(REDLINE AND STRIKEOUT)**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.7.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2 Perform CHANNEL FUNCTIONAL TEST.	24 months
<p>SR 3.3.7.3 Perform CHANNEL CALIBRATION with setpoint Allowable Values as follows:</p> <p>a. Degraded Voltage Function: <math>\geq 4181</math> V and <math>\leq 4275</math> V</p> <p>i. Dropout <math>\geq 4196</math> V</p> <p>ii. Pickup <math>\leq 4281</math> V</p> <p>SDVSS (Sustained Degraded Grid Voltage Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.8</math> seconds and <math>\leq 2.2</math> 2.17 seconds.</p> <p>ii. 162D <math>\geq 878</math> seconds and <math>\leq 132</math> 128 seconds.</p> <p>DGVSS (Degraded Grid Voltage with SIAS Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.81.83</math> seconds and <math>\leq 2.2</math> 2.17 seconds.</p> <p>ii. 162S <math>\geq 4.114.16</math> seconds and <math>\leq 4.494.44</math> seconds.</p> <p>iii. 162T <math>\geq 0.850.88</math> seconds and <math>\leq 1.651.62</math> seconds.</p> <p>b. Loss of Voltage Function <math>\geq 3554</math> V and <math>\leq 3796</math> V</p> <p>Time delay: <math>\geq 0.975</math> seconds and <math>\leq 1.05</math> seconds at 0 V.</p>	24 months
<p><del>SR 3.3.7.4 Verify Response Time of required DG-LOV channel is within 1.05 seconds.</del></p>	<p><del>24 months on a STAGGERED TEST BASIS</del></p>



**ATTACHMENT E**

**PROPOSED TECHNICAL SPECIFICATION  
SURVEILLANCE REQUIREMENT 3.3.7.3  
SAN ONOFRE UNIT 2**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.7.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2 Perform CHANNEL FUNCTIONAL TEST.	24 months
<p>SR 3.3.7.3 Perform CHANNEL CALIBRATION with setpoint Allowable Values as follows:</p> <p>a. Degraded Voltage Function:</p> <p>i. Dropout <math>\geq 4196</math> V</p> <p>ii. Pickup <math>\leq 4281</math> V</p> <p>SDVS (Sustained Degraded Grid Voltage Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\leq 2.17</math> seconds.</p> <p>ii. 162D <math>\geq 78</math> seconds and <math>\leq 128</math> seconds.</p> <p>DGVSS (Degraded Grid Voltage with SIAS Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.83</math> seconds and <math>\leq 2.17</math> seconds.</p> <p>ii. 162S <math>\geq 4.16</math> seconds and <math>\leq 4.44</math> seconds.</p> <p>iii. 162T <math>\geq 0.88</math> seconds and <math>\leq 1.62</math> seconds.</p> <p>b. Loss of Voltage Function <math>\geq 3554</math> V and <math>\leq 3796</math> V</p> <p>Time delay: <math>\geq 0.75</math> seconds and <math>\leq 1.0</math> seconds at 0 V.</p>	24 months

**ATTACHMENT F**

**PROPOSED TECHNICAL SPECIFICATION  
SURVEILLANCE REQUIREMENT 3.3.7.3  
SAN ONOFRE UNIT 3**

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.7.1 Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2 Perform CHANNEL FUNCTIONAL TEST.	24 months
<p>SR 3.3.7.3 Perform CHANNEL CALIBRATION with setpoint Allowable Values as follows:</p> <p>a. Degraded Voltage Function:</p> <p>i. Dropout <math>\geq 4196</math> V</p> <p>ii. Pickup <math>\leq 4281</math> V</p> <p>SDVS (Sustained Degraded Grid Voltage Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\leq 2.17</math> seconds.</p> <p>ii. 162D <math>\geq 78</math> seconds and <math>\leq 128</math> seconds.</p> <p>DGVSS (Degraded Grid Voltage with SIAS Signal):</p> <p>Time delay:</p> <p>i. 127D <math>\geq 1.83</math> seconds and <math>\leq 2.17</math> seconds.</p> <p>ii. 162S <math>\geq 4.16</math> seconds and <math>\leq 4.44</math> seconds.</p> <p>iii. 162T <math>\geq 0.88</math> seconds and <math>\leq 1.62</math> seconds.</p> <p>b. Loss of Voltage Function <math>\geq 3554</math> V and <math>\leq 3796</math> V</p> <p>Time delay: <math>\geq 0.75</math> seconds and <math>\leq 1.0</math> seconds at 0 V.</p>	24 months

**ATTACHMENT G**

**ENGINEERING CALCULATION**

**E4C-098**

**CALCULATION CHANGE NOTICE 28**

**4 KV SWITCHGEAR PROTECTIVE RELAY SETTING CALCULATION**

**SAN ONOFRE UNITS 2 AND 3**

<b>Southern California Edison Company</b> <b>INTERIM CALCULATION CHANGE</b> <b>NOTICE (ICCN)/ CALCULATION</b> <b>CHANGE NOTICE (CCN)</b> <b>COVER PAGE</b> <b>SUMMARY CHANGE</b> <input checked="" type="radio"/> NO <input type="radio"/> YES	CALC. NO. <b>E4C-098</b>		ICCN NO./ PRELIM. CCN NO. <b>N-18</b>	PAGE <b>1</b>	TOTAL NO. OF PAGES <b>5</b>
	BASE CALC. REV. <b>1</b>	UNIT <b>2 &amp; 3</b>	CCN CONVERSION : CCN NO. <b>CCN- 28</b>		CALC. REV. <b>1</b>
	CALCULATION SUBJECT : <b>4 KV SWITCHGEAR PROTECTIVE RELAY SETTING CALCULATION</b>				
	ENGINEERING SYSTEM NUMBER / PRIMARY STATION SYSTEM DESIGNATOR <b>1804 / PBA/PBB</b>				Q-CLASS <b>II</b>
CALCULATION CROSS-INDEX <input checked="" type="checkbox"/> New/Updated index included <input type="checkbox"/> Existing index is complete	CONTROLLED PROGRAM OR DATABASE ACCORDING TO <b>SO123-XXIV-5.1</b>		PROGRAM / DATABASE NAME (S) <input type="checkbox"/> ALSO, LISTED BELOW	VERSION/RELEASE NO.(S)	
Site Programs/Procedure Impact? <input checked="" type="radio"/> NO <input type="radio"/> YES, AR No. _____	<input type="checkbox"/> PROGRAM <input type="checkbox"/> DATA BASE				

# **1. BRIEF DESCRIPTION OF ICCN / CCN:**

This CCN revises Technical Specification Surveillance Requirements of the setpoints evaluated in CCN 25 to base calculation E4C-098 to support Proposed Change Number (PCN) 488 to SR 3.3.7.3 & SR 3.3.7.4 of Units 2&3 Technical Specifications by adding lower time limit for 162D & 127F relays, and upper voltage limit of 127F relays.

The lower limit of relay 162D is not performing safety function but it is chosen to be greater than the design basis event complete loading sequence time to avoid interruption in the sequencing and unnecessarily challenge the safety equipment. Also added the upper voltage limit of 127F relays for proper relay operation surveillance and LOVS reset.

INITIATING DOCUMENT (DCP, FCN, OTHER) PCN-488 to Units 2 & 3 Tech Spec REV. \_\_\_\_\_

## **2. OTHER AFFECTED DOCUMENTS (CHECK AS APPLICABLE FOR CCN ONLY):**

☐ YES ☒ NO OTHER AFFECTED DOCUMENTS EXIST AND ARE IDENTIFIED ON ATTACHED FORM 26-503.

## **3. APPROVAL :**

DISCIPLINE / ESC : NEDO/Electrical

K. Hara 6/16/00  
 ORIGINATOR (Print name/sign/date)

James C. Winslow 6/16/00  
 FLS (Signature/date)

OTHER (Signature/date)

J. Kim 6/16/00  
 IRE (Print name/sign/date)

OTHER (Signature/date)

OTHER (Signature/date)

## **4. CONVERSION TO CCN DATE**

6-16-00

Cathleen Morrison  
 SCE CDM - SONGS

# CALCULATION CROSS-INDEX

ICCN NO./ PRELIM. CCN NO. N-18	PAGE <u>2</u> OF <u>5</u>
CCN CONVERSION: CCN NO. CCN- <u>28</u>	

Calculation No. E4C-098

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

Calc. rev. number and responsible FLS initials and date	INPUTS These interfacing calculations and/or documents provide input to the subject calculation and if revised may require revision of the subject calculation.		OUTPUTS Results and conclusions of the subject calculation are used in these interfacing calculations and/or documents.		Does the out- put interface calc/ document require change?	Identify output interface calc/document CCN, DCN, TCN/Rev., FIDCN, or tracking number.
	Calc / Document No.	Rev. No.	Calc / Document No.	Rev. No.	YES / NO	
1 <i>Jan</i> <i>6/16/00</i>			Tech Spec. Unit 2	127	Yes	PCN-488
			Tech Spec. Unit 3	116	Yes	PCN-488

SCE 26-424 REV. 3 8/99 [REFERENCE: SP123-XXIV-7.15]

# E&TS DEPARTMENT CALCULATION SHEET

ICCN NO. / PRELIM. CCN NO. <b>N-18</b>	PAGE <u>3</u> OF <u>5</u>
CCN CONVERSION: CCN NO. CCN - <b>28</b>	

Project or DCP/FCN UNITS 2 & 3 Calc No. E4C-098

Subject 4 KV SWITCHGEAR PROTECTIVE RELAY SETTING CALCULATION Sheet      of     

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR
	Kali Hara		Joon Kim							
<div style="margin-bottom: 20px;"> <b>1. PURPOSE</b>             This CCN revises Technical Specification Surveillance Requirements of the setpoints evaluated in CCN 25 to base calculation E4C-098 for the following items to support Proposed Change Number (PCN) 488 to SR 3.3.7.3 &amp; SR 3.3.7.4 of Units 2&amp;3 Technical Specifications:         </div> <div> <ul style="list-style-type: none"> <li>■ Loss of voltage relays (127F-1, 127F-2, 127F-3, &amp; 127F-4)</li> <li>■ Time delay relays (162D)</li> </ul> </div>										



# E&TS DEPARTMENT CALCULATION SHEET

ICCN NO. / PRELIM. CCN NO. <b>N-18</b>	PAGE <b>4</b> OF <b>5</b>
CCN CONVERSION: CCN NO. CCN - <b>28</b>	

Project or DCP/FCN UNITS 2 & 3 Calc No. E4C-098

Subject 4 KV SWITCHGEAR PROTECTIVE RELAY SETTING CALCULATION Sheet      of     

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR
	Kali Hara		Joon Kim							

## 2. RESULTS/CONCLUSIONS and RECOMMENDATIONS

2.1 Results (See CCN 25)

2.2 Recommendations

2.2.1 Revise Surveillance Requirements of Technical Specification section 3.3.7 as follows:

Section	Existing Allowable Values	Recommended Allowable Values
SR 3.3.7.3. a	Degraded Voltage Function $\geq 4181$ V and $\leq 4275$ V	Degraded Voltage Function (127D): i. Dropout $\geq 4196$ V (Note 1) ii. Pickup $\leq 4281$ V (Note 2)
	SDVSS (Sustained Degraded Grid Voltage): Time delay: i. 127D $\geq 1.8$ seconds and $\leq 2.2$ seconds ii. 162D $\geq 88$ seconds and $\leq 132$ seconds	SDVSS (Sustained Degraded Grid Voltage): Time delay: i. 127D $\geq 2.17$ seconds (Note 3) ii. 162D $\geq 78$ seconds and $\leq 128$ seconds (Note 5) *
	DGVSS (Degraded Grid Voltage with SIAS Signal): Time delay: i. 127D $\geq 1.8$ seconds and $\leq 2.2$ seconds ii. 162S $\geq 4.11$ seconds and $\leq 4.49$ seconds iii. 162T $\geq 0.85$ seconds and $\leq 1.65$ seconds	DGVSS (Degraded Grid Voltage with SIAS): Time delay: i. 127D $\geq 1.83$ seconds and $\leq 2.17$ seconds ii. 162S $\geq 4.16$ seconds and $\leq 4.44$ seconds iii. 162T $\geq 0.88$ seconds and $\leq 1.62$ seconds
SR 3.3.7.3. b	Loss of Voltage Function $\geq 3554$ V and $\geq 3796$ V  Time delay: $\geq 0.95$ seconds and $\leq 1.05$ seconds at 0 V	Loss of Voltage Function (127F-1) $\geq 3554$ V and $\geq 3796$ V (Note 6) *  Time delay: $\geq 0.75$ seconds and $\leq 1.0$ seconds at 0 V (Note 4) *
SR 3.3.7.4 (Note)	Verify Response Time of required DG-LOV channel is within 1.05 seconds.	Deleted

\* Revised value from the value in CCN 25 to E4C-098 (Added lower time limit for 162D & 127F relays, and upper voltage limit of 127F relays).

### Notes:

1. Surveillance of the lower limit of the dropout voltage is important to safety because the operation of the degraded voltage relay at the setpoint ensures the protection of electrical equipment from low operating voltage.
2. Surveillance of the upper limit of the pickup voltage is required to verify that the relay will reset at the minimum bus voltage of 4297 V.
3. Surveillance of the upper limit of the time delay is required as it is important to safety. The lower limit is not performing safety function

**E&TS DEPARTMENT  
CALCULATION SHEET**

ICCN NO./	PAGE <u>5</u> OF <u>5</u>
PRELIM. CCN NO. <b>N-18</b>	
CCN CONVERSION:	
CCN NO. CCN -	<u>28</u>

Project or DCP/FCN UNITS 2 & 3 Calc No. E4C-098

Subject 4 KV SWITCHGEAR PROTECTIVE RELAY SETTING CALCULATION Sheet      of     

REV	ORIGINATOR	DATE	IRE	DATE	REV	ORIGINATOR	DATE	IRE	DATE	REV INDICATOR
	Kali Hara		Joon Kim							
<p>4. Time dial of CV-2 relay should be adjusted such that the time delay of the entire LOVS channel up to and including 127F-1X3 and 127F-1X/127F-1X2 is within this time range. A LOVS channel consists of relay 127F-1 and auxiliary relays 127F-1X3 and 127F-1X1/127F-1X2 in series. This timing requirement also applies to the LOVS channels associated with relays 127F-2, 127F-3, and 127F-4. This is the time to go from nominal voltage to zero (120 V to 0 V).</p> <p>5. Surveillance of the upper limit of the time delay is required as it is important to safety. The lower limit is not performing safety function but it is chosen to be greater than the design basis event complete loading sequence time to avoid interruption in the sequencing and unnecessarily challenge the safety equipment.</p> <p>6. Surveillance of the lower limit of the dropout voltage is important to safety because the operation of the undervoltage relay at the setpoint ensures the protection of electrical equipment from low operating voltage. Surveillance of the upper limit ensures that the relays reset above this limit for LOVS reset. This also applies to relays 127F-2, 127F-3, &amp; 127F-4.</p>										